

BRADLEY
UNIVERSITY

EXPO 2009

*Seventeenth Annual
Student Scholarship Exposition*

Student Scholarly Abstracts

Friday, April 17, 2009

Bradley Hall

*Sponsored by the
Office for Teaching Excellence & Faculty Development*

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WELCOME

2009 Student Scholarship Exposition

Schedule of Events

April 16th: 8:00 a.m. – 5:00 p.m.	Student Poster Set-Up
April 17th: 8:00 a.m. – 12:00 p.m.	Student Poster Set-Up
2:00 p.m. – 4:00 p.m.	Oral/Demonstrative Presentations (see schedule on pg. 6)
3:00 p.m. – 5:00 p.m.	Poster Presentations Public Viewing
April 20th: 8:00 a.m.—12:00 p.m.	Poster Take-down

ACKNOWLEDGEMENTS

Dr. Robert Baer, Dean
Dr. Edward Sattler, Associate Dean
Foster College of Business Administration

Dr. Claire Etaugh, Dean
Dr. Kelly McConnaughay, Associate Dean
College of Liberal Arts and Sciences

Dr. Jeffrey Huberman, Dean
Dr. Betty Jane Lawrence, Associate Dean
Slane College of Communications and Fine Arts

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Dr. Joseph Emmanuel, Associate Dean
Dr. Robert Podlasek, Assistant Dean
College of Engineering and Technology

Dr. Joan Sattler, Dean
Dr. Lori Russell-Chapin, Associate Dean
College of Education and Health Sciences

Faculty Mentors

Expo Volunteers

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University Photographer

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Multimedia

PERSONNEL

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Kim Willis
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Robert Beach, III
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Oral / Demonstrative Presentations Schedule

Moderated by: Dr. Kurt Field, Chair of Chemistry and Interim Associate Provost for Research / Dean of the Graduate School

Neumiller Hall

- 2:10PM: Bartosz Kwansiewski, Department of Communication / *A Tour of Central Europe*
- 2:20PM: Lauralyn Bogart, Department of Teacher Education / *Improving Classroom Management with the Use of "TAG"*
- 2:30PM: Kiran Kumar Vallabhaneni, Department of Computer Science & Information Systems / *IVR System for Bradley University*
- 2:40PM: Arin Davis, Department of Communication / *Advertising a University in Song*
- 2:50PM: William Herring, Andrew Becker, Lauralyn Bogart, Departments of Teacher Education and Computer Science & Information Systems / *Using Robots to Help Teach Social Skills to Individuals with Autism*
- 3:00PM: Kiran Kumar Vallabhaneni, Vaishnavi Alagirisamy Venugopal, Lakshmi Girija Rao Talagadadeevi, Department of Computer Science & Information Systems / *Writing Secure Code*
- 3:10PM: Shaun Greiner, Clint McCombs, Brock Norman, Jeremy Treadwell, Department of Multimedia / *iPhone Game Development Using Unity*
- 3:20PM: Kara Deweese, Department of Chemistry / *5-Aryl-3-oxo- δ -lactones as Potential Cyclooxygenase Inhibitors*
- 3:30PM: Josiah Miller, Department of Chemistry / *Formation of Metal Colloids in the Presence of Silane-Containing Polymers and Studies of their Catalytic and Synthetic Abilities*
- 3:40PM: Nicholas Van Hise, Department of Chemistry / *Synthesis and Antibiotic Testing of 5-aryl- δ -oxo-S-lactones*
- 3:50PM: Ryan Van Hovel, Department of Chemistry / *Synthesis of Highly Substituted Pyrandiones*

Alycia Bachkora, Amanda Kaminski, Paige Justice, Josh Newman, Matt Westbrook

Undergraduate Project

CMR2, CMR3, and TCH2 Protein Localizations and Target Protein Interactions within Arabidopsis thaliana

Department of Biology

Faculty Mentor: Dr. Keith A. Johnson

Poster Number: 20

The identification of where calmodulin-like proteins CMR2, CMR3, and TCH2 localize in *Arabidopsis thaliana* is important in furthering the understanding of interactions between these proteins and specific target proteins. By examining locations and interactions, specific functions and structures of CMR2, CMR3, and TCH2, as well as the interacting proteins, can be better understood. In order to determine all of this, a series of processes are currently being employed. Transgenic plants expressing β -glucuronidase (GUS) driven by the CMR2, CMR3, or TCH2 promoter are examined to determine where CMR2, CMR3, and TCH2 are possibly expressed in plants. The plants are also being subjected to various conditions so that optimal expression can be determined. CMR2 interactions are being studied by yeast two-hybridization, which involves creating yeast hybrids via mating to check for interactions. Once the target proteins are located and identified, the proteins can be isolated to determine cellular functions. Specifically the number of cysteine residues and disulfide bonds will be evaluated to better understand how these differences determine protein functions when compared to calmodulins. Knowledge of cellular function is important in better understanding calcium interactions within the plant, and how it affects signal transduction pathways.

Brian Boehmer

Undergraduate Project

Pichia Pastoris Vac 8 at the Vacuole

Department of Chemistry and Biochemistry

Faculty Mentor: Dr. Michelle Fry

Poster Number: 21

In *Pichia pastoris*, Vac8p has been shown to be critical for vacuolar inheritance, protein trafficking in the cytoplasm-to-vacuole pathway, and autophagy. *PpVac8p* is an armadillo repeat protein that contains putative fatty acylation sites at the amino terminus. We had previously generated mutated forms of *PpVac8p* that lacked one or both fatty acylation sites and demonstrated that they exhibited partial loss of function in microautophagy. In these studies, I have observed *PpVac8p* localization to the vacuolar membrane with fluorescence microscopy and confirmed the subcellular location with fractionation and Western blot analysis. These

studies demonstrated that wild type Vac8p cosediments largely with 13,000 x g pellet, which includes vacuoles, while forms of Vac8p lacking one or both fatty acylation sites were distributed in both the 13,000 x g pellet and 13,000 x g supernatant. Secondly, we used differential extraction to determine the type(s) of interactions displayed between *PpVac8p* and the vacuolar membrane. The *PpVac8p* is partially released from the vacuolar membrane by 1% Triton X 100 and 1% SDS solutions, but is highly resistant to removal by NaCl and urea. These extraction studies indicate hydrophobic interactions with the vacuolar membrane. Lastly, utilizing a novel immuno-precipitation methodology, a partial purification of *PpVac8p* has been accomplished and confirmed by silver staining and Western blot.

John Holmes

Undergraduate Project

*Investigation Into the Effects of Population Genetic Diversity and Germination Rates of the Fragmented Prairie Species *Gentiana Puberulenta**

Department of Biology

Faculty Mentor: Dr. Janet Gehring

Poster Number: 22

The eventual outcome of habitat fragmentation is a patchwork of small, isolated natural areas in a matrix of human-altered environment. The effects of fragmentation have been extensively studied in many ecosystems. However, few studies have investigated multiple aspects of plant fitness in the highly fragmented tallgrass prairie. Our study investigated the effects of fragmentation in tallgrass prairie by studying the interaction between population size, population genetic diversity, seed size and seed germination rates of *Gentiana puberulenta*. We determined population size, collected leaves for DNA extraction and collected seeds in nine prairie fragments. We used PCR and gel electrophoresis to identify variation revealed by 13 Randomly Amplified Polymorphic DNA (RAPD) primers. Our two measures of population genetic diversity, percent polymorphism and the Shannon index, were strongly correlated with each other and with population size. No relation was established between average seed mass and population genetic diversity or population size. However, both measures of genetic diversity were significantly correlated with mean seed germination rate.

Douglas Juvinal, Tina Khoury, Noah Kumpf

Undergraduate Project

Effects of the Fungicide Validamycin A on Trehalose Metabolism in F. verticillioides

Department of Chemistry and Biochemistry

Faculty Mentor: Dr. Kristi McQuade

Poster Number: 24

Fusarium verticillioides is a pathogenic fungus that causes significant damage to corn crops worldwide and poses a risk to food safety because of toxic metabolites it produces in infected corn. We are studying the effects of temperature stress and the antifungal validamycin A on *F. verticillioides* extracts from liquid shake cultures. Our results have shown that cold shock lowers trehalose concentration whereas heat shock raises trehalose concentration. Trehalose is a disaccharide that can function as a stress protectant and as an energy source. We have shown that validamycin A lowers trehalose content, but surprisingly, decreases the activity of trehalase, an enzyme that hydrolyzes trehalose into two glucose molecules. Ongoing work includes the study of stress and validamycin A on the enzyme trehalose phosphate synthase and on the important stress protectant glycerol.

Casey Littlefield, Harriet Kanlis, Laurel Merz, Jeremy Kirkman, Jeffrey McGinty

Graduate Project

Measuring Stress in Wildlife: Validation of a Novel Technique to Quantify Fecal Cortisol in Carnivores

Department of Biology

Faculty Mentor: Dr. Barbara Frase

Poster Number: 25

Repeated or prolonged stress can lead to a number of health problems including reduced immune response, reproduction and growth. Stress affects humans and wildlife alike, so it is important to monitor wildlife species subject to potentially stressful situations. Fecal cortisol measurement allows researchers to non-invasively measure stress in wildlife, encouraging preemptive action with the anticipation of potential problems. In the past, fecal cortisol could only be quantified using radioisotope based assays, limiting the number of facilities which could conduct studies. In a previous study at Bradley University, a new, widely accessible and economical, ELISA-based technique was developed to measure fecal cortisol in white-tailed deer (*Odocoileus virginianus*). In our study, we validated the technique for use in other species, particularly gray wolves (*Canis lupus*), adding a hydrolysis procedure to measure total cortisol. Using data from control cortisol solutions, we were able to illustrate that our data fell within the range of published values for gray wolf fecal cortisol. Further, hydrolysis experiments yielded expected ratios of

approximately 50% glucuronide-bound fecal cortisol. These data suggest this new technique, with the inclusion of hydrolysis, can accurately measure total fecal cortisol in canids for use in relative stress comparisons.

Josh Newman, Steven Fussner, Matt Westbrook

Undergraduate Project

The Effect of Blue or Red Light Supplementation, Nitrogen Addition to Soil, and Variegation on Net Photosynthesis in the Hedera helix (English Ivy)

Department of Biology

Faculty Mentor: Dr. Sherri Morris

Poster Number: 26

Photosynthesis can be affected by many variables including light and soil conditions, as well as pigment composition of the plant. The objective of this study was to (1) determine the effects of red and blue light supplementation on net photosynthesis, (2) determine the effects of nitrogen addition to soil on net photosynthesis, and (3) determine the effect of variegation on net photosynthesis in *Hedera helix*. We examined net photosynthesis of variegated and non-variegated plants under different light conditions (white with blue (470 nm) light supplementation, white with red (633 nm) light supplementation, and white light only) and soil additions of KNO₃ (0mM, 16 mM, and 50 mM). Under blue and white light supplementation, net photosynthesis significantly decreased as soil nitrogen content increased. In contrast, moderate soil nitrogen addition significantly increased net photosynthesis under red light supplementation. Finally, non-variegated plants photosynthesized significantly more than variegated plants. Our results demonstrate that while nitrogen can act as a fertilizer, the effects of high soil nitrogen additions such as those of acid deposition can be detrimental to plant photosynthetic rates. Additionally, understanding of optimal light conditions for photosynthesis can be useful in increasing yield of plant products.

