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Works for Minnesota State University, Mankato**

Undergraduate Research Symposium

2019 Undergraduate Research Symposium

Apr 2nd, 9:00 AM - 5:00 PM

2019 Abstract Booklet

Undergraduate Research Center
Minnesota State University, Mankato

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2019 Undergraduate Research Symposium

Past event.

2 April 2019, 9:00 AM – 7:00 PM.

Mankato, Minnesota, United States



2 April 2019

9:00 AM – 7:00 PM

Mankato, Minnesota, United States

Greetings from the President

It is my distinct honor to welcome you to the 21h Annual Undergraduate Research Symposium at Minnesota State University, Mankato. Talented scholars have been assembled for your intellectual and personal enjoyment. What an exciting year of productivity for our students and faculty. On February 28th, three of our students presented at the 6th annual Posters at St. Paul held at the Minnesota State Capitol. Additionally, 30 students will travel to Kennesaw State University to present later this month at the National Conference of Undergraduate Research.

Today's symposium is a celebration of intellectual exploration, creativity, hours of labor and collaboration across students, faculty, and staff. Enjoy your time today as you listen to oral presentations, engage in meaningful discussions with students at posters, and view presentations of visual and performing arts. It is, in part, because of these sorts of scholarly showcases that Minnesota State Mankato has come to be known for its Big Ideas and Real-World Thinking.

I want to express my appreciation for the efforts of the Undergraduate Research Center Council under the leadership of Dr. Kuldeep Agarwal. I also want to recognize the many contributions of our faculty and staff that have made this enriching opportunity possible for our students. Your contributions to the intellectual development of these young scholars and their pursuit of excellence will last a lifetime.

Once again enjoy your day as you are exposed to big ideas and real-world thinking in action.

Richard Davenport

President

Minnesota State University, Mankato

Congratulations to the 2018-2019 Foundation Grant Winners!

Bianca Alvarez
Joelle Anderson
Alexis Arsenault
Tyler Brenner
Heidi Cap
Hanix Daniel
Ibelizet Dominguez
Dilibe Ekowa
Dylan Fitzgibbons
Mia Hansen
Bethany Haus
Hunter Herber
Katlyn Jaeger
Lydia Jagodzinski
Madison Jewell
Taylor Johnson
Trishala Karmacharya
Taylor Kenealy
Madeleine Kennedy
Olivia Marquette
Brennah McCorkell
Lillie McDermott
Kyle Mercer
Alyssa Molnar
Rebecca Peterson
Tehut Zewdu
Eryn Zuiker

Congratulations to the 2018-2019 URC Grant Winners!

Abdulmuhsen Alibrahim

Abeer Albakri

Farah Almeer

Michael Anderson

Jonathon Arndt

Tyler Bache

Katie Grambart

Macenzie Hays

Mickayla Heiling

Afton Huss

Rohil Kayastha

Devin Kohnke

Ana Konatar

Krista Kovar

Matthew Mueller

Hannah Murphy

Charles Olson

Anjola Onadipe

Abbigail Osgood

Casey Schneider

Tori Smith

Hunter Stedman

Keshari Sudasinghe

Marissa Swenson

Hannah Thompson

Patrick Thompson

Brittney Wegener

Mark Wickelgren

Michael Valkos

Mai Ka Ying Yang

What: Creative Works Art Exhibition

Who: Shveta Agarwal, Katie Grambart, & Dylan Fitzgibbons

When: Opening reception occurring from 3-5 on April 2nd

Where: CSU Gallery (Lower Level)

The exhibition is both free and open to the public. The displays featured are a direct result of research grants each student received.

Please join us!

Undergraduate Research Center Celebration Dinner

5:00-7:00pm in the CSU Ballroom

Music

Minnesota State University, Mankato Jazz Combo

Speakers

Joseph Visker, 2018 Outstanding Undergraduate Mentor of the Year

Awards

2019 Outstanding Student Presenter Awards

2019 Outstanding Undergraduate Mentor of the Year



Undergraduate Research Symposium

Schedule of Events

Tuesday, April 2nd, 2019

9:00 a.m. – 3:00 p.m.	Check-In Coffee and Snacks Available	CSU Ballroom
10:00 – 11:30 a.m.	Poster Session A Biological Sciences, Chemistry, Environmental Sciences, Information Systems, Integrated Engineering, and Physics	CSU Ballroom
10:00 – 11:00 a.m.	Oral Session 1 Education, Social Work, and Communication Studies	CSU 203
10:00 – 11:00 a.m.	Oral Session 2 Education, Business, and German	CSU 202
10:00 – 11:00 a.m.	Oral Session 3 Art, Music, and Education	CSU 201
11:05 – 12:05 p.m.	Oral Session 4 Psychology and History	CSU 204
11:05 – 12:05 p.m.	Oral Session 5 Automotive Engineering Technology, Economics, and Education	CSU 203

1:05 – 2:05 p.m.	Oral Session 6 Integrated Engineering and Automotive Engineering Technology	CSU 201
1:05 – 2:05 p.m.	Oral Session 7 Automotive Engineering Technology and Biology	CSU 203
1:05 – 2:05 p.m.	Oral Session 8 Automotive Engineering Technology	CSU 202
2:00 – 3:30 p.m.	Poster Session B Art, Chemistry, Communication Disorders, Corrections, Ethnic Studies, Family and Consumer Science, Geography, Health Science, Human Performance, Nursing, Psychology, Recreation, Parks, & Leisure, and Special Education	CSU Ballroom
3:00 – 4:45 p.m.	Creative Works Exhibit Coffee and Snacks Available	CSU Gallery Lower Level
5:00 p.m.	Celebration Dinner	CSU Ballroom

Oral Session 1 (CSU 203, 10-11 AM) Education, Social Work, and Communication Studies

The Impact of an Introduction to Social Work Class on the Cultural Competency of Undergraduate Students in the College of Social and Behavioral Science at Minnesota State University, Mankato

Linnea Carlyle, Sarah Hagar, & Nicole Stalcar

Elizabeth Sandell & Debra Gohagen, Faculty Mentors

The present study examined the development of intercultural competency (ICC) among a group of university students in an undergraduate course, Introduction to Social Work. Clemens (2016) found that after taking a semester-long undergraduate course, “Cultural Diversity Practice,” in a social work program increased student cultural competence scores significantly. Faculty members want to prepare students to use their cultural competence to further their professional capacity. Investigators considered (ICC) as “the capability to accurately understand and adapt behavior to cultural difference and commonality” (Hammer and Bennett, 2010). The study responded to this research question: How does the ICC of undergraduate students change during their experiences in the introduction to social work course? Investigators used the Intercultural Development Inventory, developed by Hammer and Bennett (1998, 2001), based on Bennett's Developmental Model of Intercultural Sensitivity (1986), which identified five orientations toward cultural differences: denial, polarization, minimization, acceptance, and adaptation. Previously collected data from undergraduate students enrolled in a Human Relations course between 2010 and 2018 was used for comparison. Additional data was collected at the beginning and the conclusion of the 16-week course, introduction to social work, in order to measure changes that occurred possibly as a result of the course experiences. Researchers expect that the engagement in a culturally informative course will yield improved ICC scores for each participant. The results of this study will help determine the efficacy of teaching methods used by the instructors to develop ICC.

