

MOTOR THEORY OF LEARNING

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This study investigates the possible differences between learning English pseudowords that are presented with or without handwriting movements. Based on the previous literature showing the learning benefits of handwriting vs. reading new words--and neurophysiological evidence that suggests a system of neurons (mirror neuron system) can encode observed actions and elicit analogous motor responses in the observer--it is hypothesized that pseudoword learning will be facilitated when they are presented with handwriting movements. To this end, during a learning phase, pseudowords were visually presented. Following the learning phase, participants performed a recall phase consisting of a forced-choice task on statically presented pseudowords. Half of the pseudowords were new, while the other half consisted of an equal number of pseudowords presented in a handwritten or static way during the learning phase. EEG was recorded during both learning and recall phases. Measurement of EEG mu suppression was used as an index of mirror neuron activity during the learning phase. A cluster-randomization procedure was used to compare changes in Mu suppression during Handwritten and Static conditions. It was predicted that handwritten pseudowords would elicit larger Mu suppression than Static pseudowords. During the recall phase, learning was assessed using behavioral data on the forced-choice task, as well as the N400 component as an index of word familiarity.

HIP-HOP: A SURVEY OF TRADITIONAL PRODUCTION PRACTICES AND THE APPLICATION OF CONTEMPORARY TECHNIQUES THROUGH LONG-DISTANCE COLLABORATION

Matt Leigh, Graduate Student, Recording Industry; Michael Fleming (Faculty Sponsor), Recording Industry

Hip-hop music has progressed through many different stages since its humble beginnings in the early 1970s. Current trends in the industry have established standards for hip-hop production that rely heavily on programmed grooves using samples, virtual instruments or software-based synthesizers, and highly processed mixes. This project aims to create commercially viable hip-hop productions employing many of the current industry practices as well as developing newly learned skills. Extensive research will be conducted on the developmental production history up through modern practices and techniques by examining academic literature, trade articles, and musical examples. Approximately 6 songs will be crafted through the use of sound libraries, the creation of original samples, and live instrumentation using techniques that are common in current hip-hop productions. The conclusion of the project will yield a commercial, hip-hop EP that will be released on a large scale. In addition, a paper describing the research, production process, and results will also be included.

CHECKING OUT LANGUAGE: USING CORPORA TO LOOK UP PHRASAL VERBS IN FRESHMAN COMPOSITION

Clint Bryan, Graduate Student, English; Mohammed Albakry (Faculty Sponsor), English

Corpus linguistics—using specialized computer software and large collections of texts to identify patterns, frequencies, and collocations of words in English—has begun to gain significant pedagogical attention—especially for the authenticity of examples compared to contrived textbook models (Reppen 2010, Gabrielatos 2006). Few composition scholars, however, have yet to seize the educational opportunities afforded by these technologies in their classrooms. One promising area for descriptive English usage instruction involves phrasal verbs (idiomatic and otherwise) such as “check out,” “turn in,” and “look up.” Phrasal verbs (verb + particle[s]) have captured the attention of English-as-a-second-language (ESL) instructors for their difficulty in teaching and decoding (Armstrong, 2004; Pye 1996). Native English speakers, however, have received little scholarly attention in how they utilize phrasal verb forms in their own writing—especially in first-year composition (FYC). Phrasal verb usage intersects with student writing concerns when students attempt to adapt their discursive style to suit the formal register of academic papers. Using the work of Dempsey et al. (2007) on text genres indexed by phrasal verb usage as a framework, this research explores the usefulness of the online Corpus of Contemporary American English (COCA) of 450 million words in various registers (spoken, academic, newspaper, magazine, and fiction) for identifying style markers to suit the audience and level of formality of the discourse. Students in an introductory MTSU English composition course used COCA software to locate phrasal verbs in more informal discourse examples, mapped various semantic meanings, compared these forms with one-word formalized equivalents in the academic subset of the corpus, and reflected on the implications for writing in a style suited to audience, genre, and purpose. This study adds to the body of knowledge on stylistic variation in freshman composition by offering a pedagogical tool other instructors can employ in their classrooms to raise student awareness of phrasal verbs.

**WISDOM IN WORDS: ONE SCHOOL'S JOURNEY WITH VOCABULARY AND
ADULT ENGLISH LANGUAGE LEARNERS**

Jonathan Murray, Graduate Student, Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

Vocabulary instruction is a subject of hot debate. How can we continue to help our English Language Learners (ELLs) learn, acquire, and retain vocabulary? What methods can we use in this venture? The use of computers to aid instruction is helpful and provides limitless opportunities to enrich the learning experience for adult English learners. New Media, including computers, may help overcome the often-daunting task of learning new vocabulary. This study seeks to combine effective strategies, a sound background of pedagogy, and new media in order to accomplish these goals.

ADDING INSTRUCTIONAL ACCOMMODATIONS TO INCREASE COMPREHENSIBLE INPUT

Erin Cathey, Graduate Student, Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

For teachers in today's age of diversity, it is more important than ever that we tailor our teaching styles to the many different learning styles that exist and try to reach as many students as possible. This is not a new idea and is actually based in the 1974 Supreme Court ruling *Lau vs. Nichols*, which states that, "Equality of educational opportunity is not achieved by merely providing all students with "the same facilities, textbooks, teachers, and curriculum; students who do not understand English are effectively foreclosed from any meaningful education" (TN.gov, 2011). Much research has been conducted into the most effective ways to achieve this "equality of education." Stephen Krashen's (1998) theory of Comprehensible Input and language acquisition for English learners is one such set of principles that helps to guide and further research in the field and is therefore the main premise for this study, which followed a qualitative design through narrative inquiry as it examined the following questions: 1) What are the most effective instructional accommodation strategies teachers can add to enhance their lessons and make the content more comprehensible to English Language Learners (ELLs)? 2) What information may be gathered from the study that will assist other teachers in improving instructional practice? The subject population for this study was a set of first-year teachers employed at Harris Middle School. Data was collected from pre- and post-study interview questions and from teacher-created lesson plans.

GROWING WITH WORDS: EXPLICIT VOCABULARY INSTRUCTION WITH PRE-KINDERGARTEN ENGLISH LANGUAGE LEARNERS

Christina Ontiveros, Graduate Student, Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

As the number of English language learners (ELLs) entering public school pre-kindergarten (prek) classrooms increases, educators are faced with preparing this at-risk student population for a successful transition to an academically-focused kindergarten environment. ELLs are often considered an at-risk population of students and transition to kindergarten behind their peers in the school readiness skills necessary for academic success. This action research study examines using game-based explicit vocabulary interventions with seven pre-K ELLs in a rural school setting. The aim of the study is to identify ways to increase the school readiness of ELLs related to social competence. Social competence includes a student's ability to follow school routines, understand directions, and complete typical student tasks based on teacher instructions. Data sets consist of the researcher's observations of students, the researcher's field notes, and student work artifacts. The study is currently in progress and will be complete prior to the Scholars Day presentation.

RESEARCH, ANALYSIS, PRODUCTION: ELECTRONIC DANCE MUSIC (EDM)

Rick Ross, Graduate Student, Masters Recording Arts and Technologies; Joseph Akins (Faculty Sponsor), Recording Industry

This study focused on Electronic Dance Music (EDM) Production Techniques by examining four different genres: a) Trance, b) House, c) Dubstep, d) Drum and Bass. The study included research and analysis of one production from each genre including style, technique, creative process, hardware, software, signal processing utilized, and commercial success. Criteria for evolving technologies and newly developed hardware and software in electronic music production were involved in addition to artistic use of recording and signal processing techniques found in electronic dance music.

AN EXAMINATION OF EFFECTIVE PROCESSES FOR GUEST OUTREACH IN COLLEGE MINISTRY

Keely Pennington, Graduate Student, Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

College ministry is a unique atmosphere for young adults to get connected to the local church and to grow in their faith. It also provides a place in the church for them to find belonging with their peers. However, this is not possible without an effective process to reach out to those visiting the church. This action study uses a qualitative stance and will follow the Narrative Inquiry Approach to qualitative research. New Vision Baptist church has a college ministry, The Point, that gathers on Tuesday nights for worship and fellowship. This study explores and examines the following: 1) most effective marketing strategy to engage first time guests, 2) strategies that are most effective for follow up and repeat visits, and 3) information that will help improve outreach plans. The participants that will be interviewed in this study will be between the ages of 18-25 and will have attended The Point for at least one month in order to provide beneficial feedback as a first time visitor. The information gleaned from this study will provide further insight on more effective processes for first time visitors.

INDEPENDENT FILM SOUND ON A MICROBUDGET

Miranda Megill, Graduate Student, Recording Industry; Susan Noguez, Graduate Student, Recording Industry; Cosette Collier (Faculty Sponsor), Recording Industry

This project involves the creation of a feature film on a micro-budget using generally available prosumer tools. It aims to prove that a high-quality, commercially competitive product can be generated with minimum capital investment if appropriate research, planning, and execution occur. Particular emphasis has been paid to preliminary analysis-based location audio recording, production sound recording, post-production sound re-recording, design, and mixing, and music placement and licensing. The project has been completed in four phases: development, wherein a story, script, and budget were created, pre-production during which casting, scheduling, and location selections took place, principal photography, when the bulk of the media required to assemble the film was generated, and post-production when video editing, sound design, and color correction happened. Once complete, the work will be disseminated through film festivals both domestically and internationally. Acceptance and inclusion in these festivals along with a positive audience response to the viewing experience will support our thesis.

CREATING A PERCUSSIVE BENCHMARK: A STUDY INTO CLASSICAL PERCUSSION'S MOST INFLUENTIAL PIECES, RELATED REFERENCE RECORDINGS, AND THE PROCESS OF CREATING TECHNICALLY SUPERIOR MODERN DAY REFERENCES

Alex Harmon, Graduate Student, Recording Industry; Michael Fleming (Faculty Sponsor), Recording Industry

Creating a Percussive Benchmark is a multidisciplinary study that will span the fields of both classical percussion performance as well as audio engineering. The study will occur in multiple phases. The first two phases includes a formal polling of a wide test group containing some of the most revered performers, clinicians, instructors, and professors in the percussion community. Initially they will be asked to provide what they consider to be the most influential works written for the genre divided by the art's multiple periods. These results will be gathered and further revised to exclude pieces that are not logistically able to be performed or do not have overwhelming support from the others polled. The revised results will again be distributed to the test pool asking for their reference recordings of each of the remaining pieces. Phase three will involve analyzing these recordings to distinguish common threads and determine what the most important considerations are to the professionals polled. An example of the considerations could include: performance, instrument choice, interpretation, sound stage, direct to reverberant ratio, acoustical space, clarity, depth, etc. Phase four will involve picking pieces to be performed in a standard concert setting with an archival recording technique. They will also be performed in a recording session where close microphones and multiple techniques will be utilized. The purpose of these sessions is to create new reference recordings that are of superior quality based upon knowledge acquired throughout study conducted in phase three. The final phase will be the authoring of an article that will include the findings of my research, recording techniques, and other various observations to be submitted for publication in Percussive Notes, the monthly publication of the Percussive Arts Society. Also, the recordings will be made available with the publication to support my findings.

INNOVATIVE UNDERGRADUATE RESEARCH AND DEVELOPMENT IN THE EXPERIMENTAL VEHICLES PROGRAM

David O'Brien, Graduate Student, Engineering Technology; Saeed Foroudastan, Faculty, Engineering Technology; Saeed Foroudastan (Faculty Sponsor), College of Basic and Applied Sciences

Housed in the Department of Engineering Technology, the Experimental Vehicles Program (EVP) provides a student-driven, interdisciplinary, hands-on learning experience that is open to all students attending Middle Tennessee State University. Initiated in 2004, EVP is composed of four project teams--Baja SAE, Formula SAE, Moonbuggy NASA, and Solarboat ASME--which are designed, crafted, and led by students. Members are provided the opportunity to learn every aspect of product design. Each project is tasked with development, research, design, fabrication, safety considerations, writing of technical and cost reports, business, marketing, accounting, and leadership involved in prototype vehicle design in accordance to the rules provided by each oversight organization. Students fabricate in-house 80-90% of vehicle components, including vehicle frame and space-age carbon fiber composites. EVP membership allows students to develop or enhance technical skills and develop soft skills within the context of an educational atmosphere that provides students with an excellent opportunity to build their resumé while still in school.

TEACHERS' PERCEPTIONS OF THEIR PREPARATION BASED ON THEIR PARTICIPATION IN AN ALTERNATIVE INITIAL LICENSURE PROGRAM

Sarah Aldridge, Graduate Student, Psychology; James Rust, Faculty, Psychology; Tracey Huddleston, Faculty, Education; James Rust (Faculty Sponsor), Psychology

Research comparing the preparation of teachers from traditional education programs to that of teachers from alternative licensure programs has traditionally resulted in no significant difference (e.g., Houston, Marshall, & McDavid, 1993; Thompson, 2003; Wayman, Foster, Mantle-Bromley, & Wilson, 2003). The purpose of the current study was to identify participants' perception of their preparation to teach. Graduates of the Initial Licensure Program of Middle Tennessee State University (MTSU) and graduate students currently enrolled in the MTSU traditional master's program were surveyed. The researcher created a survey based on the current Tennessee Educator Acceleration Model evaluation system. Independent sample t tests showed a significant difference between teachers who graduated from the Initial Licensure Program and teachers currently enrolled in the traditional master's program, $t(64) = -2.77$, $p = .007$, two tailed. The researcher concluded that the Initial Licensure Program shows promise as an effective way to train teachers.

AN INTEGRATED APPROACH TO AN INTENSIVE INDIVIDUALIZED SUMMER READING PROGRAM

Meredith Guiffre, Graduate Student, Psychology; Aimee Holt, Faculty, Psychology; James Rust, Faculty, Psychology; James Rust (Faculty Sponsor), Psychology

The present case study examined the effectiveness of an integrated summer reading program with a student at risk for reading failure. The researcher utilized best practices and a single-subject, multi-element design in order to identify and remediate the reading problem using two different intervention phases. The first phase focused on phonemic awareness and phonics instruction, while the second intervention phase added a motivational intervention. Additionally, the author used reading pseudowords to measure generalization. The author used a Response to Intervention (RTI) framework to inform instruction. Likewise, the author employed qualitative and quantitative data analysis to analyze the effects of the integrated intervention and used g-indices and percentage of nonoverlapping data points. The study found positive effects in two measures of phonemic awareness and two measures of phonics. A positive generalization effect also was observed in pseudoword reading. At times, the student resisted the intervention and did not respond, even with the implementation of the motivational intervention. The author concluded with suggestions for future research.

DEVELOPMENT OF SCENARIOS TO BE USED IN A FUTURE STUDY OF
HOSTILE ATTRIBUTION BIAS TOWARD TEACHERS BY AGGRESSIVE VS.
NON-AGGRESSIVE CHILDREN

Dana Hood, Graduate Student, Psychology- School Psychology; Monica Wallace
(Faculty Sponsor), Psychology - School Psychology

Research by Dodge and colleagues (e.g., Dodge & Frame, 1982) indicated that aggressive children often misinterpret peers' intentions as hostile when presented with ambiguous situations. This is referred to as a hostile attribution bias. Thesis research by Bryant (2011) indicated that aggressive children do not show a hostile attribution bias when interpreting ambiguous teacher intentions. However, Bryant noted that some scenarios she used did not depict the teacher's intentions as clearly as expected. The purpose of the current study was to improve Bryant's original scenarios through a multiple step validation process. Three focus groups were used to improve the scenarios prior to college students completing a validation questionnaire. Six out of the 6 situations received high enough ratings (i.e., 80% agreement among raters) from 18 participants to be included in future research. Thus, as predicted, the scenario validation procedures used in the current research resulted in higher validation ratings.

FALLING THROUGH THE CRACKS: BIAS TOWARDS ADMISSION OF CHILDREN WITH PROBLEM BEHAVIOR INTO SPECIAL EDUCATION

Kaitlin Krupla, Graduate Student, Psychology; James Rust, Faculty, Psychology; Seth Marshall, Faculty, Psychology; James Rust (Faculty Sponsor), Psychology

Disproportionality in special education is an important topic that has been a problem for decades (Hosp & Reschly, 2002). There are many factors that contribute to disproportionality, including the evaluation process (Donovan & Cross, 2002; Hobbs, 1975; Mercer, 1973). This study examined recent archival data at a middle school for the presence of disproportionality. It was hypothesized that students who had behavior problems, minority status, economic disadvantage, and were male would have higher representation in special education compared to peers. It also was hypothesized that there would be significant relationships between achievement scores and discipline problems. Using 545 student participants, chi-square analyses found a significant difference by gender and special education placement, $\chi^2(1) = 5.320$, $p = 0.021$, $c = 0.098$. Additionally, correlations demonstrated that achievement scores were negatively related to office discipline referrals, $r(543) = -0.224$.

RETURNS TO POST-INCARCERATION EDUCATION FOR FORMER PRISONERS

Christian Brown, Graduate Student, Economics and Finance; Charles Baum (Faculty Sponsor), Economics and Finance

The returns to education for individuals who attain education after an incarceration spell were estimated using incarceration, education, employment, and earnings histories drawn from the National Longitudinal Survey of Youth 1979. Results from regression and matching techniques suggest a positive relationship between post-incarceration education and labor supply, especially for college completion. High school completion appears to benefit labor market outcomes in similar magnitudes as college completion when decomposed into diploma and equivalency certification (such as the GED). Mixed evidence is found for a post-incarceration college completion wage premium.

DIRECT SPACE RECONSTRUCTION OF ELECTRON DENSITY

Robert Michael, Graduate Student, Computational Science; Tibor Koritsanszky (Faculty Sponsor), Chemistry

Given an *ab initio* expression of a molecular wavefunction, it is possible to describe the electron density of a molecule via a fuzzy partitioning scheme [1] in direct space. In this way the molecular electron density can be described by the sum of atomic densities, each of which is centered at a nucleus.

The multipole expansion [2] lends itself to the description of each atomic density by the sum over ($l = 0, L$) and ($m = -l, l$) of a Radial Density Function (RDF) which is in terms of only 'r' (the distance away from the given atom) multiplied by density normalized spherical harmonics [3] which are terms of phi and theta - the angular parts.

Each RDF is described by a set of numerical values defined on a radial grid (found via the fuzzy partitioning) and, secondly, by a sum of analytic functions fitted to those values. We find that the inclusion of higher order numerical RDFs results in a much more accurate description of the density, and we wish to manifest this accuracy in the analytic model as well.

We separate the error from the analytic model into both the error from using a finite set of RDFs and from the inability to perfectly fit the analytic functions to the numerical RDFs. We measure accuracy by analysis of critical points and ability to reconstruct the Laplacian.