Paige Pearson

Undergraduate Project

Impact of Varying Light Levels and Soil Moisture on Germination and Growth of Helianthus Occidentalis

Department of Biology

Faculty Mentor: Dr. Janet Gehring

Poster Number: 27

Patchy distributions of plant species can be due to adaptation in a spatially heterogeneous landscape or to interactions with other species. We investigated a possible reason for the patchy

distribution of *Helianthus occidentalis*, which is typically found in sandy soils and oak savannas. In a Central Illinois sand prairie remnant in Mason County, *H. occidentalis* grows only in the shade of an oak stand bordering the open prairie and hypothesized partial shade allows *H. occidentalis* to survive in dry, sandy soils. We grew plants in a sandy potting mix and experimentally manipulated light and/or water availability to determine if *H. occidentalis* grows better in dry, high light conditions (simulating sand prairie) or dry, partial shade conditions (simulating sand savanna). Our results indicated seed germination was significantly lower in high light relative to partial shade or shade. After one month, survivorship of seedlings was lowest in conditions of high light and low water. Growth, as estimated by leaf number and aboveground biomass was also lowest when high light and low water were combined. Medium-light plants produced the largest leaves in both high and low water conditions. Our results suggest the patchy distribution of *H. occidentalis* is impacted by better germination in shade and lower survivorship and growth in dry, high light environments. The shade provided by the oak canopy in the Mason County sand prairie may contribute to an increase in moisture, allowing *H. occidentalis* to thrive in a nutrient poor, well-drained soil.

Amanda Schaefer, Matt Westbrook, Josh Newman, Michelle Haney

Undergraduate Project

Characterization of Citrobacter Spp. from Fish Intestines

Department of Biology

Faculty Mentor: Dr. Keith A. Johnson

Poster Number: 28

The difficulty of treating antibiotic-resistant bacterial infections continues to cause alarm worldwide. The overuse and misuse of antibiotics in the health care and agriculture industries have amplified the spread of resistance and have necessitated a search for new, effective antibiotics (Haydon et al., 2008). In addition, heavy metal pollution may also be contributing to the antibiotic resistance crisis. It has been suggested that genes conferring resistance to antibiotics and heavy metals are linked (McIntosh et al., 2008, Wright et al., 2006). This study investigates the characterization and identification of isolated plasmids from *Citrobacter* spp. from the intestines of feral brook trout. Objectives include examining incompatibility (Inc) groups, determining plasmid stability over generations in the presence and absence of mercury and finding the physical link between antibiotic and mercury resistance genes. Plasmids within the same Inc group cannot proliferate in the same cell line. Inc group classification has been an important tool in following the mobile genetic transfer of antimicrobial resistance among bacterial species (Gotz et al., 1996). Thus, determining the content of the isolated plasmids would provide insight to the mechanisms involved in the development of mercury and antibiotic resistance.

Calvin Schenk

Undergraduate Project

In Vitro Chemotaxis of Human Bone Marrow-derived Mesenchymal Stem Cells to Epithelial Ovarian Carcinoma Cells

Department of Biology

Faculty Mentor: Dr. Craig Cady

Poster Number: 29

Objective: Epithelial ovarian cancer is the most lethal of gynecologic cancers and one of the leading causes of cancer death in women. Bone marrow-derived mesenchymal stem cells (BMSCs) are recruited to hypoxic tissues, including malignant tumors. We hypothesize that BMSCs will migrate to ovarian cancer cells in vitro.

Design: Five ovarian cancer cell lines and controls (immortalized ovarian epithelial and fibroblast cells) were analyzed for chemotaxis using three in vitro models: a coculture assay, invasion assay, and spheroid assay. Migration assays were run to assess migration toward various cytokines, including VEGF165 +/- the VEGF antibody, Avastin. Fibroblasts transduced to over-express VEGF165 were used in migration and co-culture assays. Student's t-tests were used to assess differences between treatment groups and controls.

Results: BMSCs exhibited significant migration toward conditioned media in invasion assays ($p < 0.001$) and significant migration to all ovarian cancer cell lines in co-culture assays ($p < 0.001$), compared to controls. BMSCs associated with tumor spheroids but not fibroblast control spheroids. VEGF165 caused migration, while the presence of Avastin inhibited migration. Transduced fibroblasts overexpressing VEGF165 significantly stimulated migration.

Conclusions: In three models of invasion/migration, BMSCs migrated toward ovarian cancer cells and conditioned medium. Multiple cytokines expressed in ovarian tumors, including VEGF165, stimulated BMSC migration. In the future, we will engineer BMSCs with genes to induce cell death in cancer cells using orthotopic animal models of ovarian, breast and prostate cancer.

Cynthia Shaw

Undergraduate Project

Seed Germination of Viola pedata, Host Plant of a Threatened Butterfly Species

Department of Biology

Faculty Mentor: Dr. Janet Gehring

Poster Number: 30

Viola pedata is a native larval host plant of *Speyeria idalia*, an endangered butterfly species. This butterfly species requires large quantities of violets to maintain a viable population. Dr. Bjorklund has a population of at least 1200 *Viola pedata* individuals in the front prairie of his property in Mason County, Illinois (Walden West). It is our goal to increase population number in the front prairie and transplant lab-germinated members of this population into the back prairie at Walden West. Therefore, we wanted to find the most efficient method of germinating *Viola pedata* seeds in the lab. In order to do this, we collected seeds from the front prairie and stratified them with different lengths of warm and cool periods. Greater numbers of seeds germinated when exposed to cold, moist conditions for longer periods of time (8 or 12 weeks). It is also interesting to note that as the duration of the warm period increased, percent germination increased. These seeds also tended to take less time to start germinating than those that were exposed stratified for shorter durations.

Rebecca Sowa, Sarah Hills

Undergraduate Project

Comparative Analysis of Flower Color in G. puberulenta, G. flavida and Their Hybrids

Department of Biology

Faculty Mentor: Dr. Janet Gehring

Poster Number: 31

Much of the Illinois landscape was once covered in tallgrass prairies but was destroyed due to human expansion and settlement. In attempts to restore the natural landscape, human-created prairies have allowed hybridization between two native species of gentians. The purpose of our study was to compare flower color of *Gentiana flavida* and *G. puberulenta* using reflectance spectrophotometry. We wanted to determine if this technique allows effective quantification of flower color in gentian hybrids. We looked for differences between (1) parental *G. flavida* and *G. puberulenta* from pure native populations, (2) white- and dark blue-flowered plants from a hybrid swarm, and (3) different flowers of the same plants. Our results showed reflectance spectra of the parental species and white- and dark blue-flowered plants were significantly different from each other. In addition, half of our sample plants showed significant differences between flowers of the same plant.

Mark Aujla

Undergraduate Project

Wind Energy: Research and Applicability

Department of Economics

Faculty Mentor: Dr. Joseph Felder

Poster Number: 13

Problem Statement: To analyze the effects of technology and grid integration and policies on the development of the wind utility industry.

Motivation: Renewable energy as a part of the U.S. energy mix is more important than ever. Significant research has been done in the area of wind energy. This paper aims to educate individuals on the development of the wind industry in the United States and analyze possible areas of future growth.

Approach: This historical look at the wind industry considers areas such as growth and development, and factors that lead to the growth and analyzes the results based on business principles and ideas.

Results: Technology changes and integration policies have made wind energy a more viable solution to our country's future needs. The variability of wind, a major factor hindering the further development of wind is analyzed within the results. The cost of this variability is shown to decrease with increases in technology and proper integration of wind resources into a larger utility production portfolio. Statistical analysis and forecasting are the major techniques used to determine the significance of these factors.

Conclusion: My research provides a clear analysis of what works for the wind industry and how government policy, technological research and other areas of inputs can significantly impact the growth of this powerful resource.

Daniel Gillespie

Undergraduate Project

Senior Business Consulting Project

Department of Marketing

Faculty Mentor: Dr. Brian Nagy

Poster Number: 14

Michael Hangartner

Undergraduate Project

Sustainable Development: Model and Test

Department of Economics

Faculty Mentor: Dr. Joshua Lewer

Poster Number: 15

Over the last two hundred years, the world's level of economic growth has increased dramatically. While this has led to breath-taking improvements in the standards of living for many, the world has concurrently observed increases in its population, greater competition for its resources, and vast degradation to its environment. In the face of such rapid growth, many economists have begun to contemplate the consequences of an ever-increasing amount of development, with some proposing that global growth be limited. The purpose of this paper is to examine the validity of such proposals. This paper applies time-series data for the United States and China over a three decade period, and empirical results indicate support for the Environmental Kuznets Curve (EKC). The growth of environmental degradation first rises and then falls as an economy moves through the growth process.

Justin Knobeloch

Undergraduate Project

Issues Affecting the Comparability of Financial Statements with the Transition to IFRS

Department of Accounting

Faculty Mentor: Dr. John Gillett

Poster Number: 16

One of the benefits often associated with transitioning to International Financial Reporting Standards (IFRS) from United States Generally Accepted Accounting Principles (US GAAP) is an enhanced state of comparability and understanding. The primary purpose of this research is to determine where the general areas of improved comparability are, concentrating on the financial statements themselves, and if there are still areas in which improvements can be made. The secondary purpose of this research is to provide financial statement users with a concise summary of one of the effects of the impending conversion to IFRS. By analyzing the reporting requirements laid out by current regulations (Regulation S-X and IAS 1), a proposal for a standard that focuses on financial statement presentation, and the opinions of various professionals in the business community, this research provides professionals with an array of information condensed into one source. Among other benefits, a general consensus was found in that IFRS provides improved comparability, within the financial statements as a whole, by better relating each statement to one another. It was also found that many complications and

inconsistencies still exist, primarily due to the fact that several countries are not fully adopting IFRS.

Mariana Caffaro, Laura Nicklaus

Undergraduate Project

Magnesium Corrosion and Treatment Effectiveness of Hazardous Wastes

Department of Civil Engineering & Construction

Faculty Mentors: Dr. Robert Fuessle and Dr. Max Taylor

Poster Number: 66

Stabilization and Solidification (S/S) is designated by EPA as the “Best Demonstrated Available Technology” for 68 waste codes described by the Resource Conservation and Recovery Act. Binders for S/S include Portland cement and pozzolans such as fly ash. Pozzolans provide a reduction in cost of materials because they partially replace cement. Another advantage of pozzolans is that their reaction with calcium hydroxide creates additional calcium silicate hydrate (CSH) which is largely responsible for concrete strength and impermeability.

Recent cement research has investigated the mechanisms of magnesium corrosion—magnesium reacts with CSH and destroys its durability. Research in recent years indicates that magnesium corrosion may be more harmful for cements containing pozzolans. This research investigates how magnesium and fly ash addition impacts S/S treatment effectiveness after short- and long-term curing.

Cement mixes containing sand, magnesium and lead were prepared to simulate waste disposal at Superfund sites. Each sample consists of various amounts of magnesium and lead (low, medium and high) according to analytical data from an actual hazardous waste. The presence of fly ash and two ratios of binder to hazardous waste are also factors of this experiment. Specimens cure for 3 specified time intervals before a leaching test that measure treatment effectiveness. The leachate is filtered and analyzed for its lead concentration. As the magnesium concentration is increased in the cement mixes, the lead concentration in the cement-water solution is expected to increase. With the addition of fly ash, lead leachability should also increase.

Anna Hellgeth, Beth Alderson, Jackie Beaudry, Rachel Anderson

Undergraduate Project

Campaign Next, COM 480 Class

Department of Communication

Faculty Mentor: Dr. Ronald Koperski

Poster Number: 18

Campaign Next was a creation of a senior class public relations campaign, including four senior public relation majors, a for-profit company and non-profit organization. The community relations campaign implemented research, planning, execution, and evaluation of the PRSA Silver Award process. The state of our environment has reached a drastic point, with energy efficiency, recycling, and even water conservation being preached to people worldwide.

Our campaign team worked with EcoThermics and the Central Illinois Chapter of the American Red Cross to develop a community relations campaign to reach the community and teach the importance of going green. The campaign targeted Peoria children and emergency response units in the area with environmental education classes, a blood drive, and an energy conservation forum, and it raised awareness of these issues, increased awareness of EcoThermics as a new company in the area, and raised 56 units of blood for the Red Cross.