Intercultural Competencies Among Undergraduates in the College of Arts & Humanities at Minnesota State University, Mankato

Olivia Thomas, Jonathon Arndt

Elizabeth Sandell & Christopher Brown, Faculty Mentors

The study is examining the impact of an intercultural communication course in Arts & Humanities on the Intercultural Competency (ICC) among a group of university students. ICC was defined as “the capability to accurately understand and adapt behavior to cultural difference and commonality.” Globalization has led to increased contact between different cultures, so individuals must know how to communicate between one another and to understand the culture behind the communication (Melles & Frey, 2017). Students must strive for acceptance and understanding of religion, language, communication style, music, or any other aspect of culture. This project addressed: (1) What is the starting level of ICC among students in the intercultural communication course? Data was collected using the computer-based, online Intercultural Development Inventory (IDI), developed by Hammer and Bennett (1998, 2001), which identifies

five orientations toward cultural differences: denial, polarization, minimization, acceptance, and adaptation. Data was collected at the beginning and will be collected at the conclusion of the 16-week course, in order to measure changes that occurred possibly as a result of the course experiences. This will provide baseline and comparison data. Investigators expect that the study may show that the instructional methods of the professors and the course work in the College of Arts & Humanities leads to a positive growth in Intercultural Competency among undergraduate students. The study will offer insight to help determine the efficacy of teaching methods to develop ICC. Results were shared among faculty members seeking to infuse instruction with strategies to foster ICC.

Preparing Teachers for Diverse Classrooms

Tori Smith & Sean O'Rourke

Elizabeth Sandell, Faculty Mentor

This study responded to the question: How do changes in inter-cultural competency (ICC) compare among pre-service teachers at three data collection points? Intercultural competency was defined as “the capability to accurately understand and adapt behavior to cultural differences and commonalities (Hammer & Bennett, 2010).” The study was based on the Developmental Model of Intercultural Sensitivity (Bennett, 1986) which identified five orientations toward cultural differences: denial, polarization, minimization, acceptance, and adaptation. Investigators hypothesized that the 48 students would have a statistically significant change in their ICC from the beginning of their academic studies until just before student teaching. Subjects completed the Intercultural Developmental Inventory (IDI) (Hammer & Bennett, 2012), which calculates a score that reflects capacity for cross-cultural adaptation. Results showed that (1) students who completed the one-semester course (Human Relations) improved their ICC and (2) students who completed the professional education program (3 more semesters) improved their ICC. Most importantly, students improved their ICC from the beginning of their academic studies until the beginning of student teaching. The data analysis showed that students did have a statistically significant change in their ICC, and results suggested that the program's content, pedagogy, and mentorship has a positive impact on pre-service teachers. Outcomes are being shared with MSU's faculty to help determine the efficacy of teaching methods used by the instructors to develop Cultural Competency. Data and information will be reviewed with administrators for program planning, implementation, and assessment.

Oral Session 2 (CSU 202, 10-11 AM) Education, Business and German

Targeting the City: A Proposal to Open a Micro-Target Store in East Town, Milwaukee **Shamsudeen Adediji, Riccardo Prosdocimi, & Taylor Kemper** **Wade Davis, Faculty Mentor**

Target is expanding its business model to include small format stores located in densely populated urban neighborhoods. For these new stores to thrive, Target needs to partners with the local stakeholders and communities and tailor-make the experience to the neighborhoods. As part of a national case competition, the presenting team was asked by Target to identify a specific neighborhood and develop a strategy for the location, design, and merchandising of a new small-format store, as well as address the ways to help the community integrate Target into their neighborhood. This presentation sets forth our proposal - to open a Micro-Target in the new Couture building located in East Town Milwaukee.

Cultural Competency as a Way of Doing Business

Alejandro Reyes Vega & Sheng Vang **Elizabeth Sandell, Faculty Mentor**

ICC instruction is “an attempt to raise students' awareness of their own culture and help them to interpret and understand other cultures” (Rose, 2003, page 1). Colleges and universities are recognizing the importance of expanding student outcomes to include ICC (Burnett, & Huisman, 2010; Kimmel & Volet 2012; Lee, Poch, Shaw, & Williams, 2012). This research project studied the beginning orientation to cultural differences among undergraduate students in the College of Business. The investigators' university seeks to “provide opportunities to improve intercultural competence for a complex, diverse, and globalized society” and “increase the intercultural competencies and capabilities of faculty and staff through intercultural engagement opportunities,” and the COB also has declared its “primary focus [on] diversified undergraduate education” (Minnesota State University, Mankato, 2015). The theoretical foundation for this study was the Developmental Model of Intercultural Sensitivity (DMIS), originally described by Bennett (1986), which presents predictable stages through which people progress as their ICC increases. The Intercultural Development Inventory (IDI) version 3 (Hammer, Bennett, and Wiseman, 2003) was the measure of cultural competency. This project used archived data collected during 2010 - 2018 and new data collected in a course in the COB during Spring 2019.

Recycled Light **Katie Grambart**

Areca Roe, Faculty Mentor

Intercepting the digital aspect of photography and use of turning digital photos into negatives, allows a connected boundary of using high quality photos within the darkroom. The practice of liquid emulsion onto recycled materials, grants a cheaper route to creating a composition for one whom cannot always purchase materials.

Forced Migration: A Syrian Exodus to Germany

Taylor Witt

Nadja Kramer, Faculty Mentor

The Syrian Civil War has killed over 500,000 people and displaced over 12 million since it began in 2011. The conflict has resulted in forced migration on a massive scale. Syrian people have been displaced within Syria, to the surrounding Arab states and to Europe. This has led to an immigration crisis in some parts of the European Union. Germany has become a primary destination for these refugees, but nationalist, xenophobic forces have started pushing back against what is perceived to be an invasion of foreigners into their land and their borders. This project examines the sentiments of German citizens in the time before the crisis reached its peak in 2015, and how those sentiments have changed since then. I seek to answer the question of how Syrian refugees are integrating within the borders of Germany by analyzing the actions and reactions of those involved when two distinct cultures meet. By considering their expressions, such as the artwork created by Syrian artist Manaf Halbouni and the policy agendas set by German political parties, this project reveals the complex intercultural relationship between Syrian refugees and Germans, people who have more in common than it may initially appear.

Oral Session 3 (CSU 201, 10-11 AM) Art, Music, and Education

Modernizing Ceramics

Dylan Fitzgibbons

Mika Laidlaw & Todd Shanafelt, Faculty Mentors

The ceramic arts is something rooted closely in tradition. Over many generations the practice has had a large following of people follow the traditions and techniques passed down from the old ages. While this is not necessarily bad, it does leave little room for innovation and excitement. It's only been in the most recent generations that the ceramic arts has been experiencing a growth in how it is used to create modern artwork that is a reflection of our current era. To remedy the lacking modernity in an art form that has infinite possibilities, I have attempted to combine a material with ceramic works, in a way that is new and exciting for the entire field of ceramics, but also the arts as a whole. Through the studying of electricity and metals such as copper, and the characteristics of clay and it's inherent properties, I have successfully developed a method in which ceramics can be electroplated and bonded with metals, in this case, copper. Through this new relationship between copper and clay, we can further push the material to speak about our generation, our cultures, our problems and so on. The most surprising and promising interaction between clay and copper is the varied ways in which the copper can be produced upon the clay. Clean and smooth, rough and organic and more. Creating this bond between two very different materials will help to update the capabilities of the timeless ceramic material, inducing an exciting and new future.

Preservation of Decomposable Materials

Brittney Wegener

Amy Toscani, Faculty Mentor

In an attempt to further the abilities of decomposable materials. A material called marine plexiglass, a resin ment for water vehicles, sounded like the perfect solution. If a decomposable material can withstand the four seasons it could then be used for public art. Which could further the range of options for artist seeking these types of opportunities.