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RESPONSE TO INTERVENTION (RtI) AND ITS RELATIONSHIP TO SCHOOL PSYCHOLOGISTS' JOB SATISFACTION

Whitney Wrenn, Graduate Student, Psychology-School Psychology; Monica Wallace (Faculty Sponsor), Psychology

Job satisfaction research has found to be positively correlated with expanded role (Huebner, 1993 and Levinson, 1990). Canter (2006) described how the implementation of Response to Intervention (RtI) would expand the role of school psychologists. The purpose of the current study was to survey ratings of job satisfaction and RtI involvement among Tennessee school psychologists. It was the belief of the researcher that school psychologists who are more satisfied with their job will be more involved with RtI. The survey consisted of a Job Satisfaction (Reschly & Wilson, 1995) and RtI Survey that was created by the researcher based on a National Association of School Psychologist (NASP) document regarding role expansion and RtI (NASP, 2006). The survey was completed by 126 Tennessee school psychologists. The ANOVA showed no significant difference between school psychologists of different job satisfaction levels and their RtI involvement, $F(3,112) = 1.99, p = 0.1197$.

MONO- AND DIGALACTOSYLDIACYLGLYCEROL COMPOSITION OF THE MARENINE-PRODUCING DIATOM, *HASLEA OSTREARIA*: COMPARISON TO A SELECTION OF PENNATE AND CENTRIC DIATOMS

Josh Dodson, Graduate Student, Biology; Jeff Leblond (Faculty Sponsor), Biology

Diatoms are one of the largest groups of primary producers in the oceans, yet despite their environmental importance, little is known about their plastidial lipid biochemistry. Previously, Yan et al. (2011) found *Skeletonema* species to contain primarily C16/C16 and C20/C16 forms of mono- and digalactosyldiacylglycerol (MGDG and DGDG, respectively). Likewise, Yongmanitchai and Ward (1993) found *Phaeodactylum tricorutum* to contain primarily C16/C16 and C20/C20 forms of MGDG and DGDG. We seek to relate their studies to other diatoms, both in the centrics and pennates, with particular focus on the marenine-producing pennate diatom, *Haslea ostrearia*. To this end, the composition and positional distribution of fatty acids of MGDG and DGDG were examined using positive-ion electrospray/mass spectrometry (ESI/MS). Two centric diatoms, *Skeletonema marinoi* and *Thalassiosira weissflogii*, and the pennate diatom, *P. tricorutum*, contained primarily C20/C16 (sn-1/sn-2) and C18/C16 forms of MGDG and DGDG. The other pennate diatoms, *H. ostrearia* and *Navicula perminuta*, contained primarily C18/C16 or C18/C18 forms of MGDG and DGDG, indicating a previously unrecognized fatty acid diversity in diatom MGDG and DGDG.

EFFECTS OF 75% VERSUS 150% FLUID REPLACEMENT ON SUBSEQUENT MORNING HYDRATION STATUS AND 10-KM RUNNING PERFORMANCE

Brett Davis, Graduate Student, MTSU Health and Human Performance; Lauren Thigpen, Graduate Student, University of North Alabama; Jerrod Hornsby, Graduate Student, University of Alabama; Caitlin Stenenson, Undergraduate, University of North Alabama; Pattie Lane Riethmaier, Graduate Student, University of North Alabama; Matt Green, Professor, University of North Alabama; Eric O'Neal, Professor, University of North Alabama; Jennifer Caputo (Faculty Sponsor), Health and Human Performance

This study examined the effects of fluid replacement volume between running bouts. Following a moderate intensity 75-minute evening run (WBGT = ~ 27 °C), runners (men = 11, women = 2; age = 37 ± 12 y; $VO_{2max} = 63.3 \pm 4.5$ ml/kg/min) replaced 75% (1637 ± 372 mL) or 150% (3099 ± 850 mL) of sweat losses with a combination of water, sport beverage, and orange juice while consuming a standardized dinner and breakfast. The following morning, runners completed a 10-km time trial (WBGT = ~ 23 °C) by running 2 laps on a rigorous 5-km course. Urine voids were collected between runs, and urine specific gravity (USG) was assessed pre-run. High and low fluid replacement volumes resulted in a significant difference ($P = 0.02$) in pre-run body weight (75% = 69.6 ± 9.2 ; 150% = 70.1 ± 9.3 kg) and USG (75% = 1.026 ± 0.005 ; 150% = 1.014 ± 0.007 ; $P < 0.001$). Heart rate (168 ± 14 vs. 168 ± 12 bpm) and intestinal temperature were not significantly different ($P > 0.05$) between treatments (pre-run = 37.10 ± 0.43 vs. 37.08 ± 0.25 ; post-run = 39.08 ± 0.52 vs. 39.00 ± 0.70 °C) for 75% and 150% respectively. Despite finishing $2.9 \pm 2.5\%$ faster (75% = 47.28 ± 6.64 ; 150% = 45.93 ± 6.04 min; $P = 0.001$), session RPE was lower ($P = 0.02$) for 150% (7.5 ± 1.3) versus 75% (8.4 ± 0.9) trials. Fluid replacement equaling 75% of sweat loss is inadequate to maintain optimal running performance between an evening and morning run in the heat. However, copious urine production and reported difficulties in consuming 150% of sweat losses suggests an alternate fluid intake prescription below 150% may be ideal and practical.

PSYCHOMETRIC EVALUATION OF THE STANDARDIZED ASSESSMENT OF CONCUSSION ITEMS IN HIGH SCHOOL STUDENT-ATHLETES

Joshua Haley, Graduate Student, Health and Human Performance; Minsoo Kang, Faculty, Health and Human Performance; Minsoo Kang (Faculty Sponsor), Health and Human Performance

Context: The Standardized Assessment of Concussion (SAC) is a concussion screening tool used to identify concussions by comparing a baseline score with a post-injury score. Previous studies examined the validity and reliability of the SAC test; however, item analysis that evaluates the psychometric properties (i.e., item difficulty and discrimination) of each item has not been examined in high school student-athletes. **Objective:** The purpose of this study was to perform an item analysis on the SAC to examine its validity as a baseline measurement for use in high school student-athletes. **Participants:** One hundred forty-two high school student-athletes with no history of concussion within the previous 6 months were recruited for this study. **Interventions:** The SAC test is comprised of 4 sections: orientation, immediate memory, concentration, and delayed memory. Three versions of the SAC, reported as equivalent, were counterbalanced and given to each participant by athletic trainers in a distraction-free room. **Main Outcome Measures:** Iteman software (V 3.6) was used to calculate item difficulty and discrimination. Item difficulty (P) is reported as a proportion of those who answered an item correctly. Item discrimination (rpb) is reported as a point biserial correlation. National Commission for Certifying Agencies (NCCA) standards were used to evaluate which item statistics were appropriate. Based on item difficulty and discrimination statistics, an item determination was made to decide whether or not the item was acceptable. **Results:** All three versions of the SAC had unacceptable items (A = 50%, B = 60%, C = 63.33%). The majority of the unacceptable items were in the orientation and immediate memory sections. **Conclusions:** This study demonstrates that some items on the SAC are too easy in the high school population. Increasing the number of acceptable items in the current SAC is important to ensure the safety of athletes returning to play following concussion.

REMOTE HUMIDITY AND TEMPERATURE REAL-TIME MONITORING SYSTEM FOR THE STUDY OF THE AFTER-RIPENING PROCESS IN SEEDS

Thiruparan Balachandran, Graduate Student, Engineering Technology; Saleh Sbenaty, Faculty, Engineering Technology; Jeffrey Walck, Faculty, Biology; Saleh Sbenaty (Faculty Sponsor), Engineering Technology

The current paper discusses the design, prototyping, and testing of a remote monitoring system that is used to study seed germination under various controlled conditions. The research will help biologists in determining the optimal conditions for after-ripening in seeds, which are necessary for successful seed storage and germination. Seed biology is an important branch of plant science. Many seed germination experiments are carried out under controlled environmental conditions, and seed scientists have experienced difficulties in maintaining and monitoring the relative humidity inside closed containers. The common practice is the use of supersaturated solutions of different chemicals to provide relative humidity measurements. However, these super-saturated solutions are not accurate and require continuous (manual) checking by the researcher. The current paper discusses the development of a remote monitoring system that can be used to accurately monitor and measure the relative humidity and temperature of the closed containers used for after-ripening. What makes this task especially challenging is that the closed containers are housed in an incubator that maintains a desired temperature. The incubator is not permeable to Wi-Fi signals required for the proper communication with the monitoring system. The system under discussion allows for remote, real-time monitoring of the relative humidity and temperature of five (can be expandable to more than five) different closed containers. The system functions as a server that is connected to Internet using Wi-Fi technology. When a client requests data, the system will read the sensor values and pass them wirelessly to the client(s). A client can see these data on a web browser and will be able to study and plot the data. A time and date stamp is provided with each measurement. Application-specific software is created to implement data logging and facilitate data transfer into Microsoft Excel for further analysis. The system uses multiple sensors, a microcontroller, and a Wi-Fi module. SHT 75 from Sensirion is used to sense the relative humidity and temperature. This sensor is factory calibrated. Its RH response time is 8 sec, power consumption is 80 μ W, and has an operating range from -40 to +125 °C and from 0 to 100% RH for temperature and relative humidity, respectively. The processor used is an Arduino microcontroller that has an AVR 8-bit 2 microcontroller on it. This device is connected to Internet using Microchip MRF24WB0MA Wi-Fi module using IEEE Std. 802.11b/g/n wireless networks protocol. Figure 1 illustrates the basic block diagram of the system.

FAITH-BASED AVIATION: AN ETHNOGRAPHIC STUDY OF MISSIONARY FLIGHTS INTERNATIONAL

Joseph Cooper, Graduate Student, Aerospace; Paul Craig (Faculty Sponsor), Aerospace

The development of faith-based missionary aviation is a post-World War II phenomenon. The war effort demonstrated the value, utility, and global reach of aviation to remote underdeveloped areas of the world. With the beginnings of a worldwide infrastructure for aviation, Christian aviators realized aviation could increase the range and effectiveness of their efforts to reach the world for Christ (Mellis, 2006). Although individual organizations provide statistical information and data about flight operations there is a lack of external evidence and relevant research literature confirming the scope and value of these faith based aviation organizations and operations. A qualitative, ethnographic study was conducted to document the activities of one faith-based aviation organization to gain an understanding of this little known aspect of civilian aviation. The study was conducted of Missionary Flights International, MFI, of Fort Pierce, Florida, which has been involved in faith-based, missionary aviation since its inception in 1964. Although not technically a commercial airline, “MFI strives to offer affiliated missions the kind of efficient service and professionalism expected of an airline operation. MFI has become an ‘airline for missions’ in Haiti and the Dominican Republic” (MFI, 2013), fulfilling their motto of “Standing in the Gap”. MFI provides twice a week service to the island of Hispaniola and the Republic of Haiti. In this in-depth study insight and understanding was gained into the purpose of MFI, their daily routines, operations and the challenges they face in maintaining their flight services to Haiti. This study provided documentation of the value and utility of such aviation efforts and of the individuals involved in this endeavor.

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EFFICIENT NUMERICAL METHODS FOR SOLVING WAVE EQUATIONS

Xiao Liang, Graduate Student, Computational Science/Mathematical Sciences; Abdul Khaliq (Faculty Sponsor), Mathematical Sciences

Wave propagation is one of most basic physical phenomena and a fundamental form of energy transmission. It has applications in many fields, including geo-sciences, the communication industry, the defense and aviation industry, and manufacturing enterprises. There are different types of wave equations modeling the wave propagation, such as the acoustic wave equation, Maxwell equation, Schrödinger equation and Korteweg–de Vries equation. Numerical methods are important for solving these equations due to the fact that theoretical solutions are difficult to find. We compare several numerical methods for solving Nonlinear Schrödinger (NLS) equations. Finite difference, quartic spline, Discontinues Galerkin (DG) method and Local DG methods are implemented for the spatial discretization. The exponential time differencing (ETD) methods with Padé (1, 1) and Padé (2, 2) approximations are employed for the temporal discretization. These ETD methods have been proven to be unconditionally stable, and their convergence rates will be shown in the numerical experiments. We will also show some parallel processing algorithms and compare sequential C programs with CUDA C programs running on a GPU cluster.

PERCEPTIONS OF GENETICALLY MODIFIED FOODS

Tracy Morris, Graduate student, Health and Human Performance; Pat Whitaker, Community Member, UT-TSU Rutherford County Extension; Amanda Cole, Graduate student, Health and Human Performance; Norman Weatherby, Faculty, Health and Human Performance; Andrew Owusu, Faculty, Health and Human Performance; Norman Weatherby (Faculty Sponsor), Health and Human Performance

The prevalence of genetically modified (GM) foods has increased steadily since they were introduced in the 1990s. It is estimated that up to 70% of processed foods in American supermarkets contain GM ingredients, predominantly in the form of GM sugar. Consumers generally know very little about GM foods. Currently there are few studies that examine the perception of GM food among people 65 years and older. The University of Tennessee-Tennessee State University (UT-TSU) Rutherford County Extension office and the MTSU Health and Human Performance Department will examine perceptions of GM foods among participants at the UT-TSU Extension office "Food for Life" National Nutrition Month event. This will be a one group, pretest-posttest design. Anonymous data will be gathered utilizing individual "clickers" and TurningPoint 5 software. A 30-minute health education intervention about the advantages and disadvantages of GM foods will be delivered by a health educator. The pre- and post-test survey will gather information about perceptions of GM foods. The sample size is expected to be 60-70 people. Results will include dependent t tests of pre and post data using the Bonferroni correction to control the familywise error rate and descriptive information about the intervention participants.

BILINGUAL EDUCATION: AN EXAMINATION OF THE EFFECTIVENESS
/BENEFITS OF BILINGUAL EDUCATION INTERPRETERS/TEACHERS ON
STUDENT PERFORMANCE IN ENGLISH AS A SECOND LANGUAGE
CLASSROOMS

Dana Abed, Graduate Student, Educational Leadership; Meghan Sanders (Faculty Sponsor), Educational Leadership

One of the debates still among language teachers is whether or not to use the student's first language in English as a Second Language (ESL) classrooms. There is a wide range of opinions on the degree to which the first language should be used in classrooms. One side favors totally banning the first language from the ESL classroom, and the other side favors using the first language or limited use of the first language. Thus, this study examines the effects/benefits of bilingual education interpreters and bilingual teachers on student performance in ESL classrooms. The main research question being addressed in the study is: "Are bilingual education interpreters/teachers effective on students in ESL classrooms or learning environments?" The participants are a random selection of 15 ESL students from proficiency level one or two and 5 of their teachers enrolled at the ELS Language Center located on the campus of MTSU. This proposed action research study utilizes a quantitative approach in: a) fluency, comprehension and writing test scores, b) student age groups and proficiency levels, and c) survey for students and teachers. I have observed and compared ESL students who get native-language instruction to other ESL students who receive English-only instruction. I have used this difference in treatment dosage to estimate the effect of bilingual education on student test scores and student comprehension levels. I have administered surveys to the teachers and students that ask for opinions, views, and expectations on bilingual education and then use their answers to measure the necessity/need of bilingual education. I have also conducted in-depth analysis, which includes field notes, dating all data, and organizing and adding memos. Finally, I have conducted triangulation on all the data collected to help me to determine the results of my research. The findings in the action research approach will provide insight and suggestions to assist teachers, educators, ESL students, and anyone teaching or learning English as a Second Language by leading them in the direction of improvement. It will provide suggestions to help ESL students learning and understanding of the English language in a faster/easier/more effective manner. It will allow a way for teachers to communicate and understand their students, and it will also suggest ways to succeed in learning ESL, enabling the achievement of high grades. Findings and results from previous studies done on bilingual education showed that (Garcia, 1991) allowing the use of the first language in early ESL was critical to later success; use of both languages facilitated the transition to English.

THE EFFECT OF PAID MATERNITY LEAVE ON PARTICIPATION IN GOVERNMENT ASSISTANCE PROGRAMS

Anca Traian, Graduate Student, Economics and Finance; Charles Baum (Faculty Sponsor), Economics and Finance

This paper examines how paid and unpaid maternity leave affects participation in three government assistance programs: Temporary Assistance for Needy Families (TANF), Food Stamps, and Special Supplemental Nutrition Program for Women, Infants and Children (WIC). It uses state-mandated Temporary Disability Insurance as a measure of paid maternity leave to estimate whether access to paid leave before and after childbirth causes a decrease in reliance on government assistance programs. The results show that families with access to Temporary Disability Insurance (TDI) as a form of paid maternity leave are less likely to rely on public assistance when they have a newborn. The probability of participation in Food Stamp, TANF, and WIC programs and the value of benefits received from these programs are lower for families who reside in states that mandate TDI compared with families who reside in states without mandated TDI.

HOW DID THE 'GREAT RECESSION' AFFECT OUR CONSUMPTION BEHAVIOR?

P. Wesley Routon, Graduate Student, Economics and Finance; Joachim Zietz (Faculty Sponsor), Economics and Finance

Using Consumer Expenditure Survey data from 2000Q1 through 2012Q1 merged with several macroeconomic time series, I estimate the psychological impacts macroeconomic health and uncertainty have on American consumers and focus on the recession beginning December 2007. Empirical methodologies used include fixed effects with pseudo panels and the Almost Ideal Demand System (AIDS). I find that there are indeed significant effects and that these effects vary greatly across generations (i.e., baby boomers, Generation X, and Generation Y).

DEFINING MOMENTS: AN EXAMINATION OF USING DEFINITION-SUPPORTED AUTHENTIC TEXTS TO IMPROVE READING COMPREHENSION AND INCREASE VOCABULARY ACQUISITION.

Jennifer Cooper, Graduate Student, Literacy Studies; Amy Elleman, Faculty, Literacy Studies; Amy Elleman (Faculty Sponsor), Literacy Studies

Given the strong positive correlation between vocabulary size and reading comprehension abilities, increasing the vocabulary size of a student has the potential to benefit the student's comprehension levels. However, while vocabulary instruction may provide significant improvement in comprehension levels, explicit vocabulary instruction is labor-intensive and time-consuming. It is difficult to determine which words to instruct, and it is impossible to provide in-depth, explicit instruction on all words necessary to enhance comprehension. Wide reading may be a potential solution to this difficult conundrum, because it provides readers exposure to vocabulary with multiple exposures of contextual information that facilitates vocabulary acquisition. Additionally, prior research has demonstrated that incorporating glosses into narrative texts increases both reading comprehension and vocabulary acquisition (Abraham, 2009). This study seeks to examine the effectiveness of utilizing novels with embedded glosses, i.e. Kaplan SAT Score-Raising Classic novels, which have vocabulary target words bolded and defined on facing pages. Students in this study were individually and randomly assigned to the treatment condition or control group in which the students read the same novel without definitional support. The conditions were compared on standardized and researcher-created outcomes for reading comprehension and vocabulary acquisition. Results showed no advantage for using embedded glosses on vocabulary or comprehension outcomes. However, this may have been due to the sensitivity of the measures used. Limitations to the study as well as future directions for this line of research are discussed.