Phil H. Good

Undergraduate Project

Music is a Part of My Identity: Turning Points in the Occupational Socialization of Musicians

Department of Organizational Communications

Faculty Mentor: Dr. Elena Gabor

Poster Number: 17

This study uses data from 27 semi-structured interviews with classical musicians between the ages of 13 and 29 who have started training in classical music before the age of 7. Grounded in the vocational socialization theory (Jablin, 1999, 2001), this study uses the concept of turning points (Bullis & Bach, 1989) to understand the process of occupational socialization for a career that typically starts in childhood and lasts for a lifetime. We have found nine turning points that characterize the vocational development of a classical musician: 1. Being introduced to music; 2. Getting one's calluses; 3. Finding a mentor; 4. Informal recognition of skill; 5. Formal recognition of skill; 6. Losing/Excusing the mentor; 7. Choosing a major; 8. Getting cold feet; and 9. Crystallization of career decision. This study contributes to career literature by looking at an occupation that typically starts in early childhood as an extracurricular activity and is not

confined to an organization. Our findings could be applied to other performance-oriented careers, such as Olympic sports, ballet, and dance.

Bartosz Kwasniewski

Undergraduate Project

A Tour of Central Europe

Department of Communications

Faculty Mentor: Dr. Margaret Young

Oral/Demonstrative Presentation: 2:10PM

Chancellor Metternich, a major politician of the Congress of Vienna, is alleged to have said in the 1830s, “Asia begins at the gates of Vienna” (Kontler, 2002). Beyond Vienna, lies what can be categorized as Central Europe and it is very distinct in its traditions and history. However the past influences of paganism, oriental influences such as the Ottoman Empire, and even more recently the domination of communism and ethnic-cleansing wars have haunted Central Europe. Westerners disregard this area as a touristic destination and consider it undeveloped. *Tour of Central Europe* documentary video will uncover the beauty, cultural diversity, hospitability, and attractions that are present in Central Europe and it will create a better understanding of its people.

This documentary video will follow video-journalist Bartosz Kwasniewski as he experiences various destinations in Central Europe accompanied with experts who enlighten the very history of their own distinct cultures. Included in this journey will be UNESCO sites, Roman ruins, World War II relics and much more found in Poland, Czech, Austria, Slovakia, Hungary, Romania, Serbia, Bosnia and Herzegovina, Croatia, and Slovenia, which are generally all considered Central European countries. Experts who excel in the knowledge of all of these respective countries include Dr. László Kontler, Dr. Bogdan Murgescu, Dr. Dubravka Stojanović and many more who supplement narration of these precious experiences caught on tape.

Join us on the tour of a life time, discover the hiddent secrets, unravel the history and gain a better understanding of the people of Central Europe.

Lauralyn Bogart

Undergraduate Project

Improving Classroom Management with the Use of "TAG"

Department of Education

Faculty Mentor: Dr. Deitra Kuester

Oral/Demonstrative Presentation: 2:20PM

TAG! You're it! Teaching with Acoustical Guidance (TAG) is an innovative, inexpensive positive approach to teaching specific skills and individual types of behavior to a variety of learners with varying ability levels, across settings and environments. TAG has a wide range of applications for learners (with and without exceptional learning needs) and may be used by teachers, parents, as well as siblings of individuals with special needs. Implementation of this innovative method requires basic training offering immediate application. TAG provides an opportunity to change the interaction between teacher and learner (whether the teacher is a classroom teacher, a parent or another child) in a positive way by focusing on success ('tag' points) and offering immediate positive reinforcement (an acoustical 'click'). This method is simple and practical and has been used to reduce, increase or replace a variety of behavior across settings and disciplines. Because it allows for immediate feedback, results are quick, positive, observable and measureable. This exhibit will provide a demonstration and discuss how the use of TAG immediately reduced transition time and the number of repeated directions by the teacher for a 2nd grade inclusive classroom. Implications for a variety of applications of TAG will also be discussed.

Sam Price

Undergraduate Project

Software Defined GPS Receiver

Department of Electrical and Computer Engineering

Faculty Mentor: Dr. In Soo Ahn

Poster Number: 67

Software-Defined Receivers are becoming a useful tool to quickly implement and test various algorithms before hardware implementation. A real-time software-defined GPS receiver has been implemented on an x86 platform running Windows XP capable of processing raw IF signals at 8MHz. Less than 50% CPU usage on a dual core 3.0GHz machine is seen while tracking 6 satellites. Modules implemented in this project are satellite acquisition, carrier tracking and user position estimates. Position updates are made every 0.6 seconds. Software implementation includes multiple threads to handle sampling, acquisition loops, tracking loops, and position calculation. The project is written in C++ with object-oriented programming methodology. Integration of open source code for position estimates and satellite information storage is also done.

Keywords: GPS, Signal Acquisition, Signal Tracking, Software Defined Receiver (SDR)

Jahnvi Vaidya

Undergraduate Project

Real-Time Video Capture and Image Processing System

Department of Electrical and Computer Engineering

Faculty Mentors: Dr. Yufeng Lu and Dr. In Soo Ahn

Poster Number: 68

The capacity of the data to be processed and tight process timing constraint make it difficult to design an embedded system for video and image processing applications. It is challenging to design an embedded system to meet with the rapid changing standards in video and image application. Field Programming Gate Array (FPGA) can be a solution which is flexible to meet all these challenges. FPGA can combine logic blocks, block memory, dedicated multipliers, and embedded microprocessor to implement a whole embedded system on a single chip. Xilinx Embedded Development Kit (EDK) is effective software to integrate the processor and all the peripherals together. In this capstone project, an embedded video capture system will be designed using the EDK tools and implemented on a Virtex II Pro FPGA. The functionality of the embedded system is to capture an analog video data from a camera, process and then display the video in a real-time mode. Furthermore, some basic image processing techniques will be tested on the video capture system.

Katie Shultz

Undergraduate Project

Review of Current Vitamin D Recommendation Adjustment for Infants, Children, and Adolescents

Department of Family & Consumer Sciences

Faculty Mentor: Dr. Jeanette Davidson

Poster Number: 2

Vitamin D is known to be critically important in the diets of infants, children and adolescents because of its requirement in the formation and remodeling of bone and health. Vitamin D deficiency has been associated with rickets, low bone density, and increased risk for the development of type 1 diabetes mellitus and osteoporosis later in life. Children's diets are typically lacking sufficient vitamin D because few food items contain sufficient amounts of vitamin D to meet their daily recommendations. Based on evidence from recent clinical trials, the American Academy of Pediatrics (AAP) doubled its recommended daily intake of vitamin D for infants, children, and adolescents to 400 IU from its previous 2003 recommendation of 200 IU. However, the Institute of Medicine (IOM) has not yet followed the AAP in raising its Daily Recommended Intake of vitamin D and the recommendation remains at 200 IU daily. This review investigates the importance of vitamin D in the diet of infants, children and adolescents and evaluates published research from 1999 to 2009 to provide supporting for the increase in vitamin D recommendation by the AAP.

Liz Wiertel, Brooke Cloyd, Megan Jameson

Undergraduate Project

Psycho-Social and Nutritional Correlates of Obesity in Community Dwelling Older Adults

Department of Family and Consumer Sciences

Faculty Mentors: Dr. Kevin Randall and Dr. Jeannette Davidson

Poster Number: 3

Background: Obesity rates continue to increase in the United States, particularly for minority adults and low socioeconomic groups. Older adults are failing to meet national dietary guidelines for nutrient and food intake. Adult healthy weight or BMI (kg/m²) has been found to associate with more healthful dietary intake as assessed by the Mini Nutritional Assessment (Guigoz, Vellas, & Garry, 1994) and a number of psychosocial variables (Hagler et al., 2007). Also, demographic variables such as sex, race, income, influence weight, as does residence in low-income communities: overweight/obesity disproportionately affects people living in low-income communities (Davidson & Getz, 2004). Objective: This study investigated the influence of psychosocial and nutritional predictors on overweight and obese community-dwelling older

adults, controlling for age, race, sex, income, and physical health. We predicted that nutritional and psycho-social variables would significantly contribute to BMI (kg/m²) \geq 25, over and above the contribution of control variables. Method: Analyzing data collected from a convenience sample of physically independent, community-dwelling older adults with BMI (kg/m²) \geq 25, we conducted a hierarchical regression analysis with three blocks of predictors: control variables, nutritional variables, and psychosocial variables. Results: The two blocks of predictors (nutritional and psychosocial) explained 35% of the variance in BMI (kg/m²) \geq 25, over and above the block of control variables. In the final model race (non-White), perceived sufficiency of income, mid upper-arm circumference, and depressive symptoms were significant individual predictors, whereas age, sex, physical health, education, and marital status were not.

Laura McCormack, Kalvki Munyao

Undergraduate Project

Sensory and Vitamin Evaluation of Vegetables by Different Cooking Methods

Department of Family & Consumer Sciences

Faculty Mentors: Dr. Jeannette Davidson and Dr. Judy Moroz

Poster Number: 1

Cooking methods have been shown to affect the quality of vegetables when vitamin retention, color, and overall consumer acceptability characteristics are evaluated. This study investigated the effects of cooking methods on ascorbic acid retention, color change, and consumer acceptability based on taste, texture, and overall appearance, of broccoli, cauliflower, and peas. The cooking methods used, prepared following manufacturers' directions, were waterless cooking, boiling water, and microwaving. A taste panel consisting of 19 female students enrolled in FCS 246 was used to assess consumer acceptability of the vegetables. Ascorbic acid retention was assayed by titrating with 2,6 dichloroindophenol. Spectrophotometry was used to assess color change between raw and cooked vegetables among cooking methods. A one-way repeated measures analysis of variance test was performed comparing the consumer acceptability characteristics, taste, texture, and overall appearance, of one vegetable across cooking methods. Results indicate that boiling water was preferred for taste and appearance in cauliflower and broccoli with a similar trend appearing in peas and that the most color change on the red/ green spectrum was associated with higher acceptability in all vegetables. Results of ascorbic acid retention will be reported.

Jeremy Bell

Undergraduate Project

The Rotational Array in Music Composition

Department of Music

Faculty Mentor: Dr. Stephen Heinemann

Poster Number: 57

A rotational array is a compositional technique developed by Igor Stravinsky where the intervals of a set of pitches rotate around a single note to create new pitch sets. Throughout the composition of my piece, the rotational array affected the construction at the macro level. The pitch sets obtained at this level were then used to create matrices that provided pitch sets at the micro level. By finding commonality in replicated pitch sets at the micro level, I was able to create a “road map” for my composition *Originary Scene*. Using these similar sets, I could connect each individual matrix by use of these common tones and thus create an outline for the piece. Another outline was then used by drawing lines on a grand staff to outline the range of the piece. These lines restricted the placement of pitches to prevent them from being placed just in the middle register and requiring movement throughout the register and expansion contraction of pitch spacing.

Although the rotational array/matrix format that I used created the tonal vocabulary of the piece, the compositional process of melody, harmony, dynamics, rhythm, tempo, and other techniques were left open for me to decide as the composer. The restrictions created by this process, however, help to create a “world” whereby certain guidelines are created to make restrictions and inspire creativity in other areas. By forcing limitations, new ideas are able to be created and construct a new and different piece.

Spencer Castle, Benjamin Harding, Stephanie Meyer

Undergraduate Project

A Comparative Analysis of J.S. Bach's "Jesu, meine Freude" Settings

Department of Music

Faculty Mentor: Dr. Stephen Heinemann

Poster Number: 58

Johann Sebastian Bach’s 371 four-part chorale harmonizations of Lutheran hymn tunes have long played an integral role in the instruction of music theory. Our project involved harmonic and contrapuntal analyses of six of Bach’s settings of the hymn tune “Jesu, meine Freude” (Jesus, My Joy), as well as an analysis of his chorale prelude from the *Orgelbüchlein* (Little Organ Book) based on the same melody. The analyses, vertically aligned for comparison,

exemplify Bach's ingenious treatment of outer-voice counterpoint, harmony, and phrase structure.