Audio and Visual in a Modern form of concert music

Ryan Devens

Michael Olson, Faculty Mentor

Developing Intercultural Competency Among Students in the College of Allied Health and Nursing Students

Lydia Jagodzinski & Rebecca Peterson

Elizabeth Sandell & Lynette Engeswick, Faculty Mentors

The study examined Intercultural Competence (ICC) among a group of university undergraduate students who were early in their studies. Mareno & Hart (2014) noted that demographic patterns have shifted toward becoming more racially and ethnically diverse. Health care providers must be equipped to provide culturally competent care to patients. This study will help universities develop curriculum that fosters student development of their ICC. For this study, ICC was

defined as the capability to accurately understand and adapt behavior to cultural difference and commonality (Hammer & Bennett, 2010). The study responded to these research questions: What is the starting level of cultural competence among undergraduate students in the College of Allied Health and Nursing? Data was collected using a computer-based, online inventory. Students enrolled in an introductory course completed the Intercultural Development Inventory (IDI), developed by Hammer and Bennett (1998, 2001). The IDI was based on Bennett's Developmental Model of Intercultural Sensitivity (1986), which identified five orientations toward cultural differences: denial, polarization, minimization, acceptance, and adaptation. Investigators expect that the next step in study may show that students' ICC will grow during a semester long course when it is supplemented with cultural activities. The results of this study will provide institutions with information about the level of ICC of their students and how those levels can be improved so their students are better equipped to help others in the future.

Poster Session A (CSU Ballroom, 10-11:30 AM) Biology, Chemistry, Civil Engineering, Electrical Engineering, Environmental Science, Information Systems, Integrated Engineering, Physics

Poster 1: *Motorized Garden Scooter*

Afton Huss, Mickayla Heiling, & Macenzie Hays

Megat Hamari Puteri & Xuanhui Wu, Faculty Mentors

This project is a motorized garden scooter that has the capability of variable speed and power steering. It utilizes an already manufactured garden scooter base, DC motor, two regenerative motor drivers, a linear actuator, an Arduino Uno board, and a thumb stick. One of the motor drivers will be connected to the motor and will control the speed while the other will be connected to the linear actuator and will control the power steering. All these components will be connected to the Arduino Uno board which will then be connected to a battery. Challenges facing this project are creating a working code that will offer variable speed and power steering, mounting the components neatly and avoiding overloading the scooter. Over the course of this semester, the goal is to get a working motorized garden scooter that is functional and a code that can test its functionality. The result from this design would be a working solution for people who cannot garden due to mobility issues.

Poster 2: *Modeling Common Midwest Crops as Roughness Elements*

Tyler Bache & Nathan Gebhardt

Nazil Yilmaz Wodzinski, Faculty Mentor

Currently wind energy is dominated by large scale wind farms. However, using horizontal axis wind turbines (HAWTs) can have negative impacts including but not limited to noise pollution and wildlife endangerment. Most of these negative impacts are minimized with vertical axis wind turbines (VAWTs). This research will obtain data on velocity profiles by modeling common Midwest crops as roughness coefficients to support beneficial placement strategies for VAWTs. An open channel will be used to study the development of the velocity profiles above miniature crop fields (roughness coefficients). The open channel is preferred over wind tunnel due to the scale of the experiment, because water has a higher viscosity than air. This will help researchers perform experiments with lower velocities. The crops and their placement orientations are selected as parameters that will affect the wind velocity profiles and thus the optimal placement position of VAWTs. The miniature crop models will be placed in the open channel with varying field design and density based on common farming practices. The channel will then be operated and 2-dimensional velocity profiles at different locations along the flow direction will be measured. This will mimic what would be seen with wind velocity profiles over real crop fields. After the data is collected and multiple velocity profiles are produced, the results will be used to provide accurate velocity information for the height selected. This will allow an average user to optimally calculate the energy production of VAWTs on their own land for small scale energy production.

Poster 4: *A QUALITATIVE COMPARISON OF HEADSPACE ANALYSIS AND SOLID PHASE MICROEXTRACTION TECHNIQUES*

Allyssa Hagen

Daniel Swart & Brian Groh, Faculty Mentors

The practicality of headspace extraction may be a suitable substitute to the somewhat inaccessible and costly SPME technique. Solid phase microextraction (SPME) is a highly sensitive and valued technique by which a thin organic fiber is inserted into a vial containing a heated solid substance to collect and preconcentrate a small amount of vaporized substance for analysis in a gas chromatography - mass spectrometer (GCMS) instrument. This method, however, can be vulnerable to a phenomenon called displacement, in which larger molecules are preferentially absorbed over smaller ones. Headspace, on the other hand, refers to the gas phase above the heated sample, which can be sampled directly by the syringe present in a GCMS instrument. Since this method doesn't allow for any period of sample preconcentration, it's not as sensitive, but also doesn't allow for any bias in sampling. Samples studied included scented incense grounds and ground coriander seeds, chosen for their strong aroma and therefore propensity to vaporize. A variety of experimental conditions were measured in an attempt to enhance the output of the headspace collection method, including heating temperatures and durations and instrument program manipulation. Headspace consistently provided sizable and numerous peaks comparable to SPME and shows promise being an adequate alternative for non-quantitative work or undergraduate teaching.

Poster 5: *Connective Tissue Infiltration into Three-Dimensional Sintered Cobalt Chrome Alloy*

Bethany Haus & Eryn Zuiker

Michael Bentley, Faculty Mentor

The biomaterial used in medical implantable devices must sufficiently integrate within the biological system and be compatible with surrounding tissue. In this study, cobalt chrome (CC) will be utilized, offering high biocompatibility while minimizing immune reactivity. CC will be used in conjunction with Hydroxyapatite (HA), a bioactive material that is an essential component of normal bone and teeth. HA's bioactivity leads to high biodegradation when implanted alone, which can result in clinical implant failure. In our study, we will test the biocompatibility of a mixture alloy, fabricated using a three-dimensional printer. To test the biocompatibility of the fabricated metal implant in-vivo, one-by-two-by-four millimeter metal pieces (20% HA, 80% CC) mixture alloys will be inserted on rat skulls through a small incision made via sterilized surgery. After five weeks, the implants and surrounding tissue will be removed and observed using scanning electron microscopy. The surrounding connective tissues will be examined for inflammation and other signs of tissue damage or rejection. We hypothesize that the metal alloys will be encapsulated by dense connective tissue continuous with the periosteum and will show no signs of inflammation or rejection. Furthermore, connective tissue will infiltrate into spaces within the alloy, between and around the alloy spheres to form a dense matrix of cellular and fibrous material throughout the implant. These findings will help contribute to the science of medical implantation and tissue rejection and improve our understanding of medical device alloys used for hip, femur and other implants.