KINDERGARTEN FAMILY RESPONSES TO CULTURALLY RELEVANT TEXTS

Katie Schrod, Graduate Student, Literacy Studies; Jeanne Fain (Faculty Sponsor),
Literacy Studies

The present study has two main purposes: a) to analyze how diverse students and their families make connections with culturally relevant texts, and b) describe families' perceptions of the family backpack experience and their interactions with critical children's literature. The classroom participants in this project consisted of 7 boys and 7 girls ages 5 and 6. Children are knowledgeable in Spanish, Russian, Chinese, and Arabic and represent a wide range of socioeconomic and cultural backgrounds.

Children's literature was chosen based on the cultures and funds of knowledge represented in the classroom. These texts were shared in class and sent home through a backpack system. Data was collected through participant observation notes, response journals, classroom artifacts related to the family backpacks, survey data from families, and in-depth interviews with the families. Data analysis used constant comparison analysis (Corbin & Strauss, 2008) to generate themes of how children interacted with the texts. Children explored the texts by confirming and disconfirming their understandings of culture to make sense of the diverse texts. Discourse analysis of the families' perceptions was used to further understand the ways children were supported in their responses to the texts. Findings indicate that families perceived that culturally relevant texts build upon family histories, bridge home and school literacies, and provide space for critical conversations around texts in the home.

IMSmining: A SOFTWARE PACKAGE FOR IMAGING MASS SPECTROMETRY PROCESSING

Jingsai Liang, Graduate Student, Computational Science; Don Hong (Faculty Sponsor),
Mathematical Sciences

IMSmining is a newly developed software package by a research group at MTSU for imaging mass spectrometry processing using statistical methods. It contains functions of data visualization, biomarkers selection, and classification. Statistical algorithm selections include principle component analysis (PCA), support vector machine (SVM), LASSO, SPCA, elastic net (EN), and weighted EN (WEN). It can be used in either MATLAB GUI or MATLAB function interface. All the functions and GUI have been tested using a set of mouse brain IMS data.

A NEW AWAKENING: YOUTH INVOLVEMENT IN BIBLE STUDY

Kaleena Gaines, Graduate Student, Educational Leadership/Curriculum and Instruction;
Meghen Sanders (Faculty Sponsor), Educational Leadership

This study examines the involvement of youth ages eight to seventeen in a variety of bible study programs. Youth were involved with other programs within the youth department, but their attendance in bible study programs varied. This action research study takes a qualitative approach to identify factors that contribute and encourage youth involvement. The study focuses on three overarching questions: a) current involvement, b) student preferences in terms of programs, and c) factors that prevent youth from attending programs. Data sets examined pre- and post-study youth involvement to identify the rate of involvement and growth or lack thereof. The three overarching questions were used to triangulate, code, analyze and share findings that may assist other youth ministries to improve and encourage youth involvement.

INCORPORATING SPATIAL INFORMATION IN IMS DATA ANALYSIS USING MARKOV RANDOM FIELD

Lu Xiong, Graduate Student, Computational Science; Don Hong (Faculty Sponsor),
Mathematical Sciences

To fully utilize IMS data, it is desirable not only to identify the peaks of the spectrum within individual pixels but also to study correlation and distribution using the spatial information for the entire image cube. The phase (cancer or non-cancer) of a pixel is highly determined by the configuration of its neighbor system. Because of its locality and Markovianity in space, Markov Random Field (MRF) is an ideal tool to describe the spatial information. In this presentation, we talk about how to incorporate spatial information in IMS data analysis using MRF and Bayesian method. First, we introduce the spatial information challenges proposed in IMS data analysis. Second, we discuss the mathematics of MRF and its theoretical background. Third, we will explain a simplest MRF model--Ising model. The Metropolis Algorithm for simulating Ising model will also be discussed. Then, we will use Bayesian method with Ising prior to optimize IMS data classification accuracy. Markov chain Monte Carlo (MCMC) is used to for computing implementation. Maximum pseudo likelihood method is used for parameter estimation. Finally, we experiment this algorithm on GL26_Ti_Section1 IMS data and discuss its performance.

NEURAL MARKERS OF EMOTIONAL PROCESSING IN LANGUAGE AND MUSIC

Michael Pridmore, Graduate Student, Psychology; Cyrille Magne, Faculty, Psychology; Cyrille Magne (Faculty Sponsor), Psychology

Williams Syndrome (WS) is a rare neurodevelopmental disorder that presents a complex pattern of strengths and weaknesses in its socio-cognitive profile. In particular, individuals diagnosed with WS show strong language performance and musical engagement while deficits in perception of emotional prosody are often reported. The purpose of the present study was to examine the neural markers of the emotional connection between music and language in individuals with or without WS. The brain electrical activity was recorded in controls and in participants diagnosed with WS while they were listening to short musical excerpts followed by spoken words. The emotional valence of the music either matched or mismatched the prosody of the word. Preliminary data show that, for both groups, the amplitude of a specific brain signature (N400), usually associated with lexico-semantic processing, increased when the music-word emotional valence mismatched. In addition, the N400 response seems to be broader for individuals with WS. The results suggest not only that individuals with WS are sensitive to the emotions in music but also that this increased sensitivity to affective priming in music can influence the processing of the emotional prosody. The music's ability to modulate emotion perception in language highlights the potential for using music for therapeutic purposes in clinical populations.

THE EFFECT OF VINYL TRIETHOXYSILANE ON MESOPOROUS SILICATE SCAFFOLDS DESIGNED FOR BONE GROWTH: AN SEM STUDY

Matthew Robinson, Graduate Student, Chemistry; Andrienne Friedli, Faculty, Chemistry; Andrienne Friedli (Faculty Sponsor), Chemistry

A vast amount of research has been conducted to understand the mechanisms of bone degeneration as well as methods to promote bone growth. Mesoporous silicate (m-SiO₂) foams are biocompatible, have comparable pore size to bone, and are conducive to growth of bone-forming cells, osteoblasts. However, they lack the required mechanical strength for application as regenerative scaffolds. To increase crosslinking and flexibility during the foam template coating process, vinyl trimethoxysilane (VTMS) was incorporated into the sol-gel coating. The m-SiO₂ scaffold used in the study was synthesized from sol gels composed of tetraethyl orthosilicate (TEOS), triethyl phosphate (TEP), calcium nitrate tetrahydrate (Ca(NO₃)₂·4H₂O), nonionic surfactant F127, and three different concentrations of VTMS. Polyurethane foams were iteratively dip-coated with sol-gel, irradiated with a 450 W UV lamp and then air-dried to give 1-12 layer materials. The foams were calcined at 600 °C in a Lindberg furnace to remove the organic component, resulting in an inorganic scaffold. The materials were analyzed using SEM images including an analysis of the effect of drying time and VTMS content on pore sizes. Statistically, the data showed minimal differences between samples containing VTMS and those without the crosslinker.

TOP-DOWN LINGUISTIC APPROACH: DOES IT HELP ADULT ENGLISH AS A SECOND LANGUAGE STUDENTS IMPROVE ENGLISH LANGUAGE SKILLS?

Steven Robinson, Graduate Student, Educational Leadership; Meghan Sanders (Faculty Sponsor), Educational Leadership

Over the past few decades, a debate has taken place in the linguistics field over what the best approach is to teach a language. One method, which is traditionally used in foreign language classrooms, is the bottom-up approach. This approach starts out with vocabulary lists, specific grammar instruction, and phonics. Critics of this approach stress that this is not the natural approach to learning a language. They favor the top-down approach. This approach involves presenting literature or music to the student, then focusing in on specific parts. The logic behind this is that with the aid of the instructor, the student will use critical thinking to analyze the meaning of the media being presented. Then, the instructor can narrow the focus to a specific component of the language that deals with grammar, vocabulary, or phonics. In the ESL class that the instructor teaches, he has been traditionally using the bottom-up linguistic instruction method that follows the student workbook. His action research will consist of using the top-down approach for two weeks in order to see what impact its usage has on student learning.

The first step of the research involves willing participants to take both a spoken and written English assessment on March 19th. All participants must be over the age of 18 and of limited English proficiency. There will be 10-15 participants. After conducting the assessment and collecting the data, the instructor will implement two weeks of lessons using the top-down approach. The total instruction time will be 8 hours in length. Each class lasts 2 hours, and there are 2 classes per week. During this time period, the investigator/instructor will collect qualitative data based on student enthusiasm, participation in lessons, comments, attendance, and usage of English in the classroom. On March 28th, the investigator will once again assess the students using the same speaking and multiple-choice assessments. He will compare the results of the first test and the second test in order to measure the difference in performance. This data will be presented quantitatively.

The study has not commenced yet, but findings from previous research done by other researchers have been positive. However, this research has been conducted mostly with children. It will be interesting to see how it goes with adults. The top-down approach is still considered a theory. That means that it has not yet been proven to be more effective than the bottom-up approach. The investigator will use the qualitative and quantitative data from this action research in order to determine the effectiveness of the top-down approach to language instruction. Findings will be shared with the academic community in order to provide further knowledge about this theory and its effectiveness in language instruction, specifically in regards to adult English language learners.

DYE-TAGGED MESOPOROUS SILICATE THIN FILMS TO TEST NONLINEAR FLUORESCENCE ENHANCEMENT

Peter Haddix, Graduate Student, Chemistry; William Robertson, Faculty, Physics and Astronomy; Andrienne Friedli, Faculty, Chemistry; Andrienne Friedli (Faculty Sponsor), Chemistry

Fluorescence is nonlinear in response to the electric field in light. Photonic band gap multilayers (PBGM) developed at MTSU generate surface electromagnetic waves (SEWs) that have been used to sense changes at the surface/air interface. By coupling fluorescent materials with SEWs, sensitivity can be enhanced. Since SEWs are maximized inside the top layer of the PBGM, replacing this layer with mesoporous fluorescent materials is expected to improve sensitivity further. Mesoporous SiO₂ (m-SiO₂) was synthesized using established sol-gel synthesis procedures with F-127 polyether as the templating agent. After calcining up to 600°C, organized mesopores are formed within the spin-coated m-SiO₂ thin films. Transmission electron microscopy established that a hexagonal mesopore structure was present in the m-SiO₂ thin films and profilometry was used to measure film thickness (450 or 740 nm). Films were then treated with 3-aminopropyl triethoxysilane to functionalize the surface of the films allowing for easy attachment of Cy5, a fluorescent cyanine dye. Solution phase and solid state fluorescence spectroscopy were done on dyes including Cy5 derivatives. This presentation reports the minimum concentration for fluorescence detection.

THE CORRELATION BETWEEN EATING SCHOOL LUNCH AND ADOLESCENT HEALTH ISSUES

Sarah Peralta, Graduate Student, Educational Leadership; Meghan Sanders (Faculty Sponsor), Educational Leadership

This study examines how many students in selected elementary schools in different socio-economic areas eat school lunches while comparing that population to how many have adolescent health issues. The primary tool is a survey that was designed to question the parents of the students concerning the student's health, nutrition, diet, and nutritional awareness. The survey specifically identifies students with high cholesterol, high body mass index (BMI), diabetes, and other diet-related health issues. Preliminary findings are examined, and improvement methods are established.

DO LONG-TERM SUBSTITUTE TEACHERS HAVE ANY EFFECT ON STUDENTS' GRADES?

Mikki Ford, Graduate Student, Educational Leadership; Meghan Sanders (Faculty Sponsor), Educational Leadership

The purpose of this study is to attempt to discover if there is, in fact, any effect on students' grades when they are faced with a long-term substitute teacher. The students used for the study were in a classroom for at least one full semester with the same substitute teacher. First, the researcher looked at students' grades both before and after the presence of the substitute teacher. Then the researcher conducted interviews with the select students and had them answer specific survey questions. Finally, the researcher collected field notes during the study that were used in compiling all the gathered data. The research was conducted at Cheatham County Central High School during school hours but without interfering with any of the students' instruction time. All participants involved in this study will remain anonymous, and all identities will be protected.

THE APPLICATION OF EXPLICIT STABILIZED NUMERICAL METHODS ON A MATHEMATICAL MODEL FOR TUMOR ANGIOGENESIS IN THE CORNEA

Richard Ewool, Graduate Student, Computational Science; Zachariah Sinkala, Faculty, Mathematical Sciences; Zachariah Sinkala (Faculty Sponsor), Computational Science

We consider the onset of tumor-induced angiogenesis in the cornea and how inhibitors can possibly slow down the growth of the tumor by restricting signaling factors to blood vessels that can grow and vascularize the tumor mass. The resulting partial differential equations (PDEs) that describe this process follow from H. A. Harrington *et al.* The spatial discretization of this system of PDEs results in a large system of ordinary differential equations. In our study, we use a special class of time integration numerical methods known as the Explicit Stabilized Runge-Kutta methods. Our choice of this method was based on the fact that the Explicit Stabilized Runge-Kutta methods work very well for mildly stiff PDEs like those in our model. We used three different Explicit Stabilized Runge-Kutta methods namely DUMKA, ROCK2 and ROCK4 to solve the system numerically using Fortran as our computational tool. We compared the cpu times of DUMKA, ROCK2 and ROCK4 methods on the model and also checked whether our results were consistent with the biological process.

WEBSITE DESIGNING USING C# AND ASP.NET

Reema Kurani, Graduate Student, Computer Information Systems; Melinda Korzaan (Faculty Sponsor), Computer Information Systems

The website is designed after a semester-long study of coding using C# combined with ASP.net. The project consists of multiple webpages designed for a fictitious company titled, The Finest Chocolate Factory. It allows the customers to see the different kinds of chocolates available as well as full details and allows them to make purchases. The website combines the use of an enhanced graphical user interface with data storage in a database that is linked with the website. It also has Admin capabilities to create, update and delete a product directly from the website, which reflects in the linked database immediately. The website consists of a Master Page, Order Form, Shopping Cart, Checkout page, Database Modification for Admin (maintain products), Customer Survey, Survey Complete summary page, Contact Us page and a Site Map. It is designed to give the customer a pleasant shopping experience with effective use of images and consistency that flows between all web pages. Each web page consists of the correct use of links, buttons, dropdown lists, labels, textboxes and images that make it easy to navigate from one page to the other.

EMPOWERING LITERACY THROUGH PHYSICAL ACTIVITY

Susan Rollyson, Graduate Student, Elementary and Special Education; Beverly Boulware (Faculty Sponsor), Elementary and Special Education

When you think of Physical Education in relation to skills and standards, the mind leads us to think of gross motor skills primarily. Even small motor skills may come to mind. But Physical Education and Literacy are rarely spoken in the same sentence. They just do not go hand-in-hand. Can Literacy be empowered through physical activity? More specifically can emergent literacy be emphasized through physical activity in the classroom or in an actual Physical Education class? Research has shown that when the mind is awakened with the release of serotonin, it is easier for the mind to retain information. So why wouldn't educators want to give their students the benefit of retaining as much knowledge as possible? Could it be the discomfort of the classroom teachers trying to meet instructional standards (including new Common Core standards) without knowing how to simultaneously introduce physical activities into the classroom? We explore the countless possibilities of how to incorporate Literacy into physical movement.

DISCOVERING POE AS A COMPOSITIONIST: EDGAR ALLAN POE'S "THE PHILOSOPHY OF COMPOSITION" AND PROCESS THEORY

Kayla McNabb, Graduate Student, English; Philip Phillips (Faculty Sponsor), English

Though Poe has commonly been remembered for his contributions to the detective, horror, and science-fiction genres, we should consider how his innovation extended into other areas. This includes his critical works, such as his essay "The Philosophy of Composition." Despite Poe's classical training and the trends in composition instruction before and during his educational career, the theory of composition argued for in his critical essays is more analogous to the Process Theory established by compositionists over 100 years later than the teaching methods of his time, suggesting that Poe's concept of composition was very progressive. To truly understand Poe's environment, we must examine the tradition that informed the educational systems of his time as well as his own academic experience. In order to discover the connections between Poe's critical methodologies and those of later composition theorists, we must compare the preexisting notions in the field to the developments seen in composition theory during the late nineteenth and early twentieth centuries.

SLUM CLEARANCE AND ECONOMIC EXPANSION: SENATOR ESTES KEFAUVER AND THE QUEST FOR URBAN RENEWAL FUNDS IN MURFREESBORO, TENNESSEE; 1950-1956

Dallas Hanbury, Graduate student, History; Rebecca Conard (Faculty Sponsor), History

For Murfreesboro, Tennessee, 1952 was an important year as city planner Jennings Jones argued for an urban renewal program that began by razing The Bottoms, a poor African American neighborhood located adjacent to the downtown business district. By 1956, redevelopment was complete. African Americans had been dispersed into other residential areas, including newly built housing projects. Nonetheless, urban renewal in Murfreesboro was a failure, as it was across the nation. Not only did re-development fail to produce the anticipated commercial boom, but, in the process, it physically disrupted an entire neighborhood, including the businesses and social institutions that contributed to its identity. One of the unanswered questions about urban renewal in Murfreesboro is why this small city in middle Tennessee was an early recipient of federal funding for urban renewal. Murfreesboro's population in 1950 was approximately 13,000, yet by 1952, the city had been awarded funding for building 200 public housing units out of total of 50,000 units funded nationwide. This paper will examine the role of Senator Estes Kefauver in the urban renewal of The Bottoms. Frequent references to Senator Kefauver appear in the meeting minutes of the Murfreesboro Housing Authority, suggesting that Murfreesboro had a key political figure in the US Senate trying to advance their interests. Kefauver, who championed consumer protection and broke with the Dixiecrats on civil rights (he and Senator Al Gore Sr. were the only two southern senators who refused to sign the Southern Manifesto in 1957), nonetheless had to satisfy constituents in order to remain in office. This paper will examine the dynamics of local politics in tapping federal funding for urban renewal.

DOMESTIC LEGAL ENVIRONMENT EFFECTS ON VENTURE CAPITAL INVESTMENTS: EVIDENCE FROM AFRICA

Jonathan Adongo, Graduate Student, Economics and Finance; Bichaka Fayissa (Faculty Sponsor), Economics and Finance

Using a panel dataset of investments in Africa, I empirically investigate whether a country's legal environment influences venture capital investment within its borders. Evidence shows that improving the domestic legal environment has a significantly negative effect on seed, start-up, or early venture capital investment. Theory suggests this is because better domestic legal environments allow general partners to use debt financing, which portfolio companies at the seed, startup, or early stages cannot access because they have not yet acquired adequate tangible assets that can be collateralized. Based on these findings, the null hypothesis that the domestic legal environment has no influence on seed, startup or early venture capital investment was rejected.