Brach Jennings

Undergraduate Project

Scottish Folk Songs: The Last Compositions of Franz Joseph Haydn

Department of Music

Faculty Mentors: Dr. Kyle Dzapu and Dr. Tim Conley

Poster Number: 59

At the invitation of Edinburgh-based publisher George Thomson, Franz Joseph Haydn arranged two hundred Scottish folk songs for voice, violin, and continuo. The composer, in the twilight of his life, felt a fresh compositional zeal each time he received a new batch of Scottish airs from Thomson. Shockingly, Thomson provided only the melodies, and so, while Haydn created appealing arrangements, they did not relate to the traditional texts. Although Haydn repeatedly spoke of his fondness for the compositions, they remain relatively unknown works. This project explores the folk song settings and their relationship to Scottish music of the eighteenth century.

James Marck, Michael Harris, Douglas Stewart, Jaime Allman, Kristin Schrag

Undergraduate Project

An Analysis of Fugue Subjects in J.S. Bach's "The Well-Tempered Clavier"

Department of Music

Faculty Mentor: Dr. Stephen Heinemann

Poster Number: 60

In this project, we examine voice entries and the patterns that emerge from certain voice entry orderings in the fugue subjects from J. S. Bach's *The Well-Tempered Clavier*, Books I and II. An examination of Bach's ordering of voice entrances is presented in two analyses. The first analysis catalogues patterns of voice entrances that follow specific properties, not only to demonstrate consistent use of adjacent voice entrances, but also to propose theories for why certain combinations of voice entrances are unsuitable. The second analysis illustrates a tendency for subjects with larger ranges to open in a middle voice. These two examinations provide an exhaustive summary of the combinations used in both books of *The Well-Tempered Clavier*. The resulting outlines present these combinations in context with the structure of the subjects in the 48 fugues.

Robyn Rognstad

Graduate Project

Guinea Fowl Chicken-Like Peacock

Department of Art

Faculty Mentor: Dr. Oscar Gillespie

Poster Number: 61

Turkeys are loved and hated, abused and adored. They are the subject of misothery and misconception, while being one of the most celebrated birds in America. Arguably, the greatest environmental success story of the 20th century, the wild turkey's survival in North America owes its success to the formation of factory farms where the turkey is reduced to the status of faceless turnip. Visual presentation of turkeys confronted by everyday tasks and their solutions show turkeys to be absurd, intelligent, clumsy, eloquent, ugly, and beautiful, but most importantly as individuals.

Joseph Scardetta

Undergraduate Project

"the and of Two"

Department of Music

Faculty Mentor: Dr. Stephen Heinemann

Poster Number: 62

the and of Two is an original twelve-tone composition for oboe and piano. The melodic content of the first and third sections is derived from a rotational array based on a reordering of the first hexachord in the twelve-tone row. The melodic content of the second section is based on an inversion of the original row. I set a further limitation in this piece by assigning different pitch classes specific eighth-note pulses in the 2/4 meter. For instance, a G must always enter either on or after the fourth eighth note of a measure (often called "the and of two") but before the downbeat of the next measure. Notes, once established, could be sustained for any length of time. In setting these limitations, I paradoxically enabled myself the freedom to use any available harmonies, not just those suggested by the ordering of the row.

Brian Spicklemire

Undergraduate Project

Composite Rhythms in "Medellín"

Department of Music

Faculty Mentor: Dr. Stephen Heinemann

Poster Number: 63

In composing *Medellín*, I focused on a melodic development of sorts using un-pitched percussion among three instruments using complex composite rhythms. Through many sketches, I developed single-line rhythms that were broken down, augmented and split among three players with hopes of creating memorable and clear sequences that built up to more complex interactions. The result was a composition for percussion trio more satisfying than any of my previous compositions for percussion ensemble, one that shows great potential in the application of a complex rhythmic approach to larger scale compositions.

Anna Weiss

Undergraduate Project

Controversy in the Sistine Chapel

Department of Art

Faculty Mentor: Dr. Sarah Glover

Poster Number: 64

"Controversy in the Sistine Chapel" examines the Vatican Museum's 1980 through 1989 restoration of Michelangelo's ceiling frescoes in the Sistine Chapel and investigates the results and various controversies surrounding this monumental event. Background information on the Sistine Chapel, its fresco decoration, previous restorations, the 1980 through 1989 restoration, and the chemical and technical analysis of the frescoes are provided for a thorough foundation upon which to analyze two major controversies.

The first controversy focuses on the influences on the decision to restore the frescoes, outside of their physical condition. Critics have questioned the influence of various forms of financial, religious, public, and artistic institutions on this decision. The second and most public and highly debated controversy focuses on the physical treatment of the frescoes, including arguments about environmental conditions in the Chapel, the agents and methods used for cleaning, and most controversially, Michelangelo's intentions regarding color and "the final layer" of the fresco. By giving the reader a look at the controversies surrounding such a famous endeavor, "Controversy in the Sistine Chapel" aspires to leave the reader with a sense of the

necessary ethical considerations in restoration and conservation, as well as an informed basis upon which to answer the key question: Were these frescoes restored, or ruined?

Jacqueline Willis, Theran Van Ostrand, Richard Welsh, Carly Morrison, Kyle Skidmore

Graduate and Undergraduate Project

Iron Casting with a 10" Cupola

Department of Art

Faculty Mentor: Dr. Fisher Stolz

Poster Number: 65

The Bradley sculpture area participated in the National Conference on Cast Iron Art, accompanying workshops and student cupola contest. It expanded Bradley University's range of relevant methods of creating art and was an enriching experience for our students.

Bradley students and faculty attended the last two biennial conferences on cast iron art at the Sloss Furnaces in Birmingham, Alabama. We participated in iron casting workshops where we made patterns and invested them in resin-bonded sand. They were cast in iron on site during the conference. The conference also featured numerous university-designed cupolas (iron furnaces) that were used for casting on site, a student cupola competition, casting demonstrations and a sculpture exhibition of work incorporating cast iron. The Sloss Furnaces are designated as a National Historic Site.

This year we brought seven students to the National Cast Iron Art Conference. For the first time Bradley students participated in a student cupola contest, competing against other universities from around the nation casting iron with the new cupola we built. Students also participated in workshops making wax patterns, resin bonded sand and ceramic shell molds that were cast in iron.

As an iron casting conference with hands on mold making experiences and new work cast in iron at an important historic foundry site, as well as using our new cupola in competition against other universities, this activity was very beneficial to the students.

Lindsey Barcklay

Undergraduate Project

Child Welfare Time Management

Department of Social Work

Faculty Mentor: Dr. Wayne Evens

Poster Number: 6

My on-going research project, Child Welfare Time Management, is focused on a group of social workers and family advocates at a local agency involved in foster care and adoption. The study will look at various activities that are conducted by the worker and the length of time that these activities are consuming. Workers will fill out various questionnaires regarding their activities and use of time in which they will be reporting their anticipated time expenditures for tasks, then follow up with the actual time spent on a weekly basis. Study will help to point out various areas that may be assisted within the workers current schedule.

Bradley Bullock

Undergraduate Project

Do Boys Violence Prevention Education Groups Decrease Normative Beliefs About Aggressive Behavior?

Department of Social Work

Faculty Mentor: Dr. Wayne Evens

Poster Number: 7

Lauren Ferguson

Undergraduate Project

Factors that the Staff at DCFS Think Cause a Non-Relative foster Parent to Cease Fostering Children Department of Social Work

Faculty Mentor: Ms. Nancy Amos

Poster Number: 8

Martha Franquemont

Undergraduate Project

Strengths and Limitation of Microfinance

Department of Economics

Faculty Mentor: Dr. Joshua Lewer

Poster Number: 9

Strategic Sustainable Partnership Program, Inc. (SSPP) is a non-profit organization based in the United States that provides microloans to women living in the Acholi quarters near Kampala Uganda. SSPP is one of many organizations that have utilized microfinance in hopes of contributing to poverty alleviation. According the Consultative Group to Assist the Poor's (CGAP) 2004 microfinance effectiveness review of Uganda, there are over 1,500 organizations in Uganda engaged in microlending of some kind. The government of Uganda recognized the influence microfinance is having in the region through passage of the Micro Deposit-Taking Institution Act in 2003, which created a regulatory framework for carrying out such business in the region. Furthermore, formal mechanisms for collaboration between donors (Private Sector Donor Group), stakeholders (Micro Finance Forum) and industries (Association of Micro Finance Institutions of Uganda) exist to facilitate effective development (Goodwin-Groen, Bruett and Latortue 2004). This paper examines the role of non-profit organizations such as SSPP in the development process of Uganda, and empirically test their role using time-series methods.

Jennifer Guzman-Muelling

Undergraduate Project

The Effects of Status Characteristics on the Qualities College Students Desire in Intimate Partners

Department of Sociology

Faculty Mentor: Dr. Lizabeth Crawford

Poster Number: 10

This study examined the role of attractiveness in potential intimate relationships. Although prior studies show significant differences in the qualities college students value in potential mates, few analyses focus on the effects of other status characteristics on these preferences. Using data from a self-report questionnaire administered to a sample of Bradley undergraduates (n=317), I examined the relationship between age, race, major and hometown, as well as gender, on the characteristics desired in intimate partners. The effects of gender on desired characteristics were, overall, consistent with the literature. Men reported that they preferred women who are physically attractive, whereas women stated that they preferred men from "good family backgrounds" who were likely to be economically successful. Interestingly, LAS majors were

significantly less likely than other students to emphasize the importance of family background. Other findings were more complex and varied by gender. Size of hometown was positively associated with concerns about a mate's future socioeconomic standing and family background among males. Among females, academic class was the most important determinant of the characteristics desired in a romantic partner. As year in school increased, women placed an increasing emphasis on intelligence, sense of humor, caring and trustworthiness. Minority women were especially likely to value intelligence, economic success, and appearance in their potential mates.

Danielle Pasko

Undergraduate Project

The Influence of Education and Income on Beliefs about the Causes of Racial Inequality

Department of Sociology

Faculty Mentor: Dr. Liz Crawford

Poster Number: 11

The purpose of this project was to examine associations between status characteristics, including level of education and income, and beliefs about the sources of race differences in socioeconomic status using secondary data from the 1996 General Social Survey. Measures of perceived reasons for race differences in jobs, income and housing included differences due to: inborn disability, lack of will, lack of education, and discrimination. I hypothesized that respondent education, in particular, would be negatively related to the belief that race differences in achievement are due to individual factors (ability and will) and positively related to the belief that race differences in achievement are due to structural factors (educational opportunities and discrimination). Education had the predicted effects on beliefs about the causes of racial inequality. The effects of family income on beliefs about race differences in achievement were less consistent and were explained at least part by education. Most notable was the fact that high income respondents were less likely than other individuals to believe that race differences in achievement were due to discrimination. My analyses also indicated that women were more likely than men to believe that race differences in socioeconomic status are due to structural factors (i.e., education and discrimination). Racial and ethnic minorities were more likely than whites to believe that race differences in achievement are due to structural factors, and not a lack of will. Older respondents were more likely than younger individuals to embrace all of the four explanations for racial inequality. Consistent with the notion that people in this society downplay the importance of structural factors, overall, lack of will was the most readily accepted cause of racial inequality.

Arin Davis, Brian Spicklemire

Undergraduate Project

Advertising a University in Song

Department of Communications

Faculty Mentor: Dr. Margaret Young

Oral/Demonstrative Presentation: 2:40PM

William Herring, Andrew Becker, Lauralyn Bogart

Undergraduate Project

Using Robots to Help Teach Social Skills to Individuals with Autism

Department of Computer Science and Information Systems

Faculty Mentors: Dr. Deitra Kuester and Dr. Chirs Nikolopoulos

Oral/Demonstrative Presentation: 2:50PM

This cross-curricular project serves as a ‘jump start’ to a planned pilot case study for fall 2010 wherein two humanoid robots will be used to help teach social skills to individuals with autism. With the collaborative efforts between Special Education and Information Systems and Computer Science, “Alphena” and “Rex” were ‘born’ using NXT platforms by Lego. As a work-in-progress, this project will demonstrate the process and results thus far of how “Alphena” and “Rex” were built and programmed to simulate basic speech (“Hi!”), movement (wave with arm, move around on the floor in upright position), and interact as a human (take turns speaking). Typically, individuals with autism struggle with reciprocal communication, initiating conversation with peers, and being independent and assertive in expressing personal choice, wants or needs. The use of robots in these types of studies will help to eliminate the complexities of interacting with humans, thus allowing for greater success for individuals with autism in learning how to interact and communicate with human beings. Basic robot movements will be demonstrated, the rationale for using robots to help teach social skills to students with autism will be exhibited, and the initial stages of the planned case study will be discussed.