Poster 6: *Comparative Study of Carbonaceous Meteorites using micro-Raman Spectroscopy and SEM/EDS*

Rohil Kayastha

Analia Dall'Asén, Faculty Mentor

The formation of the planets in our solar system is not fully understood. Carbonaceous chondritic meteorites, considered the most primitive surviving materials from the early Solar System, can contribute to understand how planets formed from dust by studying their composition. These relics are mainly composed of chondrules (micro/millimeter-sized inclusions) surrounded by a matrix of microparticles. The mineralogical composition of the chondrules and surrounding matrix of this kind of meteorites can be characterized at the microscale using micro-Raman spectroscopy, while the topography and elemental composition of these relics can be studied at the micro/nanoscale using SEM/EDS (Scanning Electron Microscopy/Energy Dispersive X-ray Spectroscopy). In this work, we present a comparative study of the mineralogical and elemental composition of the chondrules and surrounding matrix of carbonaceous chondritic meteorites using the aforementioned techniques. We examine how these properties vary in different regions of the chondrules and matrix. In general, Raman spectroscopy results show graphite, pyroxene and olivine, both within and outside the chondrules. Well-defined chondrules, rims and matrix are observed from the SEM images. The results obtained with EDS show that iron is most abundant in the matrix, while the chondrule is enhanced in magnesium. Silicon, aluminum, sodium, calcium, oxygen and carbon are also found in both, chondrule and matrix. Iron and sulfur rims are observed around the chondrules. These findings contribute detailed information about the composition of these chondritic meteorites, helping to understand the origin of the found structures and to unravel the mysteries surrounding the formation of these relics.

Poster 7: *The Effects of Hexavalent Chromium on Dictyostelium Chemotaxis and Proteome*

Hanix Daniel

Rebecca Moen, Faculty Mentor

Hexavalent chromium (Cr⁶⁺) is a common environmental pollutant extensively used in industrial processes like chrome-plating, leather tanning, and paint making that is capable of accumulating in aquatic vascular plants and tissue of animals. The uneven geographical distribution of chromite mining makes this issue a global one and indicates that further study of Cr⁶⁺ may lead to targeted treatment in individuals who ingest contaminated water and wildlife or suffer from direct skin contact with contaminated soil. *Dictyostelium discoideum* is a soil-dwelling eukaryote that contains many genes that are homologous to human genes while exhibiting a simple lifecycle, restricted cell types and behaviors, and rapid growth. *Dictyostelium* is widely regarded as a good model organism for studying eukaryotic cell response to toxic compounds. The aim of the study is to determine how hexavalent chromium affects cytoskeletal proteins, specifically actin, and the movement of *Dictyostelium* in response to Cr⁶⁺. A focus is placed on actin and its associated proteins because it has been shown to be a key player specialized stress signaling pathways, and its associated proteins may be multifunctional and may be implicated in a variety of conditions. Chemotaxis, cell movement in response to an external stimulus, was assayed following cell treatment to determine how cell signaling changes as a result of Cr⁶⁺ exposure altered the assembly of the actin network. Differences in the actin network of both the treatment and control groups were visualized using fluorescence microscopy. Electrophoresis was then performed on control and treatment groups to resolve

proteins and identify specific changes in the expression of actin and its associated proteins.

Poster 8: *MicroRNA Regulation of the HIV Restricting Human APOBEC3 Enzymes*
Hunter Herber, Madeleine Kennedy, & Joelle Anderson
Allison Land, Faculty Mentor

The human APOBEC3 family of enzymes is composed of seven members that are encoded in tandem on chromosome 22 of the human genome and likely arose by gene duplication in a primate ancestor. There are therefore large similarities among the family members, both in the coding and the non-coding/regulatory regions of the genes. Despite these similarities, the APOBEC3 enzymes have distinct expression profiles and functions. Four of the APOBEC3 enzymes: APOBEC3D, APOBEC3F, APOBEC3G, and APOBEC3H have been demonstrated to restrict HIV-1 replication in human T lymphocytes, each with widely varying levels of expression. We are interested in investigating the role of microRNAs in controlling the expression levels of these APOBEC3 enzymes. MicroRNAs are short regulatory RNAs that can lead to the silencing of transcripts by binding to their 3' UTR (untranslated region). The binding site is only ~ 20 nucleotides of the mRNA, and only a few base changes within the 20 nucleotides are required to abolish binding and prevent silencing. We hypothesize that small differences in nucleotide sequence among the APOBEC3 mRNAs will result in differential interaction with expressed microRNAs, leading to the observed distinctive APOBEC3 expression profiles. We have tested this hypothesis by cloning the 3'UTRs of these four APOBEC3 enzymes into the psiCheck2 expression vector. We are now cloning candidate microRNAs to express in coordination with and quantify the level of silencing within the psiCheck2 expression vector. Our resulting data will characterize the microRNA-mediated regulation of these HIV-restricting APOBEC3 enzymes.

Poster 9: *Self Regulating Cooler*
Devin Kohnke, Matthew Mueller, & Michael Valkos
Megat Hamari Puteri & Xuanhui Wu, Faculty Mentors

The motivation behind our project came from the problem of always having to deal with ice when camping, which depending on if you are in a remote area or not, can be quite difficult to obtain. In order to solve this, we are designing a portable cooler that will ideally be able to self regulate without needing a direct power source for a certain amount of time. The more expensive solar panel you get, the longer this time will be. In order to do this, we are using semiconductor devices that use the peltier effect, which creates a cold side and a hot side and then we will expand the cold side to the environment of our cooler. In order for this to work efficiently. You have to draw as much hot air as you can away from the peltier in order for the cold side to get as cold as possible. The main problems we ran into is how to effectively cool the entire cooler environment since the peltier itself is only 40mmx40mm. As of right now, we have the entire cooler built and get a decrease in temperature, with the next step being getting it to turn on and off within a certain temperature bound and then also charging the battery with the solar panel.

Poster 10: *Exploring the Formation of Interstrand Crosslinks in Calf Thymus DNA with Arginine and Potential Anti-Cancer Agent SOS*

Abbigail Osgood

Danae Quirk Dorr, Faculty Mentor

One reason that cancer is a leading cause of death worldwide is its lack of termination programming. A possible solution to negating the effects of cancerous cells is to reprogram their DNA to replicate the termination process of non-cancerous cells. Forming interstrand crosslinks between the 2 helices of the DNA in cancer cells could halt the transcription of DNA. This would prevent the cancer cell from producing its necessary proteins and would eventually kill it. In this research, it has been proposed that reacting the thiophene derivative, SOS, in the presence of the amino acid arginine, with calf thymus DNA will form interstrand crosslinks in the DNA because SOS contains two aldehyde functional groups that can react with the guanosine nitrogenous base in DNA. In this experiment, the previously discussed reaction between SOS, arginine, and calf-thymus DNA was performed along with other couplings of the reactants used as controls so that results could be compared. Following the reaction, the calf thymus DNA mixtures underwent enzymatic digestion in order to cleave the nucleosides and nucleoside adducts from the phosphate sugar backbone. Each reaction sample underwent high-performance liquid chromatography (HPLC) for analysis.

Poster 11: *Optimum pH to flocculate construction sediment*

Mohsen Alibrahim

Steve Druschel, Faculty Mentor

Sediment from construction sites can degrade the quality of water and endanger the livelihood of many creatures from aquatic worms to fish to human beings. Coagulation and Flocculation of construction sediments is a useful treatment method to protect the quality of rivers. However, the complexity of the process stems from the coagulant dosage and the pH level. This research focuses on finding the optimum pH for Ferric Chloride to receive the most efficient result in flocculating construction sediments. Standard practices for coagulation-flocculation, taken from drinking water treatment design, is used for mixing methods and the constant amount of Ferric Chloride dosage is determined by observation. The preliminary results suggest that the optimum pH is 6.0. While the efficiency of the water treatment revolves around the drop of turbidity and settling time, the evaluations of the system require an extensive amount of work as water treatment technologies are brought to construction sites, stormwater treatments and surface water discharges. Other factors, such as the disposal of post-mixing sediments, are considered for the evaluation of the overall quality of the system.