EMPOWERING BILINGUAL STUDENTS IN READING AND WRITING

Stephanie Laws, Graduate Student, Elementary Education; Beverly Boulware (Faculty Sponsor), Elementary Education

As a current bilingual teacher, I am researching ways to help my school best impact our learners. I have an interest in helping my school teach our students in the most effective ways. As I have discovered in research, bilingual learners need strategies that help them utilize both languages. The purpose of this study is to discover strategies to better teach bilingual students in reading and writing using easy-to-implement techniques. The first question is how bilingual students gain knowledge. Next, we will study current strategies and their effectiveness with bilingual students. Finally, I will pinpoint the most effective strategies to use with bilingual students when teaching reading and writing. Findings will be shared with my school administration and teachers to better impact the learning of our students. Broad sharing of the information with other educators is expected to help the community at large.

OCCUPY WALL STREET- REBELS OR PATRIOTS: FRAMING THEORY IN KEY EVENTS

Reshma Pudota, Graduate Student, Journalism; Jason Reineke, Faculty, Journalism;
Jason Reineke (Faculty Sponsor), Journalism

Previous research indicates that the framing of public demonstrations, in terms of civil liberties or civic dangers, has an impact on public opinion regarding the demonstrators. However, this research has focused predominantly on extreme right-wing groups. Two experiments were conducted to test the effects of media coverage on attitudes towards the Occupy Wall Street (OWS) movement. The first experiment's design was post-test only with 3-conditions: grassroots civic movement (GCM), neutral (NT), and dangerous civic disorder (DCD). Initial analysis indicated unexpected results, but when data were refined to include only participants who passed a manipulation check, those in the GCM condition evaluated OWS most positively, followed by those in the N condition, with those in the DCD condition evaluating OWS most negatively.

Based on those results, a second experiment was conducted with revised stimuli and a pre-test/post-test design. Here, there was not a significant difference in post-test attitudes, but differences in attitude change were statistically significant: positive in the GCM condition and negative in the DCD condition. Limitations and opportunities for future research are discussed.

EVALUATION OF ADOLESCENT SEX EDUCATION PROGRAM PROVIDED BY AN AGENCY TO THE MAURY COUNTY MIDDLE SCHOOLS

Hilda Aderoba, Graduate Student, Health and Human Performance; Norman Weatherby, Faculty, Health and Human Performance; Amanda Cole, Graduate Student, Health and Human Performance; Brittney Oliver, Graduate Student, Health and Human Performance; Norman Weatherby (Faculty Sponsor), Health and Human Performance

Globally, unprotected sexual behaviors among adolescents are a major public health concern, because they can lead to HIV/AIDS, other sexually transmitted infections (STIs), and unwanted pregnancies. This study evaluates an adolescent sex education program provided by an agency to the Maury County middle schools. In order to determine the amount of change in knowledge produced by the program, the agency's "Choosing the best PATH" curriculum will be evaluated, and this program will be carried out in three Maury County middle schools. Groups will be selected from sample of schools and classrooms by the agency's health educators. Classrooms of students will be randomly assigned to experimental and control groups by the agency. Preceding the intervention, both groups will participate in the pre-test using the agency's instrument; the post-test will be administered immediately following the study. The treatment group will participate in a sexual health intervention program (sex education and abstinence), while the control group will participate in a regular nonsexual health education program. Effects of sex and age will be statistically controlled in this study. Data collection will be carried out prior to the intervention at baseline (pre-test) and following the intervention (post-test). Program evaluation was carried out in March 2013. No personal identifiers were collected; the pre-test and post-test are linked by arbitrary identification numbers. Middle-school participants include adolescents aged 12-14 and exclude adolescents who are hospitalized, institutionalized, not in Maury County Schools, and/or refuse to participate in the programs.

THE EFFECTS OF HOUSING TENURE ON LABOR MARKET OUTCOMES:
EVIDENCE FROM THE USA

Md. Alauddin Majumder, Graduate Student, Economics and Finance; Stuart Fowler (Faculty Sponsor), Economics and Finance

Using the US Census 2000 Public Use Microdata Sample (PUMS) 5 percent file, this paper examines the effects of housing tenure on two important labor market outcomes: employment and wages. To obtain more precise estimates, mortgagers (homeowners with mortgage liabilities) and outright owners (homeowners with no mortgage liabilities) are distinguished. I use logit and OLS as baseline specifications in the employment model and the wage model, respectively. The maximum simulated likelihood (MSL) approach is applied in both models to address the problem of endogeneity. The instruments used in this study are the state homeownership rate by race and the state property tax rate. There is no evidence of endogeneity in the employment model. In the wage model, however, the treatment variables are found to be endogenous. Thus preferred specifications are logit for the employment model and MSL for the wage model. Findings suggest that, relative to renters, outright owners are more likely to be employed, and earn higher wages. Mortgagers have higher employment probability compared to renters. However, they were found to be no different than renters in terms of wages.

OFF THE DEEP END: FISHING IN A SWIMMING POOL

Jessica Finnerty, Graduate Student, Health and Human Performance; John Dunlap (Faculty Sponsor), Health and Human Performance

Fishing has been a popular human activity since the ancient times but if individuals do not know and understand the tactics they are unlikely to attempt. With our society being so fast-paced and career oriented something as simple and laid back as fishing is a thing of the past for most. According to the American Sportfishing Association there has been a 7.0% decrease in fishing licenses from 2008-2011. Richard Louv said it best in his book *Last Child in the Woods* with “no child left indoors,” meaning children in today’s society do not appreciate the outdoors because they no longer play outside. How are people supposed to appreciate and care about something they never experience?

In August of 2012 Wake Forest University held an indoor Trout Fishing Event. This event was held in their swimming pool and open to the entire community. The event involved catching a trout, cleaning/gutting your trout, frying your trout, and enjoying your fresh catch. The purpose of this event was to educate the community on fishing and increase the local fishing community. By participating in outdoor recreational activities people are aware of and educated about the natural environment, which leads to environmental conservation advocates (Thapa, 2010). By creating an indoor Trout Fishing program, we are able to bring the knowledge and skills to our own backyard. As stated earlier with our society’s fast-paced lifestyle, who is going to take the time to drive to the nearest lake and learn how to fish? This is a great hands-on event that brings the wilderness to the city and the best part is it can be done in any local swimming pool. Always remember give someone a fish, they eat for a day; teach someone to fish, and they never go hungry.

EXERCISE DEPENDENCE A SOCIOLOGICAL PERSPECTIVE

Jessica Finnerty, Graduate Student, Health and Human Performance; John Dunlap (Faculty Sponsor), Health and Human Performance

Exercise dependence is a relatively new topic that has grown in the recent years. At this point researchers have been unable to come up with a single name and definition but they all can agree that there are both positive and negative effects physically and psychologically. Several main factors have come into play when evaluating the causes/influences of exercise dependence such as media and technology. From the day we are born to the day we die we are constantly being shown what the so-called 'ideal' body shape and size is to be well liked and to advance in our careers. The purpose of this study was to investigate exercise dependence from a sociological perspective by using the Exercise Dependence Scale. This study is specifically looking at how society portrays the female body and how females (at risk for exercise dependence and not at risk for exercise dependence) identify with societal influences.

HIGH THROUGHPUT SCREENING OF EXTRACTS FROM PLANTS USED IN TRADITIONAL CHINESE MEDICINE AGAINST *TRYPANOSOMA BRUCEI*

Michael Floyd, Graduate Student, Biology; Jeannie Stubblefield, Graduate Student, Biology; Anthony Newsome, Faculty, Biology; Anthony Newsome (Faculty Sponsor), Biology

Trypanosoma brucei, the protozoan blood parasite, is the etiological agent for the disease known as African trypanosomiasis (also known as “sleeping sickness”). This parasite is estimated to infect almost 30,000 people each year in central Africa and has a 100% mortality rate if left untreated. The current drugs used to treat infection by *T. brucei* were developed almost a century ago. These compounds are toxic, expensive, and increasingly ineffective due to a growing resistance. There are significant needs for new drug therapies for the treatment of *T. brucei* infections. The purpose of this study was to screen plants used in traditional Chinese medicine (TCM) for activity against *T. brucei*. A library of extracts from a number of plants used in TCM was screened against the trypanosomes using high throughput screening techniques and a resazurin-based PrestoBlue assay. The cytotoxicity of the extracts was also evaluated using L6 rat skeletal myoblast cells. Several plant extracts showed promising results, having IC₅₀ values ranging from 11.43 to 49.6 µg/ml, as well as selectivity for the trypanosomes over the mammalian cells. The results of this study suggest these plants used in TCM may have biochemical compounds of potential interest in the search for better drugs to treat African sleeping sickness.

TRANSCRIPTOME REFERENCE AND DIGITAL GENE EXPRESSION ATLAS OF THE RAINBOW TROUT

Bam Paneru, Graduate Student, Biology; Imtiyazuddin Mohammed, Graduate Student, Biology; Fatima Abdouni, Graduate Student, Biology; Reem Elmusharaf, Graduate Student, Biology; Jianbo Yao, Associate Professor, Laboratory of Animal Biotechnology and Genomics, Division of Animal and Nutritional Sciences, West Virginia University; Gary Thorgaard, Professor, School of Biological Sciences, Washington State University; Mohamed Salem (Faculty Sponsor), Biology

BACKGROUND: Transcriptome refers to all RNA molecules expressed in a cell. Transcriptome analysis is a preferred method of gene discovery in non-model organisms whose complete reference genome sequence is not available. Additionally, transcriptome analysis permits determination of gene expression patterns in relation to conditions and tissue types. Previously, we sequenced a transcriptome reference of rainbow trout using Sanger-based and 454-pyrosequencing technologies (Salem et al., BMC Genomics, 2010). The previous work identified a large number of genes; however, the assembly of the transcriptome is still incomplete. In addition, gene expression from different tissues was not studied.

RESULTS: In this study, thirteen non-normalized cDNA libraries were sequenced using the ultra-high-throughput sequencing of the Illumina HiSeq platform. To overcome the bioinformatics challenges in de novo assembling the transcriptome without a reference genome sequence, the transcriptome was sequenced from a single double-haploid individual. A total of ~2.3 billion (100 base-pair) paired-end reads were de novo assembled using Trinity RNA-Seq assembler, which yielded 474,524 consensus sequences (contigs) with > 500 base-pair length. A total of 287,593 (60.60%) contigs had a hit to the GenBank protein database; leaving 186,931 contigs without matches. Contigs were clustered according to their sequence homologies. From contigs with hits to the GenBank, the longest contig of each cluster was selected as a reference for downstream analysis (35,150 multiple and 11,307 single contigs). Of the EST-Scan of the selected 46,457 representative contigs identified and 45,291 transcripts with protein-coding open reading frames (ORFs), 15,822 (34.05%) were full-length sequences. A digital gene expression atlas was generated by mapping original sequence reads from each tissue to the new transcriptome reference.

CONCLUSION: This study provides the most comprehensive assembled and annotated transcriptome resource that is available for functional, structural and comparative genomics research in rainbow trout.

FINITE ELEMENT SIMULATION OF SURFACE PLASMON RESONANCE

Vijay Koju, Graduate Student, Computational Science; William Robertson (Faculty Sponsor), Computational Science/Physics and Astronomy

A Surface Plasmon (SP) is an electromagnetic surface mode resulting from the collective oscillation of the charge at the interval between a metal and an insulator. Surface Plasmon Resonance (SPR) can be used to detect molecular absorption on surfaces and consequently the phenomenon is of significance for technologies including gene arrays, biomolecules and DNA sensing, and surface electromagnetic field enhancement. Generally, SPR sensor structures can be based on either attenuated total reflection (ATR) prism coupling or metallic/dielectric grating coupling. However, the prism-based systems are widely used in practice, because their sensitivity is 2-3 times higher than that of the grating-based systems. We have been conducting numerical simulations on both types of structures, prism-based as well as grating-based, to achieve higher sensitivity and electromagnetic field enhancement. Moreover, specially designed multilayer structures with alternating high and low index layers have been studied, because they support surface electromagnetic waves similar to surface plasmons but with potentially higher sensitivity and field enhancement.

EVALUATING AN EMBODIMENT TASK

Emily Shields, Graduate Student, Psychology (URECA); Dallas Swindell, Graduate Student, Psychology; Tyler Hubbard, Graduate Student, Psychology; William Langston, Faculty, Psychology; William Langston (Faculty Sponsor), Psychology

Embodied cognition suggests that action potentials are a component of language comprehension (e.g., reading “close the drawer” makes it difficult to move towards one’s body). The purpose of the research was to evaluate task components contributing to embodiment. For all studies, participants categorized verbs that had implied motion (e.g., emerge). For the baseline condition, participants responded with both hands (a non-embodied task). For the rest of the studies, following each verb, the participants moved in a direction that was consistent or inconsistent with the implied verb motion. The task parameters that were manipulated were whether the instructions were explicit (e.g., indicate the direction of motion) or implicit (e.g., indicate the tense of the verb), the response modality (paper and pencil or computer), presentation format (blocked or mixed), and distance moved. The results were that embodiment effects are dependent upon task parameters.

MONO- AND DIGALACTOSYLDIACYLGLYCEROL COMPOSITION OF
VITRELLA BRASSICAFORMIS, A RECENTLY IDENTIFIED, SECOND MEMBER
OF THE CHROMERIDA: COMPARISON TO *CHROMERA VELIA*

Manoj Khadka, Graduate Student, Biology; Jeffrey Leblond, Faculty, Biology; Jeffrey Leblond (Faculty Sponsor), Biology

Vitrella brassicaformis belongs to phylum Chromerida and is another close photosynthetic relative of apicomplexans described after *Chromera velia*. However, no studies have been published regarding the biochemical study of its plastid lipids that could be useful for making a chemotaxonomic inference on its plastid evolution. In this study, we used a positive-ion electrospray ionization/mass spectrometry (ESI/MS) and ESI/MS/MS approach to elucidate the fatty acid regiochemical composition of two major plastid lipids, monogalactosyldiacylglycerol (MGDG) and digalactosyl-diacylglycerol (DGDG), in *V. brassicaformis* in order to provide a comparison with the forms of MGDG and DGDG as found in *C. velia*. *V. brassicaformis* primarily contained C20/C14, C20/C16 and C20/C18 fatty acid components attached to the glycerol moiety of MGDG and DGDG. The forms of MGDG and DGDG synthesized by *V. brassicaformis* are different and structurally more diverse than the previously identified C20/C20 forms that compose nearly the entirety of *C. velia*'s MGDG and DGDG. This biochemical difference is consistent with previously observed ultrastructural and pigmentation differences between *V. brassicaformis* and *C. velia* and, because MGDG and DGDG are key components of a plastid's biology, may be an indication of potential differences in plastid ancestry between the species.

SPATIAL HEARING AND SPATIAL LISTENING:
THEORY AND PRACTICE OF SPATIAL AUDIO

Mauricio Gargel, Graduate Student, Master of Fine Arts; Michael Fleming (Faculty Sponsor), Recording Industry

There are three mechanisms responsible for sound localization in the human auditory system. Two of them are related to the fact that our ears are separated by the head. The head-related components are called Interaural Time Differences (ITD) and Interaural Level Differences (ILD) representing the arrival time and level variations in sound between the two ears. The third mechanism relates to how the shape of the ears provides additional cues for sound localization. For my presentation, a binaural head microphone was built to demonstrate those three aspects of our hearing.

Besides the spatiality of hearing a study about the interpretation of space is presented. Such inquiry goes beyond the localization purposes of hearing and implies the metaphoric use of space in a creative context. In the book *Spaces Are Speaking, Can You Hear?* Blesser and Salter define the listener's awareness of space as "the internal experience of an external environment." In this presentation, the concept of space is explored using binaural signals.

EVALUATION OF EXTRACTS USED IN TRADITIONAL CHINESE MEDICINE FOR ANTIVIRAL POTENTIAL AGAINST HERPES SIMPLEX VIRUS TYPE 1

Megan House, Graduate Student, Biology; Stephen Wright (Faculty Sponsor), Biology

Herpes Simplex Virus type 1 (HSV-1) is a common pathogen that causes disease throughout the world. HSV-1 can set up lifelong latency after an initial infection. The need for new chemotherapeutic agents for the control and prevention of the virus is vital to reduce the number of people affected by HSV-1. Traditional Chinese Medicines, particularly botanical extracts, have been suggested to represent a good source for natural products with possible antiviral activity. For this study, over 140 extracts were provided from the Tennessee Center for Botanical Medicine Research to determine if any of the extracts demonstrated activity that inhibited HSV-1. After performing a cytotoxicity screen for each of the extracts, Vero cells, which are appropriate host cells for herpes simplex viruses, were exposed to HSV-1 and one of the extracts simultaneously. Antiviral potential was determined by fluorescence readings from a spectrophotometer taken after a period of virus, cell, and extract incubation. The fluorescent dye, Presto Blue, indicates potential antiviral activity by measuring cell viability. Twenty-four extracts have been able to maintain cell viability in spite of exposure to HSV-1, suggesting an antiviral effect. Future studies will attempt to isolate any active compounds in these extracts with the goal of identifying anti-HSV-1 drug candidates.

MALADAPTIVE COGNITIVE AND AFFECTIVE BEHAVIORS ARE RELATED TO SELF-TALK

Rachel Taylor, Graduate Student, Experimental Psychology; Tom Brinthaup, Faculty, Psychology; Angel Simmons, Graduate Student, Clinical Psychology; Tom Brinthaup (Faculty Sponsor), Psychology

Self-talk refers to people's tendencies to carry on internal conversations with themselves. There is much research supporting the self-regulatory functions served by self-talk. In clinical psychology, researchers have concluded that the type of self-talk an individual exhibits is linked to maladaptive cognitive and affective aspects such as anxiety and depression. Although there is a fair amount of research in this area of psychology, little has focused on the frequency of different self-talk domains using the Self-Talk Scale (STS; Brinthaup, Hein, & Kramer, 2009) and how those domains relate to maladaptive behaviors.

The STS allows researchers to measure the frequency of self-talk in four domains; self-critical, self-reinforcement, self-management, and social assessment. Using the STS, we predicted that self-talk subscales should be related to perfectionism, depression, anxiety, and loneliness. Specifically, we hypothesized that self-critical self-talk would correlate positively with measures of maladaptive cognitions and behaviors. In addition, we predicted that self-managing self-talk would positively correlate with perfectionism subtypes such as planfulness and organization.

We surveyed 235 MTSU students on measures of self-talk, general and social anxiety, depression, loneliness, and perfectionism. The results supported our hypotheses; that is, higher frequencies of self-critical self-talk were associated with greater anxiety, depression, loneliness, and perfectionism scores. In addition, as self-managing self-talk increased, scores on several perfectionism subscales increased. The results provide important information to supplement previous self-talk literature in the clinical field. We discuss implications for cognitive-behavioral interventions that focus on the identification of self-talk content and frequency.