Tyler Hyndman, Kwame Osafo, Rick Velde

Undergraduate Project

Tetrahymena Genome Database

Department of Computer Science and Information Systems

Faculty Mentors: Dr. Steven Dolins, Dr. Alexander Uskov, Dr. Nicholas Stover

Poster Number: 75

At Bradley University, five computer science students are working on this project: Tyler Hyndman, Kwame Osafo, Ravinder Punia, Anudeep Singh, and Rick Velde. Guiding the

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students are three faculty members, Dr. Dolins, Dr. Stover, and Dr. Alex Uskov. Dr. Stover, who is in the Department of Biology, is the leader and domain expert for the project, and Dr. Dolins and Dr. Alex Uskov are supporting the technical aspects of the project and working with the five computer science students. The current goal of the project is to migrate the existing Tetrahymena database at Stanford University to servers at Bradley University, update the database, and provide a user interface to the database using PHP with a wiki.

The TGD project has been going for two years at Bradley University. In 2007-2008, students made database design changes and built a prototype wiki for five genes. So far in this academic year, we have loaded data for 27,000 genes and built a new user interface utilizing Drupal, a software tool to manage community contributions on the web, and PHPMyEdit for allowing simple direct database access for the user.

We are currently integrating the user interface with the newly populated database. Once this is completed, the project will continue with maintenance of the current code and the addition of new features. The main objective of this project is for the TGD Community to use the software to progress in the study of the Tetrahymena Genome.

Jannatul F. Monyem

Graduate Project

A Usability Assessment of Bradley University Website

Department of Computer Science & Information Systems

Faculty Mentor: Dr. Young Park

Poster Number: 74

Usability is defined as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of user. With the explosive growth of Websites, usability becomes one of the most important quality factors of the Websites. Improving usability is increasingly important in order to make the Website more useful to the users. There is a set of research-based web design and usability guidelines that are developed by the U.S. Department of Health and Human Services in partnership with the U.S. General Services Administration.

This paper presents an approximate usability assessment based on the research-based web design and usability guidelines and a case study of the Bradley University Website. We evaluate the approximate usability of the Bradley University Website along with three other similar-type university Websites. We then propose recommendations for improving the usability of the Bradley University Website. Our recommendations will be useful for usability improvement by complementing recommendations based on the usability testing.

Andrew Becker, William Gosewehr, Andrew Hull, Matthew Jonas,

Undergraduate Project

CS Senior Project: NCEAS Data Warehouse

Department of Computer Science and Information Systems

Faculty Mentor: Dr. Steven Dolins

Poster Number: 71

The purpose of our senior capstone project is to build an integrated data warehouse using large, plant specimen and plot databases. The specimen source data is represented in Darwin Core, a data exchange standard. The source plot data may or may not be pre-aggregated; the plot data will be aggregated for the data warehouse. The project is based upon a grant with the National Center for Ecological Analysis and Synthesis (NCEAS); Bradley University is one of many universities and institutions participating in the grant.

Throughout the 2008-2009 academic year we have completed the following tasks: We collected and wrote software requirements, reviewed the requirements and collaborated with the domain

experts, compared different database architectures, designed and built a unified data warehouse architecture, mapped source data to the data warehouse, and began implementing loading and transformation scripts.

In the future, our database design and scripts will be used to integrate and aggregate data from many data sources. Participating botanists will be able to view specimen and plot data from across the world.

Edgar Gillen, William Herring, Mark Overholt,

Undergraduate Project

Forest Science Plot Data Entry System

Department of Computer Science and Information Systems

Faculty Mentor: Dr. Steven Dolins

Poster Number: 72

The Department of Computer Science and Information Systems has been working with the Smithsonian Tropical Research Institute (STRI) for four years. During the 2008-2009 academic year, three students in CS490/CS491 Capstone Project are building a data entry system for STRI. The three student team, Mark Overholt, Ed Gillen, and Will Herring, designed and built a graphical user interface for data entry. They created a series of data flow diagrams that models how users will enter data. They integrated a number of HTML forms, PHP scripts, and SQL scripts, which need to be run in this process. This data entry system was designed in collaboration with STRI to prevent user error during the data entry process.

In March of 2009, the three students and Dr. Dolins had an opportunity to visit the STRI in Panama; this trip was partially funded by OTEFD. They spent two days working closely with the domain experts to confirm requirements, demonstrate their software prototype, and perform a software review. A third day was spent getting a better understanding of the data collection process by experiencing field work first hand at the Barro Colorado Island rainforest.

Tyler Hyndman

Undergraduate Project

Golf Scheduling Problem

Department of Mathematics

Faculty Mentor: Dr. Michael Lang

Poster Number: 73

Consider a golf tournament in which twelve players split up into three groups of four to play five rounds. (Groups can be different in each round.) Is it possible for each player to play in a group with each other player at least once, but no more than twice? We explore this problem and generalizations, presenting mathematical results and computer algorithms.

Kiran Kumar Vallabhaneni, Vaishnavi Alagirisamy Venugopal, Lakshmi Girija Rao Talagadadevi

Graduate Project

IVR System for Bradley University

Department of Computer Science and Information Systems

Faculty Mentor: Dr. Jiang Bo Liu

Oral/Demonstrative Presentation: 2:30PM

Interactive Voice Response system is a recent development in the dialog system technology. A dialog system is a computer system intended to converse with a human, with a coherent structure. Dialog systems have employed text, speech and other modes for communication on both the input and output channel. The main intent of this project is to develop an IVR for Bradley University. This project would replace the need for website, thereby, providing ease of access to various departments in the University.

The application provides a main menu which helps the user traverse to the department menu. It also provides an option to contact the administrator at any point of time. The application is designed to be very user-friendly, using Voice XML technology.

VoiceXML is a markup language for building speech interfaces—the verbal equivalent of HTML. Developers use VoiceXML to create speech-enabled applications by specifying high-level menus and forms rather than procedural program code.

The Bradley IVR menu includes Graduate school, College of Engineering&Technology, Library, Health Center, Bookstore and Campus Security. Each menu item has several sub-menu items which helps the user to select the desired option. This project can later be expanded to implement all the webpages of Bradley University.

Alagirisamy Venugopal Vaishnavi

Graduate Project

Writing Secure Code

Department of Computer Science & Information Systems

Faculty Mentor: Dr. Jiang Bo Liu

Oral/Demonstrative Presentation: 3:00PM

It is the internet era. More and more information systems are connected to the Internet and offer Web interface to the general public or to a restricted set of users. Such openness makes them likely targets for intruders, and conventional protection techniques have been insufficient to prevent all intrusions in such open systems. A simple set of strategies has been adopted called SD3—for *secure by design, by default, and in deployment*—to help achieve our short-term and long-term security goals.

A *threat* to a system is a potential event that will have an unwelcome consequence if it becomes an attack. A *vulnerability* is a weakness in a system, such as a coding bug or a design flaw. An *attack* occurs when an attacker has a *motive*, or reason to attack, and takes advantage of a vulnerability to threaten an *asset*. An asset is also referred to in threat parlance as a *threat target*. A stack-based buffer overrun occurs when a buffer declared on the stack is overwritten by copying data larger than the buffer. Few of such cases will be demonstrated.

Adam Dempsey

Graduate Project

Autoignition Modeling of Diesel Sprays Using a Characteristic Strain Rate

Department of Mechanical Engineering

Faculty Mentor: Dr. Scott Post

Poster Number: 69

The modern direct-injection diesel engine is the most fuel efficient internal combustion engine on the market. Due to rising environmental and health concerns, government agencies are regulating the pollutant emissions from all internal combustion engines, especially diesels because of their relatively large particulate matter and NO_x emissions.

Considering the aforementioned facts, the diesel engine has become a topic of massive research and development, the goals of which are to maintain, if not increase its reputable fuel efficiency, whilst meeting the strict pollutant emissions regulations. The current topic under heavy investigation is Homogeneous Charge Compression Ignition (HCCI) engines, which have pointed out to the scientific community a need for greater understanding of the autoignition process of hydrocarbon fuels.

My masters thesis project at Bradley University is the development of an autoignition model for diesel sprays based on chemical kinetics and a characteristic fluid dynamic strain rate, namely the characteristic scalar dissipation rate. There has been a substantial amount of creditable work done into the autoignition of pre-mixed fuel and air systems. Nevertheless, these models still does not account for strain rate or mixing rate in a diesel fuel spray. Researchers have demonstrated that the strain rate in non-premixed fuel and air systems has a significant effect on ignition time. Ultimately, the autoignition model will be integrated into a diesel engine cycle simulation for use at Caterpillar Inc.

Matt Engelmann, Andrew Klumpp, Jason Davis, Per Ellingson

Undergraduate Project

Optimization of Condenser and Fan for Air Conditioning System

Department of Mechanical Engineering

Faculty Mentor: Dr. David Zietlow

Poster Number: 70

Shaun Greiner, Clint McCombs, Brock Norman, Jeremy Treadwell

Undergraduate Project

iPhone Game Development Using Unity

Department of Multimedia

Faculty Mentor: Dr. Monica McGill

Oral/Demonstrative Presentation: 3:10PM

Under an independent study project, as a group we chose to develop Infectious, a game for the iPhone. In Infectious, the player is the virus in a human body. The purpose of the game is to avoid white blood cells, while at the same time attacking red blood cells, all within the confines of a vein.

Our group recommended affordable, pre-owned, or open source software packages for game creation, prepared a design document for the game, created a project management spreadsheet, and developed the game with all original art and audio. We also identified the steps for submitting a game to the Apple store for approval and distribution.

We decided to use Unity3D basic and the iPhone add-on package as the game development environment. ProTools was selected for sound design and creation, and Maya was selected to develop original game art.

The game is currently scheduled for release in June 2009.

Nina DeBello, Ben Blomberg, Tony Birge

Undergraduate Project

Modeling Surface Diffusion Processes

Department of Physics

Faculty Mentor: Dr. Kelly Roos

Poster Number: 32

The mode of mass transport known as surface diffusion is an extremely important materials process. When harnessed by nature surface diffusion can, through a phenomenon known as self-assembly, produce ordered ensembles of useful nanostructures. Examples of such nanostructures formed via self-assembly, observed with Photoemission Electron Microscopy (PEEM) in collaboration with scientists from the Center for NanoIntegration at the University of Duisburg-Essen, along with some associated applications will first be described. We will then present the results of our computer modeling of individual decay experiments wherein nanoscopic-scale islands are observed to decay at elevated temperatures in such a way that they feed atoms onto the surrounding surface. Once detached from the decaying islands the atoms can diffuse (random motion) on the surface until they are forced to leave the surface (evaporation) due to the elevated temperature. This competition between diffusion and evaporation leads to interesting morphological thin film behavior on the surface surrounding the decaying islands. Through our simulations we have been able to numerically replicate this interesting behavior as observed experimentally in various PEEM experiments involving the decay of metallic nanostructures on various silicon surfaces. Our results have revealed information on how atomic steps can affect diffusing atoms, leading to diffusive anisotropy and the formation of elongated wire-like nanostructures. The knowledge gained in this project will ultimately lead to a better understanding of how to manipulate matter at the smallest possible scale in order to optimally build useful electromagnetic nanodevices.