Poster 12: *Targeting proteoglycans in glioblastoma with TriplatinNC using newly synthesized CRISPR knockout cells.*

Tehut Zewdu

Samantha Katner, Faculty Mentor

Poster 13: *Subcellular Localization of PolyQ Protein FAM171B*
Farah Almeer & Alaina Oakley
Geoffrey Goellner, Faculty Mentor

Huntington's Disease, along with eight other chronic neurodegenerative diseases, is characterized by a polyQ gene mutation that results in a protein with a long tract of repeating glutamine (Q) amino acids. Typical symptoms of these diseases include involuntary movements, loss of balance, and loss of cognitive functions. PolyQ mutations are strongly implicated in neurodegenerative disease due to their absence from healthy animal models. A novel protein, known as FAM171B, has been selected for investigation by our lab due to its strong potential for polyQ mutations and ubiquitous expression in brain cells. Transfection and immunofluorescence (IF) procedures were utilized to begin identifying FAM171B's subcellular location in U-138 immortal glioblastoma cells. DNA plasmids containing GFP-tagged FAM171B prepared in our lab were introduced to live cells using Lipofectamine 2000 (ThermoFischer) reagent and its transfection protocol. IF experiments utilized rabbit- α -FAM171B primary antibodies and goat- α -rabbit (Alexa488) secondary antibodies to identify naturally-expressed FAM171B proteins within methanol-fixed cells. DAPI was used in both procedures to identify the nucleus of each cell. Data from recent experiments suggest FAM171B is either expressed in the nucleus or in the cytoplasm, specifically around the nucleus and along neuronal processes, of U-138 cells. Expression of FAM171B in both the nucleus and cytoplasm informs current and future research by our lab which aims to identify FAM171B's interactions with known intracellular proteins. Determining FAM171B's subcellular location will not only give us an understanding of the protein's normal function, but will also give us a better understanding of polyQ neurodegenerative diseases as a whole.

Poster 14: *Thyroid hormone regulation of retinoic acid synthesis in brown adipose tissue*
Charles Olson & Kevin Brunson
Charles Krois, Faculty Mentor

In mice, alterations to vitamin A status through gene knockout or treatment with pharmacological doses of retinoic acid (RA), the active form of vitamin A, affect overall energy metabolism and body weight. Generally, increases in RA lead to increased metabolism and weight loss, and reductions in RA lead to weight gain. One specific effect is that within brown adipose tissue impaired RA synthesis impairs the tissue's ability to generate heat and thus an organism's ability to maintain normal body weight and temperature. We therefore hypothesize that in a cell model of brown adipose tissue, thyroid hormone (T3), a potent activator of brown adipose function, will also increase RA synthesis through induction of retinol and retinal dehydrogenases. Together, these enzymes synthesize RA from the precursor retinol. Overall, our work contributes to a better understanding of factors that impact both obesity and metabolic disease.

Poster 15: *The Effect of Exercise on Kidney Salt Excretion in Female Hypertensive Rats*
Nickolas Rockenbac & Cortney McDonald
Penny Knoblich, Faculty Mentor

Hypertension, or high blood pressure, affects approximately 33% of the U.S. population. If untreated, hypertension can lead to heart disease, kidney disease, stroke, and other pathologies. A majority contributor to hypertension is the inability of the kidneys to properly eliminate sodium (salt) from the body when blood pressure elevates. This relationship between blood pressure and urinary sodium excretion is known as the pressure-natriuresis curve, which is altered in hypertensive patients. Exercise is commonly recommended as a prevention or treatment for hypertension. Although exercise does lower blood pressure, the exact effect of exercise on the pressure natriuresis curve, is unclear. In this study, female spontaneously hypertensive rats SHR rats were exercised voluntarily from 4 to 12 weeks of age, using an exercise wheel and counter. At 12 weeks of age, the rats were anesthetized, and the urine sodium excretion was determined at different levels of blood pressure, 20 mmHg below the baseline and 30 mmHg above baseline. Urine samples were collected in 15 min intervals and analyzed for sodium content by flame photometer. A pressure-natriuresis curve was generated by graphing the relationship between the excretion of sodium from the urine and the blood pressure. The curve was compared between exercised and sedentary rats and a steeper slope was found in the exercise group. Furthermore, the exercised rats excreted more sodium at any level of blood pressure. This shows that exercise improves the excretion of sodium in the urine, and this may contribute to the blood pressure lowering effects of exercise.

Poster 16: *Identification of Genes Involved in *Cytophaga hutchinsonii* Cellulose Utilization*
Barakallah Owolabi, Bersabeh Tafesse, & Shamim Ahmed
Yongtao Zhu, Faculty Mentor

Many members of the phylum Bacteroidetes can digest polysaccharides and thus are essential in carbon cycling in the environment. The soil *Bacteroidetes C. hutchinsonii* is able to move by gliding motility on solid surfaces and is known to efficiently break down crystalline cellulose. The cellulolytic mechanism *C. hutchinsonii* undergoes to break down cellulose is not well known.

Analysis of the *C. hutchinsonii* genome revealed nine endoglucanases belonging to the glycoside hydrolase family 5 (GH5) and GH9, and six GH8 glycohydrolases. These enzymes are thought to be involved in cellulose utilization. The roles of GH5 and GH9 endoglucanases have been extensively studied. In this study, we will focus on the function of GH8 glycohydrolases in *C. hutchinsonii* cellulose utilization. CHU_1075, one of the GH8 glycohydrolase-encoding genes, will be deleted in the wild type *C. hutchinsonii*, and in mutants lacking the GH3 and GH9 endoglucanases. The growth rates of mutants lacking CHU_1075 on cellulose will be determined.

The role of gliding motility in *C. hutchinsonii* cellulose utilization is not clear. The ability to glide over surfaces might allow *C. hutchinsonii* cells to migrate along cellulose fibers and find the most amenable regions for enzymatic attack. The cell surface adhesin SprB is required for

active gliding motility in other members of Bacteroidetes. Two sprB-like genes, CHU_2225 and CHU_0597, will be deleted in *C. hutchinsonii* in this study. We expect the mutant cells lacking sprB-like genes exhibit decreased gliding motility. Their ability to digest cellulose will be determined and compared to the wild type cells.

Poster 17: *Luteinizing and Follicle Stimulating Hormone Receptors in the Seasonally Breeding Green Anole Lizard*

Kyle Mercer

Rachel Cohen, Faculty Mentor

Luteinizing and follicle stimulating hormones (LH and FSH) act as signaling molecules in the regulation of reproduction. Within the hypothalamus-pituitary-gonad axis, they control important changes in gonadal tissues. In males, LH signals testicular leydig cells to secrete testosterone which works together with FSH to promote spermatogenesis. In females, LH and FSH signals interact to coordinate follicle growth, ovulation, and estrogen production. Both male and female green anole lizards, *Anolis carolinensis*, exhibit seasonal changes in gonad size and activation. Facilitated by changing levels of LH and FSH throughout the year, these animals reproduce during the breeding season (BS) and are not receptive during the non-breeding season (NBS). Unpublished work in our lab has shown that injections of gonadotropins during the NBS can cause gonadal growth. LH and FSH receptors in gonadal tissue may be responsible, though seasonal patterns of expression have not been investigated. The purpose of this study is to define the expression levels of LH and FSHR receptors during the BS and NBS. To do this, mRNA was extracted from the gonads of 6 BS males and females, and 6 NBS males and females to be converted into cDNA. Primers for genes encoding for LHR and FSHR were designed and optimized for SYBR green qPCR and used to perform qPCR. Based on preliminary data, we expect there to be receptor expression during the NBS, though there may be less than during the BS. This might suggest that hormonal treatment could induce BS morphology in an NBS gonad.