CREATING THE MULTIVARIABLE CORRELATION COEFFICIENT MATRIX USING LINEAR ALGEBRA

Brandon Hanson, Graduate Student, Mathematics and Science Education; Angeline Gaddy, Graduate Student, Math and Science Education; Wesley Baxter, Graduate Student, Mathematics and Science Education; Elroy Sullivan (Faculty Sponsor), Psychology

Our goal for this project was to combine linear algebra and regression analysis to develop a multivariable correlation coefficient matrix. We used matrix/linear algebra to produce the output that a statistical software program like SPSS provides in a correlations chart. Creating this correlations chart is one of the first steps a researcher takes to check for bivariate correlations between the variables that are being studied.

The formula typically used to calculate bivariate correlations is r , or Pearson's Product-Moment Correlation Coefficient. In textbooks, this formula is given as the sum of squares of the cross products XY divided by the square root of the product of the sum of squares X and the sum of squares Y . Cross products are defined as the difference in an entry and its row mean multiplied by the difference in that same entry and its column mean.

The example that we demonstrate on our poster included 25 raw scores, which we organized in a matrix. Each column in the matrix represented a particular measure, and each row represented a subject from whom data was collected. Our poster demonstrates how we used linear algebra to calculate Pearson's r without directly using the typical formula.

OCCUPATIONAL HEALTH AND SAFETY: SMALL BUSINESS SAFETY VS. CORPORATION SAFETY

Jacob Pasco, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology/Occupational Health and Safety

Safety Professionals travel to a wide range of industries where companies employ temporary associates. This investigation focused on Risk Evaluations and Accident Investigations in order to get the best rate for a self-insured company. The project hopes to track and share the differences in safety procedures and accident rates between small businesses and large corporations in terms of which will provide a safer work environment. The project is limited to statistical data in order to ensure the privacy of the employees and client companies.

PUNISHMENT AND PERFORMANCE: EVIDENCE FROM INDIA

Abhradeep Maiti, Graduate Student, Economics and Finance; Joachim Zietz (Faculty Sponsor), Economics and Finance

This paper explores the impact of corporal punishment on young children's academic outcome. In many parts of Europe and the United States, corporal punishment is banned in schools. However, in developing countries that is not the case. Even if corporal punishment in schools is banned in a developing country like India, the law may not be adequately enforced. Several arguments have been proposed against the use of corporal punishment in schools. It is argued that corporal punishment produces bad outcomes in both the long run and the short run. Instead of instilling good behavioral traits in children, corporal punishment leads to more delinquent behavior. Corporal punishment in schools doesn't make students more attentive to studies or motivate them to work harder. However, there is yet to be a comprehensive empirical study to show how the application of corporal punishment in schools affects children. Using a dataset from India, the study examines the concept that corporal punishment in schools doesn't have any positive impact on students' academic performance. Depending on a student's gender and location of residence, corporal punishment in schools either has no impact on children's academic outcome, or has significant negative impact on children's academic performance. To tackle the problem of omitted variable bias, the study uses the instrumental variable method and maximum simulated likelihood method.

STOCHASTIC SIMULATION FOR BRUSSELATOR SYSTEM

Zane Colgin, Graduate Student, Computational Science; Abdul Khaliq (Faculty Sponsor),
Mathematical Sciences

Stochastic modeling and simulation has become an important tool in examining the behavior of large, complex systems. Some systems that are too large and complex to be reasonably modeled deterministically can be described by stochastic models from a statistical perspective. For instance, in well-mixed chemical reaction systems these models rely on statistical molecular concentrations and reaction rates rather than deterministic physical laws on individual molecular bodies. These methods are able to effectively and efficiently describe the behavior of large, complex systems in terms of a much smaller stochastic system. The brusselator model describes the behavior of an autocatalytic trimolecular chemical reaction system in which the concentrations of chemical species have oscillatory properties. This system can be modeled mathematically as a system of two nonlinear stochastic differential equations (SDEs). Various stochastic methods and simulation techniques will be investigated, including the established Milstein method.

A MODERN COURSE SCHEDULING SYSTEM

Nathan Reale, Graduate Student, Computer Science; Alexander Charles, Undergraduate, Computer Science; Cen Li (Faculty Sponsor), Computer Science

The process of scheduling classes for a semester can be complicated for students, especially freshmen. Between the large number of sections for some classes and leaving time for jobs outside of school, students have a lot to consider when creating their schedule. This project attempts to solve some of these problems by finding course schedules that match a student's preferences and returning potential schedules ranked using a wide range of criteria, making the scheduling process easier for students. While problems involving course scheduling are common in Computer Science, they nearly always deal with scheduling from a University's perspective, scheduling classes to maximize room and professor utilization. Scheduling from a student's perspective is a less researched topic, with few published investigations. Our project attempts to fill this void with a practical example of a course scheduler. The main interface for the project is a website students can visit from anywhere. On the main page, a student can select how they'd like to craft their schedule. First, they create a list of classes they wish to take from any classes currently offered. They can then choose the times and days on which they wish to take classes, as well as if they want online or honors courses included in the results. The processing portion of the class scheduler takes a list of course selections the student made, as well as various preferences, and finds all matching schedules, ranking them based on multiple ranking heuristics. The core of the scheduler is based on a depth first search of the entire problem space, removing those that do not meet the user's requirements, contain overlapping classes, or classes that are already full. Results are then ranked based on the time between classes, a balanced weekly course load, and the location on campus of consecutive classes.

COMPARATIVE STUDY OF NUMERICAL METHODS FOR SOLVING
MULTIDIMENSIONAL NON-LINEAR REACTION-DIFFUSION BRUSSELATOR
SYSTEM

Harish Bhatt, Graduate Student, Computational Science; Abdul Khaliq (Faculty Sponsor),
Mathematical Sciences

This study compares the mesh free (Radial Basis Function) and mesh based (Finite Difference) approach in terms of their accuracy, rate of convergence and computational efficiency for solving multi-dimensional initial-boundary value problems governed by a non-linear time dependent reaction-diffusion Brusselator system. We use linearly implicit Crank-Nicolson (LICN), Peaceman-Rachford ADI method and exponential time differencing locally one dimensional (ETD-LOD) method as a mesh based approach. Multiquadric radial basis function as a mesh free approach to compute the approximate solution of reaction-diffusion Brusselator system.

COLLEGE STUDENTS' PERCEIVED STIGMA AND PERCEPTION OF COUNSELING

Andrew Jones, Graduate Student, Educational Leadership; Amanda Dooley, Graduate Student, Educational Leadership; Alexine Grenda, Graduate Student, Educational Leadership; Chris Quarto (Faculty Sponsor), Educational Leadership

Only ten percent of college students seek counseling. Taking into account that college is considered to be one of the more stressful times throughout the lifespan, this number is alarmingly low. Numerous reasons could account for the lack of students in search of counseling services. Two specific reasons that could account for this are previous counseling experience and the stigma around mental illness and seeking counseling. Studies have been conducted on the perceptions that college students' have of counseling, and the results of what can impact a student's decision to seek counseling have been mixed. Little research has been done on what specific mental health issues produce the most perceived stigma. In order to further examine this, General Psychology students at Middle Tennessee State University were administered a survey examining college students' perceptions of counseling from a variety of factors including previous counseling experiences and perceived stigma. Students also rated the amount of stigma surrounding a variety of mental health issues. Gender differences were found in perceived stigma and correlation was detected between perception and previous counseling experiences and perception of counseling and perceived stigma.

DOES DENYING DRIVER'S LICENSES TO UNAUTHORIZED IMMIGRANTS AFFECT TRAFFIC SAFETY?

Giuseppe Rionero, Graduate Student, Economics and Finance; Joachim Zietz (Faculty Sponsor), Economics and Finance

Unauthorized immigrants are not prevented from obtaining driver's licenses in most states within the United States. This study takes advantage of changes in regulation regarding driver's licenses resulting from recommendations by the 9/11 Commission, and matches this data to state measures of traffic safety in order to identify the effect of this policy on the number of fatal traffic accidents and hit-and-run wrecks over the period from 2000 to 2009. Findings indicate that restricting the issuance of driver's licenses to undocumented immigrants reduces slightly the number of fatal crashes but increases the number of hit and run incidents.

ENERGY DISSIPATION IN ROTARY GRANULAR SEGREGATION SYSTEMS: EXPERIMENTAL RESULTS

Amin Amin, Graduate, Engineering Technology; Walter Boles, Faculty, Engineering Technology; Walter Boles (Faculty Sponsor), Engineering Technology

Binary granular materials segregate when tumbled in a rotary cylinder both radially and axially. The amount of energy dissipated is highest when segregation is least (well-mixed state) and lowest when segregation is highest. Some authors insist that segregation only occurs if there is a free surface (avalanche surface) for particles to tumble down.

Experimental results presented here prove that radial segregation occurs without a free surface while axial segregation may require a free surface to occur. The research also shows results for binary mixtures of different density, size, and angles of internal friction. The objective is to develop models explaining and predicting the decrease in energy dissipation. The "golf-ball-in-a-sand-trap" or rebound model seems to fit experimental results since the smaller or less dense particles will exhibit higher energy rebound effects while the larger particles tend to exhibit less rebound and stay in place much like a golf ball landing in a sand trap.

VALIDATION OF THE OMRON HJ-151 PEDOMETER DURING FREE-LIVING PHYSICAL ACTIVITY IN YOUTH

Saori Ishikawa, Graduate Student, Health and Human Performance; Joel Reece, Graduate Student, Health and Human Performance; Ryan Conners, Graduate Student, Health and Human Performance; Don Morgan, Faculty, Health and Human Performance; Minsoo, Kang, Faculty, Health and Human Performance; Lauren, Killen, Graduate Student, Health and Human Performance; Rose Carter, Graduate Student, Health and Human Performance; Don Morgan (Faculty Sponsor), Health and Human Performance

The purpose of this study was to document the accuracy of step counts measured by the Omron HJ-151 (OMR) pedometer during free-living step activity in children, whose PA is typically more intermittent than adults. A total of 33 able-bodied male and female participants (8 to 12 years of age) wore the OMR on the right waistband and StepWatch Activity Monitor (SAM) above right lateral malleolus over a 24-hour period while engaging in normal, non-water activities. The SAM, which was the criterion step count device, was calibrated prior to monitoring while each participant walked on the treadmill at 2, 3, and 4 mph for a total of approximately two minutes. **RESULTS:** Daily step activity for the OMR and SAM were positively correlated ($r = 0.85$, $p < .001$). However, OMR step counts (6769 ± 3327 steps) were significantly lower ($p < .001$, Cohen's $d = 1.26$) compared to SAM step counts (10703 ± 5427 steps). Although a significant linear relationship exists between step counts obtained from the OMR and SAM activity monitors, OMR substantially undercounted free-living step activity when compared to the SAM, possibly due to the 4-second step filter of the OMR device.

ANALYSIS OF THE RATE OF DECAY AND DISPERSION OF PENTOBARBITAL IN SOIL

Chasity Suttle, Graduate Student, Chemistry; Paul Kline, Faculty, Chemistry; Anthony Farone, Faculty, Biology; Mary Farone, Faculty, Biology; Paul Kline (Faculty Sponsor), Chemistry

A method for detecting the barbiturate pentobarbital in soil previously developed by this laboratory was utilized to determine its application to the decay rate and dispersion rate of pentobarbital in soil. After attending this presentation, attendees will be familiar with the principles of extracting pharmaceuticals, specifically pentobarbital, out of a complex matrix, particularly soil. Further applications of this method with respect to the time of contamination based on the rate of decay, dispersion and area of contamination will also be presented. Pentobarbital is a pyrimidine derivative in a class of organic drugs called barbiturates. Several thousand derivatives of barbituric acid have been synthesized with far reaching effects and flexible durations of action. Pentobarbital is categorized as a fast-intermediate sedative-hypnotic drug. Barbiturates are highly stable organic compounds that are released into the environment via multiple pathways. Barbiturates have been extensively used throughout the United States. Euthanized animals are a growing contamination source in addition to the contribution of barbiturates from a wide array of pharmaceutical use, misuse and abuse. The method was developed to quantify the rate of decay of pentobarbital in contaminated soil. Pentobarbital was extracted from soil samples spiked with the barbituric acid derivative. Clean up procedures involved centrifugation, reverse-phase solid phase extraction (SPE), microfiltration, and lastly analysis by liquid chromatography/mass spectrometry (LC/MS). Satisfactory recoveries of the pentobarbital indicate this is an effective method for analysis and detection. Further, pre-concentration via solid phase extraction allowed for 0.001 mg of pentobarbital per 5 grams of soil (200 parts per billion) to be detectable at limits of quantification using LC/MS. This method can be suitable for larger quantities of soil and applicable for a wide range of soil types.

ONE-WORD ATTRIBUTES: AN EXAMINATION OF GOP PRESIDENTIAL CANDIDATE ATTRIBUTES AND SECOND-LEVEL AGENDA SETTING

Aileen Bennett, Graduate Student, Journalism; Jason Reineke, Faculty, Journalism; Jason Reineke (Faculty Sponsor), Journalism

Agenda-setting theory (McCombs and Shaw, 1972) says that the media is able to influence what individuals think about. Second-level agenda-setting theory (McCombs et al., 1997; McCombs & Reynolds, 2008) extends this concept to examine the salience of specific characteristics, or attributes, of certain objects. This research tests the relationship between public opinion data collected by the Pew Research Center asking participants to give a one-word description of four 2012 GOP primary candidates and the GOP presidential nominee: Mitt Romney, Newt Gingrich, Rick Santorum, and Ron Paul; and news media coverage of four common attributes in the days preceding the public opinion polls. Attributes characterized in terms of ideology, competence, and integrity are examined. The study found that evidence of a relationship does exist with some attributes and public opinion mentions but not with all attributes. Further, there is evidence of a significant relationship across some attributes. These results are consistent with some other findings of second-level agenda-setting studies, and implications for future research are discussed.

HOW CAN LITERATURE CIRCLES EMPOWER INTERMEDIATE ELEMENTARY STUDENTS?

Kristin West, Graduate Student, Curriculum and Instruction; Beverly Boulware (Faculty Sponsor), Elementary and Special Education

Literature circles are considered to be among best practices for reading instruction. Through this class project, I will review multiple resources in order to gather many practical ideas to incorporate literature circles into classrooms. As a result, the presentation will offer organizational forms, helpful tips, and research-based tools. It is easy to lose focus on the “love of reading” in this test-prep, scholastic world we live in. This project hopes to inspire teachers to bring that passion back to their classrooms, while still doing their necessary skill work.

COMMUNICATION CHANGES IN A SIMULATED FLIGHT OPERATIONS CENTER

Emily Sanders, Graduate Student, Industrial/Organizational Psychology; D.J. Steffensen, Graduate Student, Industrial/Organizational Psychology; Glenn Littlepage (Faculty Sponsor), Psychology

Increasing complexities in the workplace have forced companies to rely on teams to meet new challenges (Smith-Jentsch, Campbell, Milanovich, and Reynolds, 2001). In aviation, flight operation centers utilize teams to integrate complex information and make decisions in real-time. Various positions are needed in this work group, each having unique information that needs to be communicated for effective decision-making and problem solving. As teams interact individual team members develop mental models (MM) regarding their work systems. These models enable them to predict and explain events occurring around them. MM also help team members process these experiences for future events (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). Over time, teams develop a deeper understanding of the systems they utilize, the information needed for optimal operation, and the team members that should be communicated with for specific knowledge. Communication was identified as one of the key behavioral processes in teams (Kozłowski & Bell, 2003; Salas, Sims, & Burke, 2005). It allows teams to fully tap into their collective expertise. This study examined the change in the density of communication importance in simulated aviation flight operations centers. Density is a measure of the proportion of dyadic ties present in a network. Social network analysis indicated that (MM) of communication importance became more refined and that the network of communication importance decreased in density following team interaction. Pre-simulation density of communication importance (.523) was higher than post-simulation communication importance (.290). A paired comparisons t-test found this decrease was statistically significant. This indicates that the MM of communication importance are becoming more refined, and the networks less tangled. This supports previous research by Littlepage, Craig, Hein, Moffett, Georgiou, and Carlson (2012) that communication becomes more focused and narrowed, even decreasing in frequency as team members begin to understand their role in context of the team.

HOW TECHNOLOGY CAN BENEFIT STUDENTS AND EMPOWER THEM IN LITERACY

Jamie Fuller, Graduate Student, Elementary and Special Education; Beverly Boulware (Faculty Sponsor), Elementary and Special Education

This class project will gather information concerning how technology in the classroom can enhance and empower middle school literacy. Literature throughout the past decade has shown that technology can enhance literacy development, impact language acquisition, provide greater access to information, support learning, motivate students, and enhance their self-esteem. Indeed, researchers have affirmed that computer technology provides abundant opportunities for students to build or modify their personal knowledge through the rich experiences that technology affords. The class project will present strategies and suggestions for the classroom and does not include human subjects or data.

REDUCE YOUR SIT AND BE MORE FIT

Joel Reece, Graduate Student, Health and Human Performance; Saori Ishikawa, Graduate Student, Health and Human Performance; Vaughn Barry, Faculty, Health and Human Performance; Dana Fuller, Faculty, Psychology; Jennifer, Caputo, Faculty, Health and Human Performance; Jennifer Caputo (Faculty Sponsor), Health and Human Performance

Due to the harmful effects of sedentary behavior, efforts should be made to decrease sedentary time. With the amount of sedentary time spent at work and the growing number of sedentary jobs, the workplace offers a natural laboratory setting to reduce sedentary behavior. The purpose of this study was to evaluate the feasibility of behavioral strategies in reducing sedentary time in the workplace. It was hypothesized office workers receiving coaching on behavioral strategies to reduce sedentary time would have a greater decrease in sedentary behavior and increase in light activity time compared to those office workers not receiving coaching. In addition, this would result in a greater increase in occupational average energy expenditure and average MET level compared to the control group. The feasibility of behavioral strategies to reduce sedentary time in the workplace was assessed using energy expenditure (kcal/min) from the Sensewear® armband. Following baseline measurements, a 1-week behavioral strategy program among office workers titled, Reduce Your Sit and Be More Fit, was implemented among the intervention group. This program included one-on-one counseling, goal setting, and self-monitoring of goals to reduce sedentary behavior. Female office workers who received the intervention ($n = 16$) had a greater decrease in the percent of time spent in sedentary behavior ($p = .023$), a greater increases in the percent of time spent in light physical activity ($p = .027$), a greater increase in average occupational energy expenditure, ($p = .032$), and a greater increase in average occupational MET level ($p = .036$) compared to the control group ($n = 16$). Conclusions: Based on these results, it was feasible to reduce sedentary time in the workplace by implementing behavioral strategies. Future studies may assess the long term effectiveness and health changes associated with decreasing sedentary time.