Kara Deweese

Undergraduate Project

5-Aryl-3-oxo- δ -Lactones as Potential Cyclooxygenase Inhibitors

Department of Chemistry and Biochemistry

Faculty Mentor: Dr. Brad Andersh

Poster Number: 3:20PM

A new one-step method for the preparation of 5-aryl-3-oxo- δ -lactones was recently discovered by Dr. Andersh's research group, and this method has several advantages over the traditionally used method. After discovering the new method, our research group started studying the biological activities of 5-aryl-3-oxo- δ -lactones. Eifler-Lima reported that these compounds have

pain relieving ability in mice. It is our hypothesis that this pain relieving ability is related to the inhibition of cyclooxygenase (COX) enzymes. COX enzymes form prostaglandins in the body which are responsible for the regulation of pain, fever, inflammation, stomach acid, and many other biological functions. We have synthesized and tested several derivatives of 5-aryl-3-oxo- δ -lactones and have found that they reduce COX activity. We are working on the synthesis of additional derivatives to try to increase this COX activity. One direction for this synthetic work includes utilizing the Topliss Scheme, a commonly used scheme in medicinal chemistry for finding the most active derivative of a compound. We are also adding hydrogen bonding groups to the aryl group of the compounds in an attempt to increase the gastrointestinal absorption of the compounds. Finally, we are trying to find the active enantiomer of the compounds so that only the active form can be included in the final drug.

Molly Gass, Kelly Eads, Mike Hoehn, Theresa Porter, Nicole Pierson, Jessica Weida, Anna Weiss

Undergraduate Project

Developing Chemistry Outreach Shows

Department of Chemistry

Faculty Mentor: Dr. Dean Campbell

Poster Number: 33

For the past two years, the Bradley University Chemistry Club has received funding from the National American Chemical Society to perform chemistry demonstration shows on campus and in the greater Peoria community. Twenty undergraduate chemistry students participated in performing a variety of demonstrations through thirty shows in the 2007-08 and 2008-09 academic years. The shows reached out to thousands of people, ranging from preschoolers to adults. This presentation will discuss the challenges in coordinating this program at a medium-sized undergraduate institution and the overall themes of the demonstrations performed.

Justin Good, Dave Steinwedel, William Lemkey, Kelly Eads

Undergraduate Project

Coordination of 2+ and 3+ Metal Ions to Organize Ligands, Forming 2-D Polymers

Department of Chemistry

Faculty Mentor: Dr. Edward Flint

Poster Number: 34

Our research group is working on synthesizing and characterizing coordination polymers, also known as metal-organic frameworks. These compounds combine metal complexes with linking

groups in a specific special arrangement. In order to produce different coordination polymers we have worked with different linking compounds.

The compound 1,4-bisacetylacetonatobenzene (H_2BAB) is a known compound that we synthesized from literature methods. The characterization of this compound by infrared, 1H and ^{13}C nuclear magnetic resonance spectroscopies indicates it has the desired structure. Single crystals of the molecule were grown, and analyzed to show the 3-dimensional structure. x-ray diffraction spectra of the compound in order to characterize the bonding and structure of the molecule. We have synthesized polymers with this linking ligand by reacting it in the presence of a strong base with Fe^{3+} , Cr^{3+} , Ni^{2+} , and Cu^{2+} ions. These polymers are all insoluble powders that infrared spectroscopy indicates that the metal has been complexed by the ligand. We are also developing the synthesis of a related compound (H_3TAB), 1,3,5-trisacetylacetonatobenzene, which will have a triangular shape.

Another linking ligand that we have used to make coordination polymers is tris-(4-pyridyl)-triazine, which also has a triangular structure. Coordination polymers of this ligand with copper compounds results in insoluble green polymers. We have X-Ray single crystal data from these polymers as well.

A tetrahedral compound of copper, chloride ions and an oxide ion with organic bases is also being studied. The 'hub' of these compounds has the formula $Cu_4OCl_6L_4$, where L is a nitrogen-containing ligand. Synthesis and characterization of these polymers is on-going.

Margaret Hammar

Undergraduate Project

Solvent Effects on Acetylcholine Conformations

Department of Chemistry

Faculty Mentor: Dr. Wayne Bosma

Poster Number: 35

Acetylcholine (ACh) is an important neurotransmitter that binds to receptors in the brain. The conformation of this molecule in the body is dependent on the specific receptor to which the ACh is binding. In principle, there are a huge number of conformers possible, but in actuality, there are only a few which have low enough energy to be stable. Using Density Functional Theory (DFT) the lowest energy conformations of ACh were examined both for the isolated molecule and using a continuum model for the solvent (COSMO). Semi-empirical methods, AM1 and PM3, were also used to examine ACh in vacuum and with COSMO. The DFT method is a higher level of theory but has the disadvantage of taking significantly longer than the semi-empirical

methods. DFT gives a different lowest energy conformation for the isolated molecule than for the solvated molecule, and the results agree well with experiments. Both the PM3 and AM1 methods were able to find several low energy conformations for the isolated molecule, but results for the solvated molecule differed greatly from the DFT calculations. AM1 appears to be more reliable than PM3 for finding the lowest energy conformation for this molecule.

Terese Kreifels

Undergraduate Project

Mechanism of the Nitrosoamide Decomposition

Department of Chemistry

Faculty Mentor: Dr. Kurt Field

Poster Number: 37

The thermal rearrangement and subsequent decomposition of *N*-nitrosoamides in alcohol solvents is under investigation. (-)-(*R*)-*N*-(1-phenylethyl)-2-naphthalenecarboxamide was prepared using a 2-fold excess of optically active 1-phenylethylamine and 2-naphthoyl chloride. Also prepared was the anticipated nitrosoamide decomposition product, 1-phenylethyl-2-naphthoate, via the reaction of 2-naphthoyl chloride with 1-phenylethyl alcohol. The amide and the ester were identified by FTIR, ¹³C-NMR, ¹H-NMR, and high resolution MS. 1-phenylethyl methyl ether has been being prepared via the Williamson synthesis utilizing 1-phenylethyl alcohol, sodium hydride, and methyl iodide. The amide has been nitrosated with N₂O₄/NaOAc. Currently, the decomposition is being conducted in methanol and dichloromethane. The enantiomeric purity, ascertained by HPLC, of the ester and ether produced should provide insight into the mechanism of this thermal decomposition.

Josiah Miller, Nathan Applegren

Graduate Project

Formation of Metal Colloids in the Presence of Silane-Containing Polymers and Studies of their Catalytic and Synthetic Abilities

Department of Chemistry

Faculty Mentors: Dr. Dean Campbell and Dr. Brad Andersh

Oral/Demonstrative Presentation: 3:30PM

Colloidal heterogeneous catalysts are often more effective than larger heterogeneous catalysts because the surface to volume ratio is greater for colloids. One of the shortcomings of using colloidal particles as catalysts is that the small particles are often difficult to remove from the product. Encapsulating the colloidal catalysts in polydimethylsiloxane (PDMS) might be a solution to this separation issue. PDMS cross-linked into a solid by hydrosilation reactions often

contains unreacted silicon-hydrogen bonds. Potassium tetrachloroaurate(III), sodium tetrachloropalladate(II), and palladium(II) acetate can diffuse into the polymer to react with these silicon-hydrogen sites to produce gold or palladium metal colloids embedded within the polymer structure. Our PDMS-confined palladium colloids were used to catalyze the hydrogenation of methyl red and the reduction of other common organic functional groups.

Ryan Van Hoveln

Undergraduate Project

Synthesis of Highly Substituted Pyrandiones

Department of Chemistry

Faculty Mentor: Dr. Brad Andersh

Poster Number: 3:50PM

We have found that dihydropyrandiones are active against gram-positive bacteria, and that they inhibit cyclooxygenase enzymes. In an effort to determine if the stereogenic center in the 6-position is necessary for this activity, we set out to prepare the corresponding pyrandiones. Direct dehydrogenation of the dihydropyrandiones was unsuccessful using various conditions. We are currently investigating the use of previously published methods for synthesizing these compounds, which involves trapping the dianion of methyl acetoacetate with 1-benzoyl-2-methylaziridine followed by cyclization. Results from this synthetic work will be presented.

Jenny Van Kirk

Undergraduate Project

Supercritical Fluid Extractions

Department of Chemistry

Faculty Mentor: Dr. Kurt Field

Poster Number: 38

The objective of my research is to extract organic materials from food and consumer products via carbon dioxide supercritical fluid extractions (SCF). At a certain temperature and pressure, solid CO₂ will melt, rather than sublime. The resulting liquid boils rapidly, thus extracting non-polar organic materials from their matrices. Our most successful extractions involved removing the essential oil limonene from citrus fruits. The outer peel of citrus fruits is known to contain higher concentrations of limonene than the fruit. Six different citrus fruits were extracted and analyzed: oranges, lemons, limes, grapefruit, tangerines, and clementines. I was able to isolate the natural product and confirm the presence of limonene through the analysis of the extract using ¹H-NMR, ¹³C-NMR, IR, and GC spectroscopy as well as mass spectrometry. The average % extraction by type was found to be: orange, 1.604%; lemon, 1.588%; lime, 1.685%;

grapefruit, 0.732%; tangerine, 0.822%; and clementine, 1.254%. We also attempted to use this procedure to isolate caffeine from coffee, isoeugenol from nutmeg, cinnamaldehyde from cinnamon bark, and eugenol from cloves. Using our standard procedure, these extractions did not remove measurable quantities of the desired natural product. Our research continues; we are currently extracting organic materials from consumer products, i.e., air fresheners, insect repellents, and analgesic pads.

Nicholas Van Hise

Undergraduate Project

Synthesis and Antibiotic Testing of 5-aryl-3-oxo- δ -lactones

Department of Chemistry

Faculty Mentor: Dr. Brad Andersh

Poster Number: 3:40PM

2-(phenylamino)methylene substituted 5-aryl-3-oxo- δ -lactones were shown by Dr. Wang to possess antifungal activity against several plant pathogens. Based upon this finding, several 5-aryl-3-oxo- δ -lactones were prepared by Dave Baudo and tested at the National Center for Agricultural Research for activity against the corn-rot fungi *Aspergillus flavus* and *Fusarium verticillioides*. Although 5-aryl-3-oxo- δ -lactones showed activity against these fungi, our collaborator was not able to continue working on this project. Because many antifungal agents also exhibit antibiotic properties, we tested the 5-aryl-3-oxo- δ -lactones for activity against the bacteria *Bacillus subtilis*, *Enterococcus faecalis*, and *Acinetobacter lwoffii*. From this work, it was found that the MIC₉₀ values for 3-oxo-5-phenyl- δ -lactone were 455-425 $\mu\text{g/mL}$, 750-700 $\mu\text{g/mL}$, and 655-603 $\mu\text{g/mL}$ against *Bacillus subtilis*, *Acinetobacter Lwoffii*, and *Enterococcus faecalis*, respectively. It was also found that the introduction of two methyl groups in the four position of 3-oxo-5-phenyl- δ -lactone, increased the activity of this class of compounds against each bacterium. Further structural modifications have resulted in additional increases in activity, with the most active derivative against *Acinetobacter lwoffii* and *Enterococcus faecalis*, 5-(3,4-chlorophenyl)-4,4-dimethyl-3-oxo- δ -lactone, producing MIC₉₀ values of 19-14 $\mu\text{g/mL}$ and 200-183 $\mu\text{g/mL}$, respectively. The most active derivative against *Bacillus subtilis*, 5-(4-chloro-3-trifluoromethylphenyl)-4,4-dimethyl-3-oxo- δ -lactone, had an MIC₉₀ value of 29-25 $\mu\text{g/mL}$.

Rachael Bloom, Ryan Stoller, Zach Bell

Graduate Project

The Validity of the Cost Reduction Technologies ET 2000 Isokinetic Dynamometer and its Relationship with the Work Well Functional Capacity Evaluating in Healthy, Employment Aged Individuals

Department of Physical Therapy & Health Sciences

Faculty Mentor: Dr. Steve Tippett

Poster Number: 44

BACKGROUND: Musculoskeletal injuries relating to work have become increasingly expensive to employers. Businesses have adopted the use of Functional Capacity Evaluations (FCE) to screen and match potential or injured employees to the most suitable job. FCE's are limited in several ways, including the length of time it takes to be administered and it's subjective scoring. A recent approach to pre-employment screening is the isokinetic dynamometer. An isokinetic dynamometer is believed to be more objective and quicker than FCE's. A limitation of the dynamometer is the lack of research on its effectiveness and relationship to the industrial rehabilitation setting.