Poster 18: *Exploring the limitations of symbolic analysis to validate a dynamical model*

Jamal Saeed

Jorge Mendez, Faculty Mentor

Modeling complex systems from first principles could be a tantalizing task. Dynamical models of natural phenomena offer an alternative way of describing the time evolution of a system, and to capture the qualitatively different behaviors display by the system. Once a dynamical model is put forward, it is important to validate its representation of the phenomena. In the study of the dynamics of a semiconductor laser with optical feedback, a method to validate or refute a model relying on a symbolic analysis of its dynamics has been used. This laser system displays very rich and complex dynamics, expanding from excitable dynamics to chaotic dynamics. Furthermore, a simple dynamical model to describe its behavior has been proposed. In this study, we take a deep look at the uses and limitations of using ordinal time series analysis (symbolic analysis) to study the validity of a model. In particular, we focus our study on the proposed dynamical model to represent the behavior of a semiconductor laser with optical feedback as a test bench.

Poster 19: *Using Fluorescence Spectroscopy to Predict Photochemical Production of Reactive Intermediates in Minnesota Surface Waters*

Zoe Wright

John Thoenke, Faculty Mentor

The widespread problem of organic contaminants found within our surface waters is jeopardizing the health of the people, plants, and communities supported by these aquatic ecosystems. Pollutants such as pesticides, and pharmaceutical and personal care products, can be detrimental to the overall quality of the environment. Understanding how these pollutants are transported and transformed in surface waters, and finding ways to remove these pollutants from our lakes and rivers is a subject of ongoing scientific inquiry. One agent critical in the process of improving the quality of our water is dissolved organic matter (DOM). DOM is a diverse mixture of organic compounds that takes on many roles in aquatic systems, such as initiating photoreactions. Upon absorbing sunlight, DOM is promoted to an energetically excited state, and these excited state molecules are known as photochemically-produced reactive intermediates (PPRI). PPRI react with many of the organic contaminants found in surface waters. Previous work has demonstrated that the source material of the DOM can affect its capacity for producing PPRI, and that fluorescence spectroscopy can be used to partially determine the source material for a specific DOM sample. We have acquired fluorescence spectra for water samples throughout Minnesota, and using parallel factor analysis (PARAFAC) have begun to develop a model that will, when coupled with previously developed correlations between fluorescence spectral features and molecular components, help to refine predictions of PPRI production based on the source material of the DOM.

Poster 20: *Colocalization of FAM171B, CAMKIID, and MPP3 using Co-Immunofluorescence*

Dilibe Ekowa

Geoffrey Goellner, Faculty Mentor

Neurodegenerative diseases, such as Huntington's diseases (HD), are linked to polyglutamine (PolyQ) disorders. The continuous repetition of the glutamine amino acid is linked to these neurodegenerative and genetic disorders. The expanded sequence of Glutamine is found in affected individuals and thought to be the underlying cause of neurodegenerative diseases such as HD. Poly length variations are found in all individuals but those exceeding the disease's threshold develop the disease. Previous studies have identified various proteins that contain these PolyQ stretches but their functions have yet to be determined. One of those PolyQ proteins is FAM171B, a relatively new discovered protein that has shown high expressivity in neurons. Previous studies have also suggested a colocalization between proteins CAMKIID along with MPP3. Using precise technique and concrete procedure, a discovery in the colocalization between FAM171B, CAMKIID and MPP3 is very much possible. Using Co-Immunofluorescence, it is possible to determine whether the colocalization is present between these proteins. Using red and green fluorophores, as markers for these proteins, if there a yellow signal is detected, we can presume colocalization is occurring. Preliminary data supports that FAM171B is perinuclear as well as throughout the cytoplasm. Early microscopy data suggests

that CAMKIID and MMP3 are thought to be located all throughout the cytoplasm with no particular location. Different fixative will be used to determine which is better for future experiments.

Poster 21: *Effect of Disease Mutants in Calmodulin on Oxidation, Binding and Degradation*

Jordan Julian

Rebecca Moen, Faculty Mentor

Catecholaminergic polymorphic ventricular tachycardia (CPVT) is an inherited disease that causes episodic syncope and sudden cardiac arrest, particularly in infants. Various amino acid point mutations, including N54I and N97S, in the protein calmodulin (CaM) are thought to be the primary cause of the genetic disease. Calmodulin is a key protein in calcium binding and signaling in all human muscles. CaM's impaired binding to both calcium ions as well as the ryanodine receptor (RyR2) in heart muscle is thought to be the primary cause of CPVT. In addition to disease-causing mutations, CaM has also been shown to be highly susceptible to oxidation, particularly at its nine methionine residues. Oxidation of these side chains reduces the binding ability of CaM to RyR2 and calcium ions. The degradation of CaM is also affected by the oxidation of these methionine side chains and has not been fully studied. The reduced binding affinity of mutant CaM when paired with oxidation can be observed through its binding to RyR2 with the analysis of tryptophan fluorescence. The point mutation effects on the protein can be further observed through the proteasomal degradation of both the mutant and its oxidized form.

Poster 22: *Effect of Arachidonic Acid on Myosin II Function*

Trishala Karmacharya

Rebecca Moen, Faculty Mentor

The main contractile proteins in muscle are actin and myosin, the interaction between them is what generates movement and muscle contraction. Muscle myosin, myosin II, is the motor protein that drives muscle contraction through chemo-mechanical coupling; binding adenosine triphosphate (ATP) and hydrolyzing into adenosine diphosphate (ADP) and inorganic phosphate (Pi) as it produces force. This conversion of ATP into ADP and Pi is myosin's ATPase activity. Arachidonic acid is a bioactive lipid and is produced in all eukaryotic cells. It has been shown to stimulate the ATPase activity in smooth muscle myosin II (1). It is postulated to bind to myosin motor domain near the actin-binding site and increase the rate of Pi release, which also increases the ATPase activity of myosin (1). This study will test the effect of arachidonic acid on myosin II from *Dictyostelium discoideum*, which will specifically test ATPase activity in myosin and myosin's ability to interact with actin. The functional changes in myosin and actin will be tested using the myosin ATPase assay, which measures the rate at which myosin hydrolyses ATP, and actomyosin co-sedimentation assay, to measure the binding interaction and affinity of myosin for actin.

Poster 23: *Characterization of insulin-like growth factor 1 (Igf1) protein levels in a mouse model that over expresses Igf1*

Anjola Onadipe

David Sharlin, Faculty Mentor

Congenital hypothyroidism is a condition in which there is an inadequate amount of circulating thyroid hormone during development and can lead to many adverse effects, including permanent neurological deficits. Interestingly, developmental inefficiency of brain-derived Insulin-Like Growth Factor 1 (Igf1) results in neurological defects that are similar to those associated with developmental hypothyroidism. Considering this, we are investigating whether ectopic expression of Igf1 can restore normal brain development in the face of low thyroid hormone.

To test this, we are utilizing the “Tet-Off” system in mice to overexpress Igf1 specifically in the brain. In this system, double transgenic mice are generated. One transgene has an astrocyte-specific promoter and codes for the tetracycline transactivator (tTA). The other transgene contains the tetracycline response element (TRE), which drives Igf1 production when bound to the tTA. Two groups of wildtype and double transgenic mice will be utilized: control and hypothyroid. The mice will be sacrificed on postnatal day 15, at which time the cerebral cortex and hippocampus will be dissected out. Enzyme-linked immunosorbent assay (ELISA) will be used to determine Igf1 levels in the cortex and hippocampus.