ON THE EXISTENCE OF PURE STRATEGY NASH EQUILIBRIA IN TWO PERSON GAMES

Hays Whitlatch, Graduate Student, Mathematical Sciences; Zachariah Sinkala (Faculty Sponsor), Mathematical Sciences

In 1950 John Nash defined and characterized the notion of an equilibrium point in n -person games. Known as the Nash Equilibrium the concept has been adapted to apply to economics, political analysis, behavioral sciences and other social sciences. The Nash Equilibria of a pure strategy game is a set of points in which, given that each player has chosen a particular strategy, neither player would benefit by independently changing their strategy. To introduce elementary concepts we explore examples of games that do not contain Nash Equilibria such as rock, paper and scissors, as well as games that do include Nash Equilibria such as the game of chicken. The remainder of the presentation is approached mathematically and with inspiration from political science; that is, we will discover dominant strategies and Nash Equilibria in political science (such as politicians' stances on global warming) by analyzing them as two-player games where we can use math to investigate best response correspondences, develop dominant strategies, and establish existence of Nash Equilibria. We focus on normal form games located in convex and compact subsets of Euclidean spaces and determine methodologies for finding Nash Equilibria by discovery of dominated strategies and iterative deletion of strategies.

LARGE RANGING SNAKES IN A SMALL NATURE PRESERVE: THE SEASONAL MOVEMENT PATTERNS OF TIMBER RATTLESNAKES (*CROTALUS HORRIDUS*) IN MIDDLE TENNESSEE

Eric Nordberg, Graduate Student, Biology; Henrique Momm, Faculty, Geosciences; Vince Cobb (Faculty Sponsor), Biology

Habitat loss and degradation has been a major cause of the decline of timber rattlesnakes across much of its range. In many cases, populations have become separated and scattered throughout suitable habitat. Tennessee is no exception; many areas have become fragmented by urbanization resulting in isolated rattlesnake populations. This study presents data on the seasonal movement patterns and habitat selection for 8 timber rattlesnakes in Middle Tennessee throughout their 2012 active season. The study site is unique in that suitable hibernacula exist within a small nature preserve just 8 km from a major developing city. Snakes were surgically implanted with radio transmitters and located via telemetry every 2-3 days and their movement patterns were quantitatively characterized using Geographic Information Systems (GIS) methodology. Snakes emerged from hibernation in March/April and exhibited extensive movement through forested areas early in the season. By late spring and throughout summer, movement bouts shortened and snakes commonly chose open canopy habitats (old growth fields, cedar glades, or mixed forest openings), often in close proximity to habitat edges, houses, and roads. Net movement varied considerably among individuals (total distance traveled 1.91 – 7.95 km). All snakes spent multiple days at each location (1 – 45 d) and averaged 33 movements or changes in location throughout their active season. During September and early October, snakes made lengthy movements back to a forested ridge for hibernation.

SEXUAL DIMORPHISM IN COMPLETE AND FRAGMENTARY NAVICULAR BONES

Amber Schmuhl, Graduate Student, Sociology and Anthropology; Hugh Berryman , Faculty, Sociology and Anthropology; Hugh Berryman (Faculty Sponsor), Sociology and Anthropology

The current study examines the navicular from 100 adult individuals (50 male and 50 female) from the William M. Bass Skeletal Collection. This study examined the “maximum” measurements from Harris (2009) and then created 9 new measurements using smaller features on the bone. Digital sliding calipers were used to take 11 measurements (2 from Harris and 9 new) and then FORDISC 3.0 (Ousley and Jantz) was used to perform discriminant function analysis to test the measurements for their efficiency. This study used the baseline suggested by Scheuer and Elkington and only measurements with an accuracy rate of 80.0% or greater were considered to be useful. The results were positive and show that the navicular can be useful whether complete or fragmented. 4 of the 11 variables used in this study meet or exceed that threshold. While some individual measurements fell below 80%, the rate increased above 80.0% when combined with at least one other measurement. In conclusion, although the navicular is a small bone of the foot, it can be useful in sex estimation whether the bone is complete or incomplete.

WORKING MEMORY CAPACITY AND INATTENTIONAL BLINDNESS IN INDIVIDUALS WITH AND WITHOUT ADD/ADHD

Melissa Millikan, Graduate Student, Psychology; Jonathan Driver, Undergraduate, Psychology (Honors College); Jillian Hughes, Undergraduate, Psychology; Stephen Schmidt, Faculty, Psychology; Stephen Schmidt (Faculty Sponsor), Psychology

Previous research suggests individuals with ADD/ADHD tend to have lower working memory capacities than those without ADD/ADHD. This study investigated if individuals with ADD/ADHD were more likely to have inattention blindness due to having lower working memory capacities. Inattention blindness is the failure to notice a fully-visible, but unexpected object because attention was focused elsewhere. A backwards digit span task was used to measure working memory capacity prior to participants completing a task that measured whether or not they had inattention blindness. Results did suggest that those with lower working memory capacities were more likely to have inattention blindness; however there was not a significant relationship between having a low working memory capacity and having ADD/ADHD. Unexpectedly, results also showed that females were significantly more likely than males to have inattention blindness.

TERRESTRIAL MOVEMENT AND HABITAT USE OF THE STREAMSIDE
SALAMANDER (*AMBYSTOMA BARBOURI*) IN MIDDLE TENNESSEE

Emily Mattison, Graduate Student, Biology; Brian Miller, Faculty, Biology; Brian Miller (Faculty Sponsor), Biology

The Streamside Salamander (*Ambystoma barbouri*) is a stream-breeding salamander with Tennessee populations restricted to the Nashville Basin. In Kentucky, these salamanders are strongly associated with ephemeral streams located in heavily forested habitat. However, many populations within Tennessee breed in habitat dominated by pasture or cropland. The Streamside Salamander is “deemed in need of management” by the Tennessee Wildlife Resources Agency and is listed as near threatened on the IUCN Red List. The distance traveled and the types of habitats used during the migratory movements of *A. barbouri* are important for considerations of non-breeding terrestrial habitat requirements. The present study examines these components in both fragmented and continuously forested landscapes. In January and February 2012 radio transmitters were surgically implanted into 13 adult salamanders from Wilson County, a continuously forested habitat, and Bedford County, a fragmented habitat dominated by row crops. Each individual was tracked for six weeks near the end of their breeding season. In Bedford County, the average movement was 14.8m with a maximum movement of 42.3m and a minimum of 2.4m. In Wilson County, the average movement was 18.6m with a maximum movement of 36.4m and a minimum of 3.5m. Currently, a second season of data is being collected on *A. barbouri* in Bedford County, Rutherford County, and Wilson County.

IDENTIFYING THE LOCALIZATION OF UBIQUITIN WITHIN MUSCLE CELLS UNDER STRESSFUL CONDITIONS

Jacob Sanders, Graduate Student, Biology; Lynn Boyd (Faculty Sponsor), Biology

The misfolding of proteins in aging cells has been associated with specific neurodegenerative diseases; misfolded proteins tend to trigger degradation pathways. The ubiquitin-proteasome degradation pathway has been well studied and characterized. This pathway functions by the addition of ubiquitin to the unwanted protein. The addition allows for the recognition of the protein by the proteasome, which degrades the protein. Ubiquitin, a highly conserved and small protein, is the focus of our studies; our goal is to track the formation of ubiquitin within the muscle cells of *Caenorhabditis elegans*. We can visualize ubiquitin by using fluorescent proteins tagged to ubiquitin in live cells. We will monitor seven developmental stages including four larval stages and 1, 3, and 7 day adults. Microscopy analysis using an Olympus BX51 and Nikon confocal will also include observations of *C. elegans* under stressful conditions, such as starvation. Cellular response has been shown to change localization of ubiquitin under stressful conditions. Current literature has suggested the formation of various foci, including protein aggregates and nuclear bodies when the cells are aged and stressed. The formation of foci has been associated neurodegenerative diseases. We would like to observe the muscle cells to understand ubiquitin response due to stress.

DEVELOPMENT AND VALIDATION OF THE KOREAN MOTOR PERFORMANCE SCALE (KMPS) FOR CHILDREN WITH INTELLECTUAL DISABILITIES AND AUTISM SPECTRUM DISABILITIES

Kyungtae Kim, Graduate Student, Literacy studies; Jwa Kim, Faculty, Literacy Studies;
Jwa K. Kim (Faculty Sponsor), Literacy studies

The purpose of this project was to develop and validate a motor performance measurement scale for children with intellectual disability in South Korea based on Bruininks-Oseretsky Test (BOT), Test of Gross Motor Development (TGMD), Competency Testing for Adapted Physical Education (CTAPE), and Psycho-Educational Profile Revised (PEP-R). Item response theory (IRT) and Classical Test Theory (CTT) were applied to analyze the data. The scale had a total of 36 items with two sub-factors; cognitive (22 items) and physical (14 items) motor performance. Data were collected from 566 children of ages ranging from 4 to 21 years with Intellectual Disability (ID) and Autism Spectrum disability (ASD) in South Korea. The results showed the differences between children with ID and ASD in their performance on many items of the KMPS proposed. The dichotomous IRT model demonstrated that the KMPS produced a better fit for the Korean children with ID and ASD because other scales by TGMD-2 and BOT-2 are hard to apply Korean children due to item difficulty as well as cultural difference. The KMPS provides familiar items and adjusted item difficulty. It was recommended that more items be developed to appropriately measure the skill levels of children with ID and ASD.

RNPEPL1 EXPRESSION DECREASES IN LPS INDUCED INFLAMMATION

Karen Maynard, Graduate Student, Biology; James West, Vanderbilt University Medical Center, Nashville, TN; Rebecca Seipelt-Thiemann (Faculty Sponsor), Biology

Arginyl aminopeptidase like-1 (RNPEPL1) is an M1 family zinc metalloprotease first characterized in 2008. RNPEPL1 contains the HEXXH(X)18E domain and enzymatic activity crucial to placement in the M1 family. This protease has a high affinity for Met, Glu, and Cit, as well as a broad pH range. Many human members of the M1 aminopeptidase family are well known to play various roles in inflammatory response. In this study, RNPEPL1 RNA and protein levels were analyzed during an induced inflammatory response. Bone marrow derived macrophages from FVB/NJ mice were subjected to 24 hours of LPS treatment and harvested. Microarray and western blot analysis showed that RNPEPL1 RNA and protein levels did decrease significantly in LPS induced inflammation.

THE STUDY OF VOCABULARY: TEACHING AND LEARNING AT ENGLISH LANGUAGE CENTER

Mogbil Almogbil, Graduate Student, Department of Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

This action research study focuses on effective methods of teaching and learning academic vocabulary among students and instructors at the ELC (English Language Center) at Middle Tennessee State University. Academic vocabulary is one of the most important area of emphasis for students learning English because it supports instructional content. This study will follow an action research design within the framework of qualitative inquiry and will attempt to identify best practices for vocabulary acquisition appropriate for adult English learners. Data will include structured interview responses collected from students enrolled at the ELS who are learning English as well as ESL instructors. Analysis will utilize the Constant Comparative Method and varied coding. Findings will offer suggestions, techniques and instructional methods for vocabulary instruction to assist with improving instructional practices.

OBJECTIVE ASSESSMENT OF FUNCTION FOLLOWING HEAD INJURY USING MOVEMENT AND ACTIVITY IN PHYSICAL SPACE (MAPS) SCORES: A CASE REPORT

James Farnsworth, Graduate Student, Health and Human Performance; Minsoo Kang (Faculty Sponsor), Health and Human Performance

The purpose of this case report is to highlight the use of an objective functional measure, the Movement and Activity in Physical Space (MAPS) scores following injury. The participant was instructed to wear a beeper sized accelerometer on her hip and to carry an on-person Global Positioning System (GPS) receiver at all times for 10. These devices measure physical activity (intensity) and location (latitude/ longitude). Daily MAPS scores were calculated by combining data from the GPS and accelerometer for each day during the recovery period to assess the patient's level of function in free-living conditions. The MAPS data, representing the patient's interaction within her environment, were analyzed to provide an objective measure of function following injury. Progress was monitored during the concussion recovery process using GPS and accelerometers creating MAPS scores. Findings indicate that MAPS scores were low while the participant was symptomatic and increased as she became asymptomatic. In situations where accuracy of reported symptoms may be a concern, this measure may provide a way to verify the validity of self-reported symptoms.

LATENT CLASS ANALYSIS OF HEALTH RISK BEHAVIORS AMONG US ADOLESCENTS.

Youngdeok Kim, Graduate Student, Health and Human Performance; Jim Farnsworth, Graduate Student, Health and Human Performance; Minsoo Kang, Faculty, Health and Human Performance; Minsoo Kang (Faculty Sponsor), Health and Human Performance

Physical activity and sedentary behaviors are associated with higher risk of obesity among adolescents; however, little is known for the joint associations of physical activity and sedentary behaviors with obesity. The purpose of this study was to identify the latent sub-populations of US adolescents based on their health risk behaviors (i.e., physical activity and sedentary behaviors) and to examine its relationship with obesity. Data from a total of 13,827 adolescents who participated in Youth Risk Behaviors Survey (YRBS) during 2010-2011 were analyzed. Six health risk behaviors were used to predict the latent sub-populations. Latent class analysis (LCA) with the covariates (i.e., gender and grade) and a distal outcome of obesity (i.e., BMI \geq 95th percentile by age and gender) was performed using Mplus v6.2. Complex sampling scheme of YRBS was accounted for all analyses to estimate the parameters in population level. LCA with three latent sub-populations showed relatively good data-model fits. The first latent sub-population (35.7%) consisted of adolescents who were highly physically active and less sedentary. The second sub-population (18.2%) was highly physically active and sedentary, and the third sub-population (46.1%) was modestly physically active and sedentary. The probabilities of being obese for each sub-population were 6.5%, 19.9%, and 14.8%, respectively. The results clearly implied that reducing sedentary behaviors and increasing physical activities may reduce the risk of obesity among adolescents. Furthermore, sedentary behaviors were shown to be more crucial health risk behaviors related to obesity than physical activities.

COMPUTATIONAL MODELING AND OPTIMIZATION OF BLAST MITIGATION

Zack Spears, Graduate Student, Computational Science; Andrew Corrigan, Staff, Naval Research Laboratory; John Wallin (Faculty Sponsor), Computational Science / Physics and Astronomy

In a world where consulates and other government buildings are targeted every day by terrorist groups, blast protection becomes a very real concern. Many modern buildings are built in large cities with little room for protection by distance from the road. This makes the need for blast walls paramount. Blast walls which are effective are often large and unattractive and are not ideal for the visual appeal of the government buildings. The need then arises to design blast mitigation, which is relatively inexpensive and minimally invasive. The tests needed to design such a wall would be prohibitively expensive if done in a real world testing method. Computational modeling of the effects of a blast with a blast wall prove to be much more affordable and more practical. To optimize the design of the blast wall however turns out to again be prohibitively expensive if standard finite difference type optimization is used over a large number of points on the blast wall. With this in mind, an adjoint solver is implemented to get a much more intuitive iterative process and thus require much fewer runs to reach the optimal design. Adjoint solvers also require a good bit of storage since every step of the forward run is needed for the adjoint run, thus a checkpointing scheme which minimizes disk writes was used. All of this combined makes for a much quicker and much less painful method of designing blast protection.

AN EXAMINATION OF INSTRUCTIONAL METHODS FOR TEACHING DIALOGUE PARTS IN JAPANESE

Saori Endo, Graduate Student, Educational Leadership; Craig Dorothy (Faculty Sponsor),
Educational Leadership

This action research study examines the importance of learning textbook dialogues and the effectiveness of teaching methods for teaching textbook dialogues from memorization, role-play, and Total Physical Response Storytelling (TPRS) for college learners in an elementary Japanese class at Middle Tennessee State University. This study will incorporate qualitative methods to gather data from participants. Data will consist of: a) participant surveys, b) test scores, c) interview responses, and c) researcher field-notes. Participating students will be surveyed on the current teaching methods of dialogue included in the adopted textbook. After they examine specific teaching methods, memorization, role play, and TPRS, they will be surveyed again and their opinion taken regarding the effectiveness of the new teaching methods. Furthermore, data will also include post-test scores with regard to the effectiveness of the new teaching methods. Findings will be shared with instructors in the Japanese program at MTSU to improve the curriculum and the way textbook dialogue is taught.

PRONUNCIATION PROBLEMS AMONG MTSU STUDENTS WHO ARE LEARNING ARABIC

Ahmad Altaleb, Graduate Student, Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

This study attempts to investigate the difficulties MTSU students encounter when pronouncing certain Arabic words. The study involves English and Arabic rules to demonstrate some of the differences between the two languages. All participants in the study are undergraduates enrolled in the Arabic Program at Middle Tennessee State University. The participants have never been to any of the Arabic-speaking countries, therefore, they do not have any kind of exposure to a native Arabic environment. This study attempts to provide insight and assist Arabic instructors with providing helpful suggestions and teaching strategies that will reduce future problems regarding pronunciation of Arabic words by non-Arab learners. The research reflects student needs and findings will offer suggestions regarding the two languages. In addition, the findings will offer suggestions, techniques, and strategies to teach the Arabic language.

IMPROVISATION IN PERFORMANCE: A SURVEY OF SECONDARY CHORAL MUSIC EDUCATORS IN TENNESSEE

Janie Delk, Graduate Student, Music; Jamila McWhirter (Faculty Sponsor), Music

In choral music education, the focus of instruction tends to be on performance. With the increased importance on individual student performance assessments, limited rehearsal time, and planning time devoted to the new teacher evaluation system choral educators may find themselves neglecting to address music standards emphasizing creativity, such as improvisation. The purpose of this study will be to determine how secondary choral educators in Tennessee incorporate improvisation in the choral ensemble setting. A review of the related literature will be used to formulate a survey instrument. Areas of examination for the study will include: a) the attitude of choral educators toward the inclusion of improvisation in the rehearsal setting, b) the frequency of improvisation in the choral ensemble setting, and c) the age appropriate strategies, techniques, and assessments used when teaching improvisation in a choral ensemble. Data collected from this online survey will be reported as frequencies and percentages. The results of this pilot study will be used as a basis for further investigation and discussion of the importance and benefits improvisation in the choral music classroom.

BENEFITS, DRAWBACKS, AND FACULTY PERCEPTIONS OF CUSTOM TEXTBOOKS IN GENERAL PSYCHOLOGY CLASSES

Jessica Stidham, Graduate Student, Psychology; Caitlin Orman, Graduate Student, Psychology; Teresa Davis, Faculty, Psychology; Mary Ellen Fromuth, Faculty, Psychology; Mary Ellen Fromuth (Faculty Sponsor), Psychology

To remedy rising textbook costs, the use of customized textbooks for college courses has been increasing. The research, however, on the perceptions of these customized textbooks is limited. Due to the time consuming nature of textbook customization, it is important to further assess and evaluate the perceived use and benefits of the overall customized textbook, as well as features included in the customized textbook. General Psychology instructors ($N = 8$) at a midsize state university completed a survey that addressed their perceptions of the overall usefulness of the customized textbook, as well as the usefulness of specific customized features (e.g., handouts, chapter checkups). Results of this study indicated that overall, most ($6/8$) instructors preferred the custom textbook over a traditional non-customized textbook. Also, it was found that most ($5/8$) instructors rated the reduced cost to the student as the most important benefit. The next highest regarded benefit was the inclusion of handouts in the customized textbook. The most commonly reported drawback to the use of the custom textbook was that the book is loose-leaf, and that there is no buy-back option due to the inclusion of the handouts.