OBJECTIVE: A correlation study to determine the relationship between the strength levels obtained from the Work Well FCE and the Cost Reduction Technologies (CRT) ET 2000 isokinetic dynamometer.

METHODS: Twenty-seven healthy, employment-aged individuals were recruited to compare the strength levels obtained from the Work Well FCE and the CRT ET 2000 isokinetic dynamometer.

RESULTS: Overall FCE scores showed a good correlation to the DOL strength levels ($r = 0.719$, $p = 0.01$). The correlation showing the most significance was between the waist-to-floor FCE subtest and the CRT ET ($r = 0.731$, $p = 0.01$).

DISCUSSION AND CONCLUSION: We concluded that there was a good correlation between the CRT ET 2000 and the Work Well FCE. Future studies should control for fatigue factors related to order of testing, ensuring that all subjects have equal rest time between tests.

Dan Cluskey, Elise Engelhard, Jayson Michnowicz, Sarah Shambaugh, Amanda Staley

Undergraduate Project

A Comparison of Community and Hospital Acquired MRSA Infection

Department of Nursing

Faculty Mentor: Dr. Peggy Flannigan

Poster Number: 45

Methicillin Resistant Staphylococcus Aureus (MRSA) has been on the rise in the community and hospital settings over the past several years. The objective of this review is to examine the differences and/or similarities in community-acquired (CA) and hospital-acquired (HA) MRSA. Ten articles were chosen to research this topic. Many of these articles are post 2002 because MRSA is a relatively new epidemic. All of the studies were quantitative in design. The goal was to identify risk factors, demographics, treatment, and prevalence of MRSA. Certain risk factors, including Diabetes Mellitus, COPD, and Cardiac Disease were found to be significant for both types. The results related to demographics were inconsistent regarding age and gender. Vancymycin is an effective treatment for MRSA. There are other antibiotics that are effective for CA-MRSA, including Trimethoprim/ Sulfamethoxazole and Clindamycin. Both HA and CA-MRSA are on the rise, but HA-MRSA poses a greater risk. However, research gaps were observed and can be attributed to the scarcity of MRSA studies. Identified in the review are ways to further address these gaps and provide better outcomes for the victims of MRSA.

Danielle Cooper

Undergraduate Project

Practice Patterns of Physical Therapists Treating Individuals at Risk for Osteoporosis: Does Direct Access Matter?

Department of Physical Therapy & Health Sciences

Faculty Mentors: Dr. Melissa Peterson and Dr. Stacie Bertram

Poster Number: 46

INTRODUCTION: Osteoporosis is a common metabolic bone disorder that can lead to low bone mass and fractures. Little research has been conducted regarding physical therapists' knowledge of identifying risk factors for osteoporosis in states with direct access.

PURPOSE: The purpose of this study was to learn about physical therapists' knowledge and confidence in screening patients for osteoporosis in states with direct access.

METHODS: A survey was sent to 500 licensed physical therapists working in two different states with direct access. Participants reported the frequency with which they screen individuals for osteoporosis. Frequency distributions and chi-square analyses were conducted using data

from these surveys and that of a previous, similar survey of physical therapists practicing in Illinois.

RESULTS: The response rate was 30%. Risk factor identification and screening practices were similar across the three states. Less than 35% of physical therapists reported screening for osteoporosis always or often. Most therapists would always or often screen individuals with common risk factors. However, less than half of physical therapists routinely screen individuals for osteoporosis with lesser known risk factors.

DISCUSSION and CONCLUSION: Physical therapists in the three states surveyed identify the common risk factors and screen accordingly. While physical therapists practicing in states with direct access report higher levels of confidence, they do not identify risk factors more accurately than those practicing with physician referral. Failure to identify individuals at risk for osteoporosis can result in inappropriate and ineffective treatment at best, but more importantly, potentially places the individual at risk for injury.

Ashley M. Culbertson

Graduate Project

A Systematic Analysis of Existing Classification Methods Used in Directing the Course of Treatment for Acute and Chronic Low Back Pain

Department of Physical Therapy & Health Sciences

Faculty Mentor: Mr. William McGehee

Poster Number: 47

Aside from the common cold, low back pain (LBP) is the most widespread reason individuals visit their physician's office. LBP can be deterring to patients physically, mentally and emotionally affecting their activities of daily living (ADL) and work. Not only can LBP be a physical barrier but it can be a substantial economical burden that exceeds nearly 50 billion annually in the United States alone. The health care and disability costs for those with LBP can be compared to that of heart disease, diabetes and depression.⁶ Reports indicate 37 percent of the health care costs associated with LBP are a direct result of physical therapy services. There has been a wide array of interventions used for this category of patients, however attempts to identify the most effective intervention have been lacking. The Guide to Physical Therapist Practice and advocates of evidence-based practice promote the idea that effectively sub-grouping patients should ultimately direct decision-making towards the most effective means of intervention. The development of an effective and clinically applicable method for classifying patients with LBP could improve decision-making and outcomes. Clinical predication rules (CPR) are tools used to assist clinicians in decision making regarding patients plan of care. There have been several CPR's developed and validated over the years regarding treatment for LBP. Primary basis for this systematic review was to research how many different classification systems existed for the

treatment of LBP and if any clinical prediction rules have been established and validated for placing patients into an appropriate treatment subgroup.

Kristin Czuba, Brittany Swint

Graduate Project

Chiropractor's Awareness and Attitudes Toward the Profession of Physical Therapy in Regards to the Musculoskeletal System

Department of Physical Therapy & Health Sciences

Faculty Mentor: Dr. Dawn Hall

Poster Number: 49

The purpose of this study is: 1) to initiate an understanding of chiropractors' general awareness of the scope of physical therapy practice as it relates to chiropractic care; 2) to explore the attitudes of chiropractors regarding direct access to physical therapy; and 3) to determine if chiropractors feel that physical therapists are capable of performing joint manipulations. One hundred and seven surveys were sent to licensed chiropractors listed in a central Illinois phonebook. In all, twenty-five surveys were returned; one was returned blank and disregarded. Those surveyed indicated that a Doctoral degree is necessary for physical therapists (70.8%) to be competent at delivering care in an autonomous setting; however, most were unaware of what degree is currently offered, as 25% thought a Bachelor's and 29.2% thought a Master's degree. Results also show 16.7% were for direct access and 79.2% were against direct access to physical therapy services. Overall, participants perceived physical therapists as unaware and unskilled in joint manipulation (awareness = 70.8%; skill = 83.4%), yet moderately aware and skilled in joint mobilization (awareness = 37.5%; skill = 54.2%). Participants were not fully knowledgeable of the scope of physical therapy practice and education. If chiropractors are educated about the level of education required of a licensed physical therapist, and the evidence based practice utilized in physical therapy clinics, then misunderstandings can be eliminated with hope that one day, patients and the public may have the right to access physical therapy services directly.

Dorothy Fernandez, Wardhani Tirtianto

Graduate Project

A Survey of Physical Therapists' Initial Evaluation of General Survey and Vital Signs

Department of Physical Therapy & Health Sciences

Faculty Mentor: Dr. Stacie Bertram

Poster Number: 50

Background and Purpose

Physical therapists (PTs) see consumers for the diagnosis of disabilities related to movement, function and health. Screening measurements such as general survey and vital signs (VS) help provide the PT information necessary to formulate an appropriate intervention plan. This study investigated the frequency that PTs conducted general survey (height and weight) and VS measures (pulse, blood pressure [BP], respiratory rate [RR], temperature), and whether the level of entry-level PT degree or continuing education (CE) in differential diagnosis influenced PT's decisions.

Subjects and Methods

Fifty six randomly selected physical therapists participated in an online survey. The frequency of general survey and VS measurement and demographic and educational information was analyzed.

Results

Forty percent obtained an entry level graduate degree (master's or doctoral) in PT and the majority (53%) completed CE coursework in differential diagnosis. Despite their exposure to differential diagnosis the majority of respondents did not routinely assess VS. Independent t-tests conducted revealed no differences based on level of degree. When examining the responses of PTs that treated adults only, CE influenced assessment of general survey measures and VS. The completion of CE coursework in differential diagnosis improved the likelihood that a PT would assess VS overall, specifically pulse, BP and RR.

Discussion and Conclusion

Previous research notes that routine examination of VS and general survey measures is not a common practice among physical therapists. This study found that CE coursework in differential diagnosis positively effects the inclusion of some VS measures as routine components of initial patient examination.

Megan Flannery, Brittany Armstrong

Graduate Project

The Effects of Body Mass Index on Peabody Scores and Vertical Jump Height of 3 to 5 Year-Olds: A Secondary Data Analysis

Department of Physical Therapy & Health Sciences

Faculty Mentors: Dr. Kurt Neelly and Ms. Brenda Pratt

Poster Number: 51

Introduction: Prior studies have highlighted negative associations between body composition and motor performance in childhood and adolescence. Purpose: To examine the relationship between Body Mass Index (BMI) percentile and gross motor skills in preschool children. Subjects: Eighty-six healthy inner city 3-5 year-old children. Method: Counter movement vertical jump height, with and without arms, was measured using 2-D video analysis. The locomotor subtest of the Peabody Development Motor Scales-2 (PDMS-2) was completed, along with height and weight measurements of each child. BMI was calculated and BMI and PDMS-2 were converted to percentile ranks. Results: A significant Pearson Product correlation was found between BMI and PDMS-2 percentiles, $r(86)=-0.271$, $p<0.011$. No significant relationship was found between BMI percentile and vertical jump height with arms, without arms, and vertical jump efficiency. Discussion: The results show a limited or no association between a preschool child's BMI percentile and their gross motor performance. Researchers' suggest that children at this age utilize variable motor skill patterns and lack consistent motor performance.

Jessica Newman Jaime Kirby

Graduate Project

The Comparison of Balance, Cognition, Gait, and Bone Density on Three Geriatric Groups: Line Dancers, Walkers, and Sedentary People

Department of Physical Therpay & Health Sciences

Faculty Mentor: Dr. Melissa Peterson

Poster Number: 48

PURPOSE: The purpose of this study was to investigate potential differences in balance, gait, cognition, and bone density between walkers, line dancers, and sedentary individuals.

PARTICIPANTS: Forty-two females between 60 and 85 were recruited for the study (19 line dancers, 13 walkers, and 10 sedentary individuals). Participants for the walkers and sedentary groups were recruited from the community by word of mouth and an educational presentation, while line dancers were recruited through a community center line dancing class.

METHODS: This abstract describes the baseline phase of a two-year longitudinal quasi-experimental trial. The following data were collected for all participants: balance using the Four Square Step Test, Unilateral Step Test, and Maximal Step Length Test, gait characteristics during normal walking, fast walking, and dual task walking using the GAITRite instrumented walkway, bone density using a heel sonometer, and cognition using the Montreal Cognitive Assessment.

RESULTS: The three groups were similar for most variables, including bone density, gait measures, and most balance measures. The line dancing group differed from both groups in that they exercised for a longer average weekly duration, and differed from the walker group with lower scores on the cognitive assessment and older mean age.

DISCUSSION & CONCLUSION: Baseline data reveal many similarities between older women engaging in different forms of exercise. Data collected after one year of continued activity will allow for more definitive conclusions as to the potential role of exercise on gait, balance, bone density, and cognition of these participants.

Katelyn Pietras, Dana Jaremus, Amanda Lund

Undergraduate Project

Indwelling vs. Intermittent: A Preferred Method

Department of Nursing

Faculty Mentor: Dr. Peggy Flannigan

Poster Number: 52

Urinary catheterization is a common procedure used on patient of all ages and for various diagnoses. It is important for nurses to know the difference between the 2 methods of catheterization in order to provide the most appropriate and best quality of care for their patients. This literature review focused on investigating which method is preferred: indwelling or intermittent catheterization. After reviewing the research, there was little evidence supporting the use of indwelling catheters. A common thread found amongst the 10 articles reviewed was the over-use of indwelling catheters. The research revealed that over-use was related to indwelling catheters being placed without orders for the convenience of staff. The articles focused on several other negative aspects of indwelling catheters such as: increased risk of acquiring urinary tract infection (UTI), lengthened hospital stay, and a nursing knowledge deficit related to the procedure. If catheterization is believed to be necessary, intermittent catheterization is preferred. There are fewer harmful effects associated with intermittent catheterization than indwelling, such as fewer occurrences of UTIs. The main advantage to intermittent catheterization is the patient's overall improved quality of life. Research has found that patients experience: decreased urinary frequency, nocturia and urge, lowering of UTI rate, and a restoration of continence. Intermittent

catheterization is a safe and beneficial alternative to an indwelling catheter and has become a gold standard for catheterization.

Ashley Reel, Tania Sarraf, Mike Gibson

Graduate Project

The Assessment of Proprioception in the Osteoarthritic Knee: A Systematic Review

Department of Physical Therapy & Health Sciences

Faculty Mentor: Dr. Steve Tippet

Poster Number: 53

Objective: Osteoarthritis (OA) is one of the leading causes of orthopedic disability currently. Due to the importance of proprioception evaluation in individuals with OA, the aim was to compare and contrast various types of proprioceptive tools used in the assessment of the osteoarthritic knee through a systematic review of research reports. **Methods:** A search of CINAHL, Cochrane Library, EBSCOhost, Ovid Medline, PubMed @ Bradley, PubMed @ UIC, and SCOPUS to identify research reports of proprioceptive assessment tools. **Key words** included proprioception, osteoarthritis, knee, kinesthesia, joint awareness, joint position sense, total knee arthroplasty (TKA), and balance. The search yielded 31 articles which were reviewed by two independent researchers. A study was excluded if it contained any of the following criteria: healthy subjects, post-operative TKA only, rheumatoid arthritis, osteoarthritis of any joint other than the knee, and subjective assessment of proprioception (i.e. questionnaires).

Results: After review of the 31 articles, 17 of these studies were rejected. The remaining 14 studies were included and categorized into four groups: threshold to detect passive motion, reproduce knee target angle, reproduce position of the knee on a model, and computerized force plate systems.

Conclusion: These assessment tools are widely used and accepted in the research of proprioception. However, there is a disparity between research and clinical significance. This systematic review shows the need for a quick and effective tool used to cover all aspects of proprioception that can be used not only in research, but also in the clinic.

Jessica Rients, Natalie Larsen

Undergraduate Project

Determinants of Elementary School Participation for Students with Cerebral Palsy-A Systematic Review: Preliminary Results

Department of Physical Therapy & Health Sciences

Faculty Mentor: Ms. Brenda Pratt

Poster Number: 54

Participation of children in their home, school and community is vital to their overall growth and development. While participation is important for all children, it is crucial to the growth and development of children with disabilities. Limited school participation in children with disabilities can have negative outcomes in their academic, social, physical, and cognitive-behavioral development.

A search of CINAHL, PubMed, and ERIC databases was done using the key words participation, school, school participation, childhood disability, restricted mobility, school function assessment, cerebral palsy, social status, friendship, and friendship development.

Using the International Classification of Function (ICF) as a framework, the factors that may potentially influence school participation are discussed. According to this model, school participation results from the dynamic interaction of the child's characteristics and school environment. Children with cerebral palsy have limited participation in school compared to their typically developing peers. When placed in a general versus a special education classroom, the average level of school participation is higher. The social, physical, and attitudinal characteristics of a school may influence the extent of school participation. These school environmental factors can affect the level of participation by being a facilitator, barrier, or a combination of the two. Continued research will help determine which factors will enhance the school participation of children with cerebral palsy.

Kristen Stevenson, Jake Livingston

Graduate Project

Undergraduate Project Perceptions of Physical Therapy and the Doctor of Physical Therapy (DPT) Degree

Department of Physical Therapy & Health Sciences

Faculty Mentor: Dr. Rob Bertram

Poster Number: 55

There has been an increase in the number of students interested in pursuing a career in physical therapy. This emphasizes the importance for students to understand and recognize the

requirements to become a licensed physical therapist. The purpose of the study is to assess the knowledge and perceptions undergraduate students have regarding a career in physical therapy, as well as the Doctor of Physical Therapy (DPT) degree. A total of 136 students who plan on pursuing a career in Physical Therapy were surveyed from three distinct institutions in Illinois. Data was collected from 3 Midwestern universities. The survey consisted of a compilation of questions including demographics, the students' perceptions of physical therapy as a career, the potential for direct access, and the DPT program. Data was analyzed using t-tests, correlation, and ANOVAs. Results suggest that students' overall survey scores were significantly influenced by their experience consulting with a physical therapist, observing a physical therapist, and working in a health care setting.

Abigail Walk, Sarah Wagoner

Graduate Project

The Relationship Between Anticipatory (Feed-Forward) Proprioception and Reactive Proprioception in Young Individuals Between 18-26 Years Old

Department of Physical Therapy & Health Sciences

Faculty Mentor: Dr. Andrew J. Strubhar

Poster Number: 56

Objective: To explore the relationship between feed-forward proprioception and reactive proprioception as measured by two tests, the maximum step length and the Proprio 5000 Dynamic Motion Analysis (DMA) system. A correlation between the two was anticipated.

Methods: Fifty-one subjects completed a maximum step length test (MSLT), the Proprio 5000 test, and the Baecke Activity Questionnaire,. Subjects were between the ages of 18 and 26 years old and with no significant medical history that would interfere with testing.

Results: Correlations were found only between MSLT right and left foot backwards stepping and Proprio 5000 DMA scores (right $r = -.299$, $P = 0.017$; left $r = -0.378$, $P = 0.003$).

Additional correlations were found between the Baecke sport activity level and MSLT stepping in all directions, except for the backward direction. Correlation between the DMA score and sport activity levels were also found ($r_s = -0.342$, $P = 0.008$).

Conclusions: The general lack of correlation between the Proprio 5000 testing and the MSLT test results does not support a relationship between anticipatory and reactive balance. An assumption can be made that the Proprio 5000 test measures characteristics independent of those measured by the MSLT. The relationship between backward stepping and DMA scores might be explained by the role played by vision in balance. Further, since backward stepping was the only

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MSLT movement without correlation to activity level, it can be assumed that backward stepping is not an indicator of athleticism.

Douglas Bahnick

Undergraduate Project

The Relationship Between Implicit Theories of Intelligence and Self-Handicapping

Department of Psychology

Faculty Mentor: Dr. Anthony Hermann

Poster Number: 39

This study is designed to examine the influence of implicit theories of intelligence on self-handicapping strategies. Behavioral self-handicapping is a behavior (observed only in males) that occurs when an individual lacks confidence in his ability to perform at an expected level. The individual will attempt to find a non-ability based excuse for a poor performance in order to externalize failure. Implicit theories of intelligence are beliefs that occur on a continuum from entity theorists (those who believe intelligence is fixed and inherited) to incremental theorists (those who believe intelligence is malleable and based on effort) and impact the way in which an individual will engage in ability-based tasks. Participants were randomly assigned to a condition where they were meant to believe they either could or could not succeed based on the feedback they were given. Our hypothesis was that individuals in the non-contingent success group (designed to create high amounts of anxiety) were more likely to engage in self-handicapping strategies than those in the contingent success group. Additionally, individuals in the non-contingent success group who were primed with an internal incremental theory were hypothesized to be less likely to engage in self-handicapping behavior than those in the non-contingent success group who were not primed. The results of this pilot study show non-significant trends to support these hypotheses. With a larger sample, it is expected to achieve significant results.

Richard Griggs, Dianna Taylor, Corey Weir, Wesley Wayman

Undergraduate Project

Repeated Methylphenidate Administration During Adolescence Produces Hyperactivity, Impulsivity and Enhanced Cocaine Seeking Behavior

Department of Psychology

Faculty Mentor: Dr. Tim Koeltzow

Poster Number: 40

Attention-Deficit/Hyperactivity Disorder (ADHD) is linked to disruptions in dopamine transporter (DAT) function and is often treated with the DAT blocker methylphenidate (MP). Adolescent exposure to repeated, intermittent MP produces long-lasting behavioral changes in rats, including increased acquisition of cocaine self-administration. Whereas intermittent cocaine injections promote behavioral and neurophysiological adaptations linked to substance abuse,

continuous infusion is associated with tolerance to these effects. Thus, the ability of stimulant treatment to promote addictive behavior in rats may depend on the route of administration. The current study assessed the effects of intermittent (0.8 or 1.6 mg/kg, s.c., twice daily) versus continuous (1.6 or 3.2 mg/kg/day via osmotic minipump) MP administration across 4 weeks of adolescent development in rats. Results indicate the intermittent MP promotes hyperlocomotor responses to a novel open field and in a T-Maze task of impulsivity. However, continuous MP was associated with increased adaptive responding in the T-Maze task. Finally, whereas intermittent MP resulted in increased cocaine seeking behavior, continuously-treated rats did not show this effect. Taken together, these data indicate that sustained release formulations of MP are likely to elicit tolerance to the reinforcing properties of psychostimulant medications and are not likely to promote addiction.

Michele Hart, Hayley Skulbortstad, Justine Janis

Undergraduate Project

The Relationship Between Self-Esteem, Self-Compassion and Body Image

Department of Psychology

Faculty Mentor: Dr. Anthony Hermann

Poster Number: 41

The Self-Compassion scale is a measure of individuals' feelings of self-worth through the use of three components: self-kindness, common humanity and mindfulness. Unlike self-esteem, self-compassion is not based around self-evaluations, but rather focuses on feelings of self-understanding that are not contingent on external stimuli. The purpose of this study is to measure the relationship between self-compassion and predictions of individuals' feelings of overall satisfaction with their current body type and their overall accuracy of predicting their actual weight. Participants in the study (n=29) were given a survey containing Neff's Self-Compassion scale, the Rosenberg Self-Esteem Scale, the Family Allocentrism-Idiocentrism scale, and the Body Parts Satisfaction scale. The Rosenberg Self-Esteem scale is a ten item likert scale that measures the attitudes individuals possess towards themselves. The Family Allocentrism-Idiocentrism scale measures the levels to which individuals describe their self as dependent on, or consisting of those around them. The Body Parts Satisfaction Scale measures individuals' body satisfaction or dissatisfaction by the rating of different body parts. Participants were also asked to record their current weight at the beginning of the study, and then were weighed at the end of the study to gain a measure of accuracy. Results of the study found significant interactions between the self-compassion sub-scales and self-esteem in predicting individuals levels of body satisfaction. In particular, the study found that those individuals who were low in self esteem, the more isolated they felt, the more they tended to estimate their weight

as lower than it actually is. Additionally, for individuals of low self-esteem, the more they felt they have in common with humanity; the more satisfied they tend to be with their overall body.

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Graduate and Undergraduate Project

The Effects of Environmental Enrichment on the Acquisition and Reinstatement of Cocaine Self-Administration in Rats

Department of Graduate Student At-Large

Faculty Mentor: Dr. Tim Koeltzow

Poster Number: 43

Social (SE) and environmental enrichment (EE) have been reported to influence spontaneous locomotor activity and various indices of dopamine (DA) function. ADHD is characterized by hyperactivity and impulsivity, and is linked to increased substance abuse. ADHD is associated with dysfunction of the DA transporter (DAT), and is commonly treated with the DAT blocker, methylphenidate. The current study sought to establish the effects of EE and SE on spontaneous locomotor activity, impulsivity in a T-Maze task, and the acquisition of cocaine self-administration behavior. EE rats exhibited an increased locomotor response to novelty accompanied by decreased behavioral anxiety compared to SE rats. EE rats also exhibited more rapid acquisition of the T-Maze task, and decreased impulsivity during testing. Operant self-administration data were inconclusive. Future studies will attempt to assess the impact of EE in an animal model of ADHD in order to develop increasingly effective therapies for humans with this disorder.