We predict that Igf1 proteins levels will be significantly increased in euthyroid double transgenic brains compared to hypothyroid double transgenics. Additionally, we predict that hypothyroid double transgenic mice will have similar or increased Igf1 levels compared to euthyroid wildtypes. These findings would validate our model and allow us to ask whether restoring brain Igf1 levels in hypothyroidism can rescue developmental effects associated with low thyroid hormone in development.

Poster 24: *Effects of LQTS mutations on Calmodulin Oxidation and Interaction with the Cardiac Ryanodine Receptor*

Imad Isehak

Rebecca Moen, Faculty Mentor

Calmodulin (CaM) is a protein in the human body that binds calcium ions and regulation calcium concentration. It also plays a role in creating ion gradients and cell signaling pathways. This is accomplished by calcium pumps and calcium binding proteins. In my research, the emphasis is given to the role of CaM in calcium signaling in cardiac muscle. More than a dozen human CaM missense mutations have been described, all found in patients with severe cardiac arrhythmias (2). My research project will focus on two missense mutations in the calmodulin gene that result in Long QT Syndrome (LQTS), aspartic acid 95 to valine (D95V) and aspartic acid 129 to glycine (D129G). In addition to disease-causing mutations, CaM has been shown to be highly susceptible to methionine oxidation (it contains no cysteines) which disrupts secondary structure, causes conformational disorder and affects hydrophobic interactions. This oxidation also impairs CaM's ability to regulate RyR2 (3). I will investigate if these LQTS mutations in

CaM make CaM more susceptible to oxidation as well as determine changes in the CaM/RyR2 binding interaction.

Poster 25: *Evaluating Adduct Formation between 5'-Hydroxymethylfurfural (HMF) and DNA in the Presence of Arginine*

Diamond Yusuf

Danae Quirk Dorr, Faculty Mentor

5-Hydroxymethylfurfural (HMF) is a six carbon heterocyclic aldehyde that is formed through the Maillard reaction. Natural forms of this compound are found in carbohydrate rich sources, such as dried fruits and caramel products. HMF has been demonstrated to be toxic in animals with a link to its metabolite 5-sulfoxymethylfurfural (SMF). To date, little is known about the formation of SMF or the formation of DNA adducts in animals or humans. However, previous conclusions led to the central hypothesis of this project which is that DNA adducts will be formed in a reaction between DNA and HMF. Therefore, the main research goal was to determine if the formation of DNA adducts occurred. This was accomplished with several reactions containing variations of ct-DNA, 2'-deoxyguanosine, and L-arginine. The reactions were treated with either enzyme treatments - DNase and phosphodiesterase-or acid treatment-HCl, filtered, and then analyzed by high performance liquid chromatography (HPLC).

Poster 27: *Visualization of the Rearrangement of Cell-Cell junctions in Metastatic Cells*

Taylor Johnson

Marilyn Hart, Faculty Mentor

Cancer is a collection of disorders where the body's cells rapidly divide and metastasize. Cancerous cells disengage from neighboring cells, change shape and have increased mobility due to actin remodeling which ultimately leads to additional tissue invasion. Actin filaments are a underlying component of cell: cell junctions (adherens junctions), securing the membranes of neighboring cells to allow for the integrated structure of tissues. Actin is regulated by a large group of accessory proteins including actin capping protein (CP). The focus of my research was to characterize the disengagement of cancerous cells by analyzing the cell: cell junctions of metastatic cells. Using CP as a marker, I sought to characterize the regulation of actin organization in focal adhesions. I generated a clone which consists of a fusion protein of CP and a fluorescent marker and introduced the construct into a living metastatic cell. Cells that incorporated the fusion protein were visualized for the fluorescent marker via advanced fluorescent microscopy. Fluorescent microscopic analysis revealed an irregular appearance and distribution of CP near adherence junctions of metastatic cells, indicating that CP does play a role in the reorganization of adherence junctions in metastatic cells.

Poster 28: *Steroid Hormone Effect on Neurons of the Amygdala and the Preoptic Area in the Brain of Green Anole Lizards*

Mohannad Alhuwaish, Georgia Muelken, & Spencer Savannah

Rachel Cohen, Faculty Mentor

Testosterone has distinct effects on seasonal brain morphology and behavior. The seasonally breeding green anole lizard, *Anolis carolinensis*, has distinct behaviors during the breeding season, such as reproductive displays and territorial behaviors. Interestingly, these behaviors are not observed during the non-breeding season. We are examining two forebrain areas, the preoptic area (POA) which facilitates masculine reproductive behavior under androgen treatment, and the amygdala (AMY) which plays a role in fear behaviors. These areas are also known to change volume seasonally, but the specific mechanism is unknown. Our experiment seeks to understand the mechanism by which steroid hormones act on nuclei in the forebrain to induce seasonal differences using gonadectomized breeding season males. Each individual was treated with testosterone, dihydrotestosterone, estradiol, or vehicle. We expect to see soma size and cell numbers in steroid hormone treated lizards to be restored to breeding season levels within the POA and the AMY, as has been shown in previous work. Overall, our experiment suggests that steroid hormones can impact brain morphology. Future studies may investigate different factors that may contribute to the increase in POA or AMY volumes in the breeding season like glial cell count or measuring the distances between neurons.

Poster 29: *Selection for Drosophila melanogaster exposed to low dose gamma radiation*

Lillie McDermott & Heidi Cap

Daniel Toma, Faculty Mentor

Gamma radiation is a highly penetrating form of radiation to living systems. Gamma rays can alter DNA structure and damage other cellular structures, leading to cancers and other genetic problems. This is particularly troubling due to the increased interest in space travel, especially to Mars. Our research focused on the cumulative effects of low/mid-range gamma radiation on *Drosophila melanogaster* (fruit flies). Low gamma ranges are much less studied than high ranges, and the effects over multiple generations has never been examined. In tandem with Dr. Roberts and his research team from the physics department, we exposed *Drosophila* to gamma radiation via the AN-400 Particle Accelerator. By selectively breeding the exposed flies together over multiple generations, we studied how the flies respond to gamma radiation by testing changes occurring generationally in levels of antioxidant enzymes. A rise in the level of oxidants in a living system is a common result that occurs due to radiation. These oxidants are the principle cause of damage to cellular structure. As a protective response mechanism, organisms produce antioxidants to remove the oxidants.

Additionally, we froze flies for future work on genetic changes occurring generationally due to gamma exposure.

Poster 30: *Examination of the Social Response Reversal Circuit in the Domestic Dog*
Samantha Davis & Joe Zrucky
Bradley Arsznov, Faculty Mentor

One aspect of navigating a social environment involves the ability to inhibit inappropriate behaviors. Such inhibition in social situations has been shown to be related to activity in the Social Response Reversal (SRR) circuit (Blair and Cipolotti, 2004). The SRR circuit includes projections from the orbital prefrontal cortex to the amygdala, the medial hypothalamus, and the periaqueductal gray. This neurocircuit is found in most mammalian brains and is related to inhibition control in social situations. Blair and Cipolotti (2004) described this circuit in humans, where it regulates the suppression of aggression. Previously, Brutkowski and Dabrowska (1966) showed that damage to the ventromedial area of the prefrontal cortex in dogs was related to deficits in their social behavior, (e.g. aggressive-defensive responses). This study sought to identify the the regions of the SRR circuit, which have been previously individually described in the purpose breed beagle (Burtkowski and Dabrowska, 1966; Kosmal and Nitecka, 1977) and in a novel carnivore model, the spotted hyena. Here we examined subdivisions of the amygdala including: the basomagnocellular, medial amygdala, and lateral amygdala. We found the amygdalar subdivisions in the dog were consistent with previous cytoarchitectonic descriptions for dog amygdala (see Kosmal and Nitecka, 1977). These findings confirm that the cytoarchitecture of amygdala is concurrent with the existing literature. Next, we will continue to describe the remaining regions of the SRR circuit in the dog in order to make future comparisons with other carnivore species that display a range of social behaviors, specifically the spotted hyena.