SURFACE-BOUND DENDRIMERS AS EXPLOSIVES SENSORS

Jabe Kiri, Graduate Student, Chemistry; Andrienne Friedli, Faculty, Chemistry;
Andrienne Friedli (Faculty Sponsor), Chemistry

Dendrimers are highly branched polymers that have recently been applied as sensors. Here we report results for a series of surface-bound dendrimers designed as explosives sensors. Films and solids of mesoporous silicate were synthesized using F-127 as template in a sol-gel process. After spin-coating (films) and drying (solids), the template was removed by calcining in a programmable furnace up to 600 °C. The m-SiO₂ materials were coated with 3-aminopropyl triethoxysilane to activate the surface. A step-by-step synthesis of three generations of melamine dendrons was performed following the literature procedure of Shantz and coworkers. The dendrimers were modified with phenols designed to entrap 2, 4-dinitrotoluene (DNT) vapor. Thermogravimetric analysis allowed an estimate of the weight percent and composition of the dendronic coating, and IR spectroscopy indicated the presence of expected functional groups in the solid m-SiO₂ samples. Ultraviolet spectroscopy confirmed the presence of pyrazine rings in the films. The films and solids were exposed to DNT vapor and analyzed for traces of DNT by TGA, IR and UV.

DEMOGRAPHICS AND PERCEPTIONS OF TENNESSEE WALKING HORSE NATIONAL CELEBRATION ATTENDEES

Dannie Lowrey, Graduate Student, Horse Science; Warren Gill, Faculty, Agribusiness and Agriscience; Rhonda Hoffman, Faculty, Agribusiness and Agriscience; Rhonda Hoffman (Faculty Sponsor), Agribusiness and Agriscience - Horse Science

The Tennessee Walking Horse National Celebration crowns the World Grand Champion. The gait of the Tennessee Walking Horse has been enhanced through use of pads and action devices and sometimes illegally by soring (application of chemicals). In 2012, the AMVA and AAEP issued a position statement calling for a ban on pads and action devices. Their position is that pads and action devices may disguise soring. Some of the most popular classes at The Celebration have padded horses. The purpose of this study was to survey The Celebration participants to determine demographics and opinion regarding use of pads and action devices. Our hypothesis was that the type of participant (trainer, owner, exhibitor, spectator) would influence their response. A survey was administered during The Celebration. Questions included type of participant, years attended, likelihood of attending if pads were downsized or removed. Data were analyzed using PROC FREQ with a chi-square option in SAS. 346 surveys were collected. Survey participants included 41% spectators, 22% exhibitors, 27% owners, and 10% trainers. Of those surveyed, 7% were first year attendees, 11% for 2-5 years, 30% for 6-15 years, 31% for 16-30 years, and 21% for 30+ years. When asked if they would continue to attend if pads were eliminated, 55% said they would, 21% were unsure, and 24% would not attend. The chi-square analysis indicated that trainers, were less likely ($P = 0.042$) to attend if pads were eliminated. When asked if their attendance would be affected if a smaller pad was required and the action device removed, 29% would be more likely to attend, 31% less likely, 25% were unsure, 6% indicated it would make no difference, and 9% wrote in an answer. Results of this survey provide answers about The Celebration attendees and perceptions of pads and action devices.

PREDICTING G1 PHASE TIME DISTRIBUTION BY COMPUTATIONAL MODELING OF THE BISTABLE RB-E2F SWITCH.

Zack Jones, Graduate Student, Computational Sciences; Shawn Garbett, Faculty, Vanderbilt Medical Center; Carlos Lopez, Faculty, Vanderbilt Medical Center; Zachariah Sinkala, Faculty, Mathematical Sciences; Zachariah Sinkala (Faculty Sponsor), Mathematical Sciences

Heterogeneity of cellular growth response has been shown to be a major factor in oncogene addicted cancer treatment relapse. G1-S transition time strongly correlates in overall inter-mitotic time for a population of genetically identical cells. Both the G1-S transition time and overall inter-mitotic time possess a highly variable distribution which has been shown to fit an exponentially modified Gaussian distribution (EMG)³. The G1-S transition in the mammalian cell cycle through the restriction point (R- point) is tightly regulated by the Rb-E2F pathway, which has been shown to function as a bistable switch¹. An Rb-E2F model has been coarse grained into a robust minimal model consisting of three nodes, which possess the same switch like behavior as its expanded model². Using computational methods, our findings suggest that variation in the regulation of the retinoblastoma (Rb) node in our expanded Rb-E2F model is the principal driver of variation in G1 phase time. Simulations varying this regulation are consistent with experimentally observed data that fit the EMG model. This suggests that proteins involved in regulation of the Rb node are potential targets to prevent relapse of non-small cell lung cancer (NSCLC).

RESOURCE, POWER, AND THREAT: REPRESENTATION OF THE ENGLISH LANGUAGE IN CONTEMPORARY CHINESE NEWSPAPERS

Mo Li, Graduate Student, English; Mohammed Albakry (Faculty Sponsor), English

In a corpus of about 70 articles from the People's Daily and about 60 articles from the People's Daily Overseas from January 1, 2010 to December 31, 2012, the study examined the representation of the English language and the implied representation of its core countries, especially the U.S. The People's Daily is the official mouthpiece for the political views of the Communist Party of China with an intended audience of readers in mainland China. The People's Daily Overseas is issued by the same committee but with an intended audience of Chinese or Chinese-descendent readers living or working overseas. For the purpose of data collection, the researcher applied Demont-Heinrich's categorization of English Central (EC), English Somewhat Central (ESC), and English Peripheral (EP). This study concludes that both newspapers perceive the English language (and the American influence behind it) as a resource, power, and threat to a globalized China. While the knowledge of the English language has empowered China, it has also threatened the linguistic, cultural, and ethnic independence of China. The People's Daily Overseas is even more heavy-handed in revealing the competing position between English language and Chinese language. This research helps to illustrate the Party's prevalent view on the English language and the tension between China and Western forces, especially the U.S.

SYNTHESIS, PURIFICATION AND FTIR ANALYSIS OF ^{13}C LABELED α -HELICAL MODEL PEPTIDE (AAAAK)4AAAAK

Sneha Potana, Graduate Student, Chemistry; Chengshan Wang (Faculty Sponsor), Chemistry

The function of a protein is dependent on its structure. Minor change in protein structure is known to drastically affect its function and cause dreadful diseases in living organisms. Therefore, elucidation of relationship of protein structures with their functions is considered to be of utmost importance to understand the pathway of diseases. Most of the protein structures are addressed by X-ray crystallography, which requires proteins to form a single crystal. However, lots of proteins cannot form single crystals. Consequently, other methodologies have been used to clarify protein structure. Recently, Fourier Transform Infrared Spectroscopy (FTIR) has been found to successfully elucidate the structure of peptide (AAAAK)4AAAAK (a model peptide for α -helix) with ^{13}C labeled carbonyl group (C=O) in deuterated water (D_2O). Since D_2O is not biologically relevant, we propose to apply FTIR technology with ^{13}C labels in plain water by attenuated total reflection (ATR) technique which can reduce the path length to micrometers to preclude H_2O IR absorption. ^{13}C labels have been introduced into (AAAAK)4AAAAK at various positions in the peptide. The synthesis was confirmed by mass spectrometry and the peptide samples were purified by HPLC. The structure remains to be elucidated using ATR-FTIR.

LEARNING STRUCTURES FOR ENGLISH LANGUAGE LEARNERS AND LITERACY

Ebony Isom, Graduate Student, Elementary and Special Education; Beverly Boulware (Faculty Sponsor), Elementary and Special Education

The purpose of this project is to examine and discuss the best learning structures to assist English Language Learners (ELLs) in literacy. Due to the increasing number of ELLs in schools, finding effective ways to teach literacy determines if these students will succeed in becoming adequate readers. The project will review literature focusing on various learning structures to determine which structures best assist with teaching ELLs to speak, read and comprehend a second language. Some learning structures possible in teaching English language learners in literacy include focusing on oral language development, read alouds, shared readings, small group reading instruction, phonemic awareness/phonics, and independent reading. The presentation will provide suggestions based on literature.

IMPACT OF VOCABULARY INSTRUCTION METHODS ON RETENTION AND ACQUISITION IN A FOREIGN LANGUAGE CLASSROOM

Jacob Truax, Graduate Student, Educational Leadership; Dorothy Craig (Faculty Sponsor), Educational Leadership

This study attempted to determine which of eight vocabulary instruction methods are the most effective at accessing the long-term memory processes of students in a second year French class. The study explored a total of 56 vocabulary terms that were selected on a similar theme: cooking and eating. The 56 vocabulary terms were broken down into eight sets of seven words each. Each set of vocabulary was taught using a different vocabulary instruction method: 1) Pictures from a power point, 2) realia, 3) manipulatives (Total Physical Response method subset), 4) acting out (True TPR), 5) rote memorization 6) reading, 7) keyword association, and 8) TPR storytelling. For each method except for keyword association, participants were given 20 repetitions of the vocabulary term during the explicit instruction phase. Over the course of the unit, each vocabulary term was given an equal number of repetitions during reading and other in-class vocabulary and grammar-building activities. This action research study adopts a quantitative, experimental design. A pre-test placed the participants into three categories—low, medium and high performers. A post-test evaluated each category's retention rate for the eight sets of vocabulary terms. The results of the both tests were analyzed to see which terms had the best retention from the class. Finally, a student exit survey assisted in evaluating the participants' opinions of the various teaching methods in terms of instructional efficacy and interest level.

I LIKE MYSELF: ASSESSING THE USE OF PERSONAL OR IMPERSONAL
QUESTIONS IN WRITTEN RESPONSES OF ENGLISH AS A FOREIGN
LANGUAGE STUDENTS

Trevor Renfro, Graduate Student, Educational Leadership; Meghan Sanders (Faculty Sponsor), Educational Leadership

In recent years there has been an increase to promote oral and written English skills in Asia. As part of this movement, students of a variety of ages have begun taking conversational English classes. Classes involve asking students to answer questions in English in order to practice their vocabulary skills. Students are meant to reflect on questions and answer in fluid English using vocabulary they have previously learned. This study seeks to examine which types of questions evoke longer and more detailed written responses from Asian English as a Foreign Language (EFL) students. In particular there will be a comparison between impersonal questions and personal questions as to which will yield longer responses from participants. The adult participants will respond to a series of questions via e-mail. Participants also will complete surveys regarding their preferences in the types of questions they are asked.

DEVELOPING AUTONOMOUS ROBOTS IN AN OPEN ENVIRONMENT

Marques Fulford, Graduate Student, Engineering Technology; Ahad Nasab (Faculty Sponsor), Engineering Technology

Lack of funding is a major issue facing the future of colleges and universities. The ways in which these institutions have begun reducing costs have been by limiting the number of courses offered in addition to reducing departmental budgets. Often times professors are forced to make due with outdated materials and lab equipment. This can lead to lower enrollment and retention of students whom switch to universities with higher budgets. One-way in which, universities can lower the cost of their programs without sacrificing quality is using open hardware and open source software. Open source software is free software in which user have the rights to use and change the code to fit their needs. The fact that the software is free means that universities are not spending money on yearly licenses. Often times this software is supported by a large community of users who improve the software continuously. The software titles being used in this study are the Arduino and Fritzing. Open source hardware are materials supported by the open source movement which provides users enough information and support to build the device in question. As a result, universities are able to build the hardware at a fraction of the cost. In this study, the Arduino Uno development board was used. The focus of this study is to determine how the quality of the education from the student's perspective changes when they are exposed to equipment and software that is affordable and current for them to use in a classroom setting. The students will be using the open software and hardware to develop autonomous robots. If the use of open source software and hardware is successful students will have a stronger knowledge of the topic while the cost to the institution decreases.

PLANNING AND DESIGN STORM WATER PREVENTION PLANS

Corey Willmore, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

The accepted methods of planning, designing, and organizing effective storm water pollution prevention plan (SWPP). Planners often begin with a step by step procedure beginning with basic best management practices such as; spill prevention, visual inspections, jobsite housekeeping, etc. This often starts with worksheets and guidelines that are passed down or even required by sponsors state or local. These guidelines are often to meet high restrictions set by National Pollution Discharge Elimination system permits (NPDES). Taking into account weather this is a low or heavy rainfall area. The site itself must be taken into perspective for area for restraining runoff and basic development of the SWPPP. The basic steps for implementing a SWPPP are: a) planning and organization, b) assessment, c) best management practice identification, Implementation,d) evaluation and monitoring.

ISOLATION AND EFFECTS OF VAGINOLYSIN ON MONOCYTES

Corbett Ouellette, Graduate Student, Biology; Anthony Farone, Faculty, Biology;
Anthony Farone (Faculty Sponsor), Biology

Vaginolysin, a cholesterol dependant cytolyisin, is a toxin produced by *Gardnerella vaginalis*, the leading cause of bacterial vaginosis. Bacterial vaginosis, if contracted while pregnant can lead to preterm birth, resulting in a child with underdeveloped organs. The purpose of this project is to determine if vaginolysin stimulates the same inflammation as labor, hence, vaginolysin is the agent responsible for preterm birth for patients who contract bacterial vaginosis.

RECOMMENDED GUIDELINES FOR THE INTERPRETATION OF MOLD SPORE AIR SAMPLE ANALYTICAL RESULTS

Michael Collins, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

The generally accepted view for interpreting analytical results of mold spore air sampling is to conduct a direct mathematical comparison of interior versus exterior analytical results. This study seeks to expand on a typical direct comparison by presenting additional variables associated with conditions at the time of sampling to assist the industrial hygienist in forming a more complete and defensible conclusion. Various sampling protocols exist for mold spore air sampling; however this study will focus on the use of Zefon Air-O-Cell air sampling cassettes and the associated recommended sampling methodology. This study will draw on representative analytical data obtained over the past three years from mold assessment and mold remediation project locations in the Southeast United States. As you will see, based on the data presented, enormous variability exists associated with analytical data for mold spore air sampling. Multiple factors, such as sampling procedure, weather conditions, and analytical laboratory reporting introduce variation into any sampling event. This study will present several recommendations regarding the interpretation of mold spore air sampling analytical results to better equip an industrial hygienist tasked with providing recommendations based on the analytical results.

RUNNING SHOE TECHNOLOGY REVOLUTION

Festus Chemaoui, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

Running shoes are undergoing rapid changes in the 21st century. In the past, shoe use to be made with heavy cushioning as it had been seen as the best way to protect runners from the hard surface. Companies have been rolling out a different shoe every year. Nike for example has the vomero series; it started from just vomero and every year they add a number and now in 2013 they have vomero 7. Brooks on the other hand has the Ghost series, which is at ghost five after five years. The world being a competitive environment means that companies should be in a rapid technological improvement in order to meet its customer's demands. The naming of shoes in series is a reaction to customers review on the shoe. This is because many people are not elite runners who get their feet molded so that a shoe that specifically fit their feet can be made. This was not the case ten years ago where the same shoe can be in sale for several years without any redesigning. Recently a wide variety of lighter, more minimally designed shoes have been preferred. These changes are seen because research has confirmed that lighter, more flexible, lower-to-the-ground shoes enable feet to move similarly to how they move when barefoot, and that allows the most natural and efficient form possible. To attain this, new materials are being used to make shoes. The research will show how technology is being applied in transforming running shoes to better lighter shoes for injury prevention.

BECOMING READING DETECTIVES: A PILOT STUDY CONSIDERING THE
IMPACT OF INFERENTIAL COMPREHENSION INSTRUCTION ON TEXTUAL
UNDERSTANDING AND KNOWLEDGE ACQUISITION

Penny Thompson, Graduate Student, Literacy Studies; Jennifer Cooper, Graduate Student, Literacy Studies; Holly Marshall, Graduate Student, Literacy Studies; Michelle Hasty, Graduate Student, Literacy Studies; Amy Elleman (Faculty Sponsor) Literacy Studies

The researchers conducted a randomized control trial to consider the impact of teaching inferencing strategies or close reading strategies focused on the literal content of text. Participants were readers in grades 2-5 in summer programs at two local community centers. Research procedures randomly assigned children to one of three groups: 1) a reading detective (inference) condition in which we taught children to engage in text by using contextual clues and connecting information in the text with their background knowledge, 2) a reading explorer (literal/knowledge) condition in which we taught the children how to find important information and answer literal questions, and 3) a no treatment control. Participants were taught by trained doctoral students. The researchers considered the effects of the program on multiple measures of comprehension including general comprehension, content area comprehension, and knowledge acquisition. In this preliminary analysis, only one outcome, a custom measure of knowledge acquisition showed significant differences between the treatment groups and control. There were no significant differences between the two conditions on this measure.

A SURVEY OF JOB HAZARDS WITHIN THE AVIATION MAINTENANCE PROFESSION

Joshua Wagner, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

This study explores the jobs and associated hazards within the aircraft maintenance profession. For this study, OSHA 300 record-able incidents from a Nashville-based aircraft maintenance facility were used. This particular facility is full-service, meaning mechanic, sheet-metal, interior, and paint work is all done in one location. This gives a broad and in-depth survey of the varying tasks and their associated hazards within the aircraft maintenance industry. Statistics have been gathered from the 2012 OSHA 300 record-able incidents report. From there the recorded incidents have been linked to their particular task or job. Job hazards were examined, and their severity and frequencies were used to determine jobs or tasks where safety or procedure improvements need to be implemented. The aim of this study is to improve workplace safety within the aircraft maintenance profession. With this goal in mind, various safety related suggestions and recommendations were made. These ranged from personal protection equipment (PPE), procedural changes for various tasks, better compliance with OSHA and TOSHA standards, and improved administrative rule implementation.

EXAMINING THE PSYCHOMETRIC PROPERTIES OF THE GHANA GLOBAL SCHOOL-BASED STUDENT HEALTH SURVEY (GSHS)

Samuel Sowah, Graduate Student, Health and Human Performance; Minsoo Kang, Faculty, Health and Human Performance; Andrew Owusu, Faculty, Health and Human performance; Andrew Owusu (Faculty Sponsor), Health and Human Performance

Risky Health behaviors contribute significantly to adolescent mortality and to overall global burden of disease. Reliable and valid assessments of prevalence and patterns of adolescent health-risk behaviors are pre-requisites for sound policy making and program planning. The Global School-based Student Health Survey (GSHS) is a generic instrument for assessing adolescent health risk behaviors and protective factors among WHO member countries. The primary aim of the present study was to examine internal consistency reliability and convergent validity of the 2008 Ghana GSHS.