Poster 31: *Aquaponics Demonstration Project Using MN Hybrid Bluegills (Fish)*
Sara Garcia & Caitlin Murphy
Beth Proctor, Faculty Mentor

It is increasingly difficult to feed the world's ever increasing human population using only traditional farming methods. Aquaponics is a relatively new technology that utilizes fish and plants in an almost self-sustaining system. Water containing the fish wastes are used to fertilize the plants and then the water is recycled back to the fish. The fish we chose to use in this study are Minnesota native Hybrid Bluegill. They are used to stock ponds. These fish grow fast and accept man made feed easily. The goal of this research is to create and maintain an aquaponics system to harvest both fish and food crops such as lettuce, spinach and herbs. Endpoints will include growth/harvest of organic plants (lettuce, spinach, basil) and fish. Once this system is running smoothly, we will expand to growing organic specialty greens such as Arugula, Red Mustard, Tatsoi and Kale that can be harvested in 3-6 weeks cycles. This system has the potential to provide more fresh food (plant and animal protein), an alternative or additional source of revenue for farmers large and small since specialty organic foods command higher prices. This pilot system should be able to be scaled up (size of tanks, number of fish, energy /light/heat requirements/cost and profit from organic specialty plants) and adaptable to existing greenhouse and underground operations in Minnesota.

Poster 32: *The effect of LH/FSH injections on steroid hormone production and aggressive behavior in green anole lizards*

Taylor Kenealy

Rachel Cohen, Faculty Mentor

Infertility has become a growing concern for couples, with many of the issues rising from the improper function of the pituitary gland or hypothalamus. In order for sperm or eggs to be produced, the hypothalamus-pituitary-gonad (HPG) axis needs to be activated. The hypothalamus releases gonadotropin releasing hormone (GnRH) to the pituitary gland through the bloodstream. Then, the pituitary gland is activated and releases follicle stimulating hormone (FSH) and luteinizing hormone (LH), which stimulates the testes or ovaries. Green anole lizards (*Anolis carolinensis*) are seasonally breeding, such that they have high levels of steroid hormones, with high territorial and reproductive behaviors during the breeding season. During the non-breeding season, these lizards have very low levels of territorial and reproductive behaviors, with low steroid hormone levels. We hypothesized that if we activate the HPG axis, we should see an increase in steroid hormone levels and reproductive behavior in non-breeding lizards. We injected non-breeding males and females with saline, different doses of LH and/or FSH hormones. Plasma was collected to measure testosterone (T) or estradiol (E2) levels using enzyme-linked immunosorbent assays. Males injected with a higher dose of LH and FSH had increased T levels compared to other groups. There was no significant difference detected in E2 levels in females. We also expect to find a correlation between gonadal size, steroid hormone levels, and aggressive behavior in males. These results suggest that breeding hormone levels can be restored by HPG axis stimulation.

Poster 33: *pH on metal conc. in sediment associated water*

Hunter Stedman

Steven Mercurio, Faculty Mentor

The effect of pH on metal concentrations in sediment associated water and temperature as snow melt and water temperature (likely going to play a significant role here that did not happen in the marine study) by Rapidan Dam and other sites in Minnesota River. Four sampling sites were present in the field when collecting water samples, the first, upriver of the Sibley Park confluence of the Minnesota and Blue Rivers as a control site as with an upstream control site from the Rapidan Dam. These control sites were chosen so that the disturbance of sediment from either the dam or the confluence could bring about higher pH levels. The other two sites were before the dam where the ice was thawed out due to jet streams of water being pushed up by a pump, which could cause a disturbance in the sediment. The confluence site was the same concept where there wasn't any ice where the two rivers met.

At low water temperatures (-1 to -2 °C) and air temps (-6 to 5 °C), all of the sampling sites had the same divalent metal concentrations of 10 ppb. The upstream Judson crossing of the Minnesota River site had significantly higher pH of 8.0 than sites influenced by the Blue Earth River which had from pH values that ranged from 7.6 to 7.8. This may be significant if the divalent metal ion concentrations rise faster in the more acidic Blue Earth River.

Poster 34: *Microwave Plasma for Waste Management*

**Tressa Marquardt, Jonathan Menke, Rauof Abeidi, & Danayit Shewamene
Jacob Swanson, Faculty Mentor**

Plasma gasification of biomass is emerging as an efficient way to reduce the carbon foot print of waste management while generating renewable energy. In general, the gasification process heats solid waste to a sufficient temperature to change states from solid to a gas. This gas is called synthesis gas. A negative byproduct of gasification is tar which shortens component life of gensets which are used to convert the syngas into electricity. A 2.45 GHz microwave driven plasma (MDP) gasification process is examined as a way to improve the conversion efficiency and eliminate tar content of synthesis gas. Simulation of the MDP process opens new doors for the optimization of this green technology. The first step in simulating is validating an experiment already conducted to have a ground state model to improve upon. The adjustable parameters of this system are microwave power, plasma carrier gas flow rate, frequency, and plasma carrier gas. The simulation is performed using the Plasma interface to model wave heated discharges. An experimental design using the geometric constraints defined in a similar model will further validate MDP system design and provide a foundation for more efficient future commercial designs. The expected results from the simulations would be a proportional relationship between microwave power, plasma flame length, and electric field strength. Another important result is that the plasma carrier gas flow rate affects plasma flame size, and area inversely. With these relationships we can work to optimize our system converting biomass to synthesis gas more efficiently.

Poster 35: *Assessment of Maternal Risk Factors*

**Tashinga Mupambo
Joseph Visker, Faculty Mentor**

In 2000, leaders of all the nations of the world came together to sign the United Nations Millennium Declaration which outlined eight targets known as the Millennium Development Goals. Goal number 5 was to improve maternal health and decrease maternal mortality by 75% before 2015. The United States has one of the highest maternal mortality rates in the developing world, with black women being three to four times more likely to die from pregnancy or child-birth related causes than white women. The aim of this research is to identify trends that could be possible causes for the great disparity in maternal mortality rates across racial lines in the United States. Data will be collected by handing out surveys to students in large, diverse, general education courses. The purpose of the 30-question survey is to assess the individual's participation in smoking, drinking, and eating habits that are linked to causes of maternal death and the prevalence of health conditions that increase risk of maternal death in the individual's personal or family medical history. Results are pending and implications for health professionals will be discussed.

Poster 36: *Visualization of the Vasculature and Aqueous Fluid Outflow Pathway in Porcine Eyes.*

Hannah Murphy, Keshari Sudasinghe, & Casey Schneider

Michael Bentley, Faculty Mentor

Glaucoma affects more than seventy million people globally. Glaucoma is caused by the buildup of aqueous fluid in the anterior chamber of the eye, which increases the pressure and causes optic nerve damage. A common form of the condition, open-angle glaucoma, is thought to be caused by a blockage of the aqueous fluid outflow pathway that allows fluid of the anterior chamber to