Methods: A total of 7,137 Senior High School students participated in this self-reported survey. The overall Cronbach's Alpha for the 2008 Ghana GSHS was 0.61, indicating acceptable internal consistency. However, only three of the modules (Alcohol, Violence & Unintentional injury and Personal Hygiene) showed acceptable internal consistency with alpha values greater than 0.6. Four of the modules (Alcohol, Tobacco, Violence & Unintentional injury and Personal hygiene) had CR values greater than 0.6 indicating good reliability. None of the modules, however, had AVE values over 0.5 indicating low convergent validity. The 2008 Ghana GSHS showed fairly acceptable internal consistency, but it provided low evidence of convergent validity indicating need to improve psychometric properties of the instrument.

VOICE AND CHOICE: CRITICAL RESPONSE TO RELEVANT TEXTS

Michelle Hasty, Graduate Student, Literacy Studies; Jeanne Fain (Faculty Sponsor), Elementary and Special Education and Literacy Studies

This study examined how teachers can make literacy relevant for students through personal, critical responses to text. Overall goals were to explore the ways students' in- and out-of-school writing connects and to learn how students would respond in writing to literature they selected. This project was grounded in Vygotsky's (1978) theories of learning as social interaction and the zone of proximal development; Moll, Amanti, Neff, and Gonzalez' (2001) funds of knowledge theories; Street's (1995) New Literacies work; Lewis's (2000) adaptation of Rosenblatt's (1993) reader response as a critical stance; and Graham and Hebert's (2010) work connecting reading comprehension to writing tasks. Participants were African-American, third through fifth grade students in an urban after-school program for financially impoverished families. A qualitative framework was employed over three phases of research: 1) focus group sessions discussing students' in- and out-of-school literacy practices, 2) literature selection, and 3) writing workshop responding to the text. Data was analyzed using the constant comparative method, a grounded theory approach, and Discourse Analysis (Glaser & Strauss, 1967; Gee, 2006). Patterns were examined, and categories emerged from the first research phase, such as Discourse of School, Discourse of Identity/Agency, Funds of Knowledge Discourse, and a Discourse of Connections. From the writing phase, categories based on Fulwiler's (1989) categories for reading comprehension were found, such as critical awareness, emerging action, and empathic statements. The students purposefully integrated the Discourses in their writing, transforming the Discourse of School into a Discourse of Connections by using the vocabulary of school for their own use in their written responses to text. When students felt empowered to use their own voices and choices in their reading and writing tasks, they could act as Text Critics (Freebody & Luke, 1999) by examining power structures, missing voices, and issues of justice.

IDENTIFYING HAZARDS AND BARRIERS IN A PETROLEUM COMPANY FOR IMPLEMENTING THE ISO 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

Selin Aras, Graduate Student, Engineering Technology - Occupational Health and Safety;
Carol Boraiko (Faculty Sponsor), Engineering Technology

Turkish Petroleum Company (TPAO) has exploration, drilling, production and well completion, natural gas storage, oil and natural gas pipeline projects activities in the oil sector. There are kinds of critical hazards in this industry. Identifying the hazards and implementing the Occupational Health and Safety Management System to minimize the risks and prevent the accidents/injuries is the most effective method to control the hazards. TPAO has safety and health programs, however work-related accidents and injuries still occur. This research is focused on the hazard identification, risk assessment and employee's awareness and competence following the voluntary standard, ISO 18001 Occupational Health and Safety Management Standard. These risk assessments are related to working at height, confined space, and emergency preparedness on the processes. The purpose of this study is to define the improvements and/or changes that are needed to upgrade TPAO's safety and health programs, and measure the employee's perception of their current safety and health programs with surveys to identify the barriers that may prevent changes.

SYNTHESIS, CHARACTERIZATION AND SOLAR CELL FABRICATION OF DONOR-ACCEPTOR BULK HETEROJUNCTION POLYMER SOLAR CELLS

Ameen Alsubhi, Graduate Student, Chemistry; Dwight Patterson (Faculty Sponsor), Chemistry

According to the EPA, 34% of the greenhouse gas emission in the United States comes from electricity production. Over 70% of the U.S.'s electricity comes from burning fossil fuels. Harvesting energy from the sun, polymer solar cells in particular, would make exceptional changes in energy generation, which would reduce greenhouse gases emissions from burning fossil fuels. The utilization of the photovoltaic effect to generate electricity from solar energy represents an attractive solution to the growing need for clean and renewable energy sources and protects the earth by limiting greenhouse gases emissions. Solution processed polymer solar cells became one of the important candidates because of the flexibility, low cost, light weight, and ease in which they produced. These solution-processed polymer utilize the concept of bulk heterojunction (BHJ) in the active layer. The BHJ layer consists of a polymer such as poly(3-hexylethiophene) (P3HT) as electron donor and an acceptor with a relatively lower LUMO such as fullerene derivatives. However, the active layer suffers from phase separation, induced by thermal annealing or exposure to sunlight. Phase separation reduces the efficiency and lifetime of the polymer solar cell. To overcome this, donor-acceptor materials have been used as a compatibilizer or as moieties on different acceptors in order to increase the donor/acceptor interface. To date, the use of P3HT as the donor and PCBM as the acceptor in the active layer represents the most efficient and widely investigated BHJ solar cell, with power conversion efficiency approaching (PCE) 8%. The coupling of [60]PCBM with P3HT have been achieved and tested. Still, there are several important candidate such as graphene and [70]PCBM that been utilized as an acceptor in the solar cell that reported with the highest PCE of ~7.4%.

ANALYZE AND VISUALIZE NAIVE BAYES CLASSIFIER ON PUBMED CITATIONS

Sachintha Pitigala, Graduate Student, Computational Sciences; Cen Li (Faculty Sponsor), Computer Science

PubMed is one of the most comprehensive citation database in the field of Biomedicine. It contains more than 22 million citations from Medline and life science journals published in all over the world. However, retrieving relevant information from PubMed is becoming more challenge due to its size and rapid growth. Traditional key-word based searches often end up in too many citations which are not directly relevant to the information need. Text classifiers developed by the machine learning community will be an answer to find the most relevant document set for a given query. This study tested the feasibility and efficiency of Naive Bayes text classifier in the context of information retrieved from PubMed. TREC 2005 Genome dataset was used in this study. Five Query templates were selected out of 50 query templates. Experiment results were visualized to study the distribution of DR, PR and NR documents and classifier efficiency. Term frequency (TF), Term Frequency-Inverse Document Frequency (TFIDF) feature representation and Mutual Information (MI) feature selection method were experimented in this study. Principal Component Analysis (PCA) was used to reduce the dimensionality of feature vectors in order to visualize the documents in 2D plots. Conclusions based on this study are: 1)TF feature representation method performs better than TFIDF feature representation, 2) Number of features in MI method is heavily depend on the query, and 3) DR, PR and NR documents had very wide spread over the feature space. Therefore, Naive Bayes classifier didn't perform well in this context. Bootstrap methods can be used as a future study to improve the classifier performance.

TEAM PERFORMANCE IN AEROSPACE SIMULATIONS

Artyom Ivakh, Graduate Student, Psychology; Amber Fritsch, Graduate Student, Psychology; Glenn Littlepage (Faculty Sponsor), Psychology

Within the NASA Flight Operations Center-Unified Simulation (FOCUS) Lab, an airline simulation capstone course for the aerospace disciplines at Middle Tennessee State University, the positions of pilot, weather and forecasting, crew scheduling, maintenance control, ramp tower coordinator, flight operations data, and flight operations coordinator work interdependently to achieve goals and objectives, such as safety, overall efficiency, and high job performance. This study will attempt to investigate the relationships between action and transition processes that the teams engage in at the NASA FOCUS Lab based upon a similar model. In addition, this study will investigate the relationship of pre-test measures and individual performance measures to team performance measures and transition performance. Performance of students and teams within the lab will be measured in various ways. Some of those are self-reported measures from the students, while others will come from observers' ratings. Prior to the first simulation, students will be trained on their positions and complete a knowledge-based pre-test after the training. The pre-test serves as a baseline for students' knowledge going into the first simulation. There are several measures of teamwork and measures that capture revenue and delay loss. Students will be evaluated on an individual level through the use of position specific, individual performance measures. Last, a transition measure will also evaluate team participation in the After Action Reviews (debriefing) following each simulation.

SUPERCONDUCTING MAGNETIC ENERGY STORAGE SYSTEMS

Pan Li, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

The current presentation describes the development of superconducting magnetic energy storage systems. Superconducting magnets play an important role in current technology. It can be used in many different fields. It can be used in energy storage systems. Nowadays, there are many different kinds method to storage energy. The most popular is the integration of fluctuating renewable energy. These included pumped hydroelectric energy storage (PHES), underground pumped hydroelectric energy storage (UPHES), compressed air energy storage (CAES), battery energy storage (BES), flywheel energy storage (FES), supercapacitor energy storage (SCES), superconducting magnetic energy storage (SMES), hydrogen energy storage system (HESS). We will compare these systems and study the advantage about superconducting magnetic energy storage systems. And we can study some application of superconducting magnetic energy storage systems.

CALDECOTT WINNERS: LEADING OR LATE IN EMPOWERMENT THEMES?

Erin FitzPatrick, Graduate Student, Elementary and Special Education; Ashley Whitaker, Graduate Student, Elementary and Special Education; Beverly Boulware (Faculty Sponsor), Elementary and Special Education

This class project seeks to determine if Caldecott Winners have preceded or followed sociopolitical progress on themes of empowerment. Several of the Caldecott winners who demonstrated the most obvious commentary on specific empowering themes were selected for review. Through a careful examination of the selected titles, literary factors will be analyzed to determine how geographic setting or cultural identity might impact a student's response to the text. This literature-based project does not involve human subjects or data collected as a result of interactions.

DOES SAFETY COME AT A PRICE?

Andrew Ammerman, Graduate Student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

This paper will explore how the level of compensation a worker receives affects the rate of accidents in the workplace. Different industries will be explored and discussion of the characteristics of the usual types of people who perform them will be investigated. The types and severity of the accidents that occur will also be reviewed. The cost of the accidents will be quantified and a cost benefit analysis of lower wages versus paying for accidents will be discussed. There will also be an investigation into the correlation of false accident reports and wages. Results will be submitted to various experts in those industries and feedback will be requested. This research will hopefully lead to more research focused at the workers who appear to be at highest risk for accidents. Legislature could someday be the result regulating higher wages in certain industries and professions. Society can only hope to achieve an adequate level of skill, ensuring safety, in the workforce if adequate wages are supplied.

HOW CAN TEACHERS HELP TO EMPOWER MIDDLE SCHOOL GIRLS WITH LITERACY?

Erin Haywood, Graduate Student, Elementary and Special Education; Beverly Boulware (Faculty Sponsor), Elementary and Special Education

Teens struggle finding themselves in this world and it mainly becomes a struggle in middle school. Teen girls tend to struggle the most, due to pop culture. Teachers are constantly trying to help them find their way in the classroom and in life, but they struggle by being confined to a strict curriculum. With the help of intriguing novels, teachers can accomplish both concepts in their classroom. Novels that show teenage girls that it is okay not to conform to the “norm” and to "be yourself" are a great start. They show strong female characters in their plot that are able to solve tough situations and overcome them for the better. This process will also help the teacher by following the Common Core State Standards that are soon to be within all schools. Teaching with novels rather than teaching the novel is one of the best ways to accomplish empowering our teenage girls and pushing them to strive to become productive women in the future. The presentation will provide suggestions gathered as a result of a class project that examined a variety of novels aimed at teens.

HOW LOW CAN YOU GO? MAXIMIZING H₂O₂ DETECTION USING ZINC OXIDE-CARBON NANOTUBE COMPOSITES

Tuphan Devkota, Graduate Student, Chemistry; Mulugeta Wayu, Graduate Student, Molecular Biosciences; Ryan Spidle, Faculty, Missouri State University; Adam Wanekaya, Faculty, Missouri State University; Charles Chusuei, Faculty, Chemistry; Charles Chusuei (Faculty Sponsor), Chemistry

A novel electrochemical H₂O₂ sensor based on zinc oxide-carbon nanotubes (ZnO-CNTs) composites is proposed. ZnO nanostructures, prepared by a simple hydrothermal synthesis, were attached to COOH-functionalized multiwalled carbon nanotubes (COOH-MWNTs) using ultrasonication to form the ZnO-CNTs composites. These nanocomposites were incorporated onto glassy carbon electrodes (GCE) surface via Nafion film to obtain Nafion/ZnO/COOH-MWNTs/GCE electrochemical sensor. The electrocatalytic behavior of the sensor was investigated using cyclic voltammetry and chronoamperometry. The nanocomposites showed a linear response for H₂O₂ concentration in 1-20 mM concentration range in cyclic voltammetry experiments. The comparison of cyclic voltammograms with other analytes such as uric acid, ascorbic acid, folic acid and lactate indicates selective detection of H₂O₂ in the presence of these interfering electroactive substances. In the chronoamperometry experiments, the novel materials showed quick response time of less than 10 s and high sensitivity (as low as 5 μ M) toward detection of H₂O₂ implying that the proposed material can be a highly efficient electrochemical sensor for the detection of H₂O₂.

A QUALITATIVE STUDY OF THE SUMMER YOUTH SCIENCE LEADERSHIP INTERNSHIP AT THE GREAT SMOKY MOUNTAINS INSTITUTE AT TREMONT

Zena Tenenbaum, Graduate Student, Biology; Kim Sadler (Faculty Sponsor), Biology

This longitudinal study was undertaken to determine if interns of the Summer Youth Science Leadership (SYSL) program at the Great Smoky Mountains Institute at Tremont (GSMIT) left the program with an extensive understanding of natural history, environmental stewardship, and scientific methodology. The study was also undertaken to determine if the former interns followed a science and/or environmental education career trajectory. A qualitative and constant comparison design was chosen to answer the initial objectives. Most of the interns did leave the program with an extensive understanding of natural history, environmental stewardship, and scientific methodology. The internship had a positive impact for many of the interns following a career in science and environmental education. The interns also reported that the internship benefited them in other ways such as confidence in sharing knowledge with others about biology/environmental education by teaching or developing environmental education programs of their own. This study determined that GSMIT is accomplishing its mission of connecting people and nature through its SYSL program.

REDUCING MEDICARE EXPENDITURES: EMERGENCY MEDICAL SERVICES UTILIZATION IN RUTHERFORD COUNTY, TENNESSEE

Amanda Cole, Graduate Student, Health and Human Performance; Norman Weatherby Faculty, Health and Human Performance, Randy White, Community Member, Rutherford County Emergency Medical Service; Mike Nunley, Community Member, Director, Rutherford County Emergency Medical Service and MTSU Health and Human Performance; Linda Bloodworth, Graduate student, NHC and Health and Human Performance; Vickie Harden, Graduate student, Health and Human Performance; Tracy Morris, Graduate student, Health and Human Performance; Renata Alexandre, Faculty, Health and Human Performance; Norman Weatherby (Faculty Sponsor), Health and Human Performance

Persons age 65 and older, who are 13% of the U.S. population, account for 33% of all hospitalizations and 43% of health care expenditures. Medicare covers most but not all of these costs. The most expensive Medicare beneficiaries have multiple chronic conditions and functional impairments. They are 25% of beneficiaries and account for 85% of all Medicare spending. We need to identify and provide prevention services to this population before they enter the long-term process of hospitalization and rehabilitation. One gateway into intensive Medicare use is the frequent use of Emergency Medical Services (EMS). In this study, we identify characteristics of persons age 65+ that frequently used EMS in Rutherford County, Tennessee, in 2012. Initial EMS calls in 2011 were included in the analysis. In 2012, Rutherford County had 23,555 persons age 65 and older. EMS was called 8,318 times by 4,560 persons (19.4% of the elderly population). Their median age was 76. Women were 59% of the users, 88% were White, and 8% were Black. Frequent users (283) called EMS 5 to 72 times for a total of 1,064 calls (12.8% of all calls by persons age 65+). Among people who used EMS only once in 2012, 79% were taken to a hospital emergency room (ER). Among the frequent users, 77% were taken to the ER at least once. Ten percent of one-time users, and 15% of frequent users, were found to have no complaint, injury, or illness. Major reasons for services included injury from falls, neurologic conditions, cardiovascular conditions, and respiratory problems. Rutherford County EMS provides excellent services to older persons. The number of times that people repeatedly call EMS may be reduced through assistance from community paramedics and health workers. This would allow EMS to serve those truly in need and result in substantial savings for Medicare.

SURFACE ACOUSTIC WAVE SENSORS: TECHNICAL ASPECTS

Kapila Dissanayaka, Graduate student, Engineering Technology; Carol Boraiko (Faculty Sponsor), Engineering Technology

Surface acoustic wave (SAW) sensors possess a high operating recognition in the high frequency domain with high sensitivity. This facilitates real time data analysis in particle level identifications. But, the efficiency of the device can still be enhanced with the increment of the effective area of the sensing region (or delay line). In particle level experiments this can be achieved by creating vertical nanostructures (nanopillars) on the sensing region without increasing the dimensions of the delay line. We hypothesized that there is a practical limitation for nanopillar height because mass loading can dampen SAW energy more than adsorbed particles. Here we report the effect of vertical population of gold nanopillars using computational 3D modeling. Analysis was carried out using two SAW device models; one with gold nanopillars and the other with just a layer of gold on the delay line. Finally, we analyzed the optimum length limit of the nanopillars.

WRITING: EMPOWERING SECONDARY DEAF STUDENTS

Krista Beukema, Graduate student, Educational Leadership; Meghen Sanders (Faculty Sponsor), Educational Leadership

The purpose of this study is to examine the writing skills of deaf students at the secondary level and to confront the alarming truth that they are struggling to communicate clearly in written English. Deaf students' writing tends to contain substantial amounts of nonstandard grammatical errors not typically found in the writing of their hearing peers, and tangible strategies for properly translating sign language into written English are lacking. This mixed-method action research study will involve conducting a writing workshop for two weeks with a group of deaf Jamaican students who are 18 years old or older. The researcher will implement a method called Strategic Interactive Writing Instruction (SIWI) for the workshop and will measure changes that occur in terms of lower order writing skills, higher order writing skills, and attitude toward writing. SIWI is an instructional strategy designed for deaf students that is designed to be interactive, balanced, linguistic and metalinguistic. The researcher analyzes data from pre- and post-intervention writing samples, writing attitude surveys, and video documentation of the workshop sessions to determine what changes, if any, resulted from this instructional method. The results of this study will become available to deaf educators in Jamaica and the United States to inform their classroom practices for writing instruction. The findings from this study will also be shared with the developers and pioneers of the SIWI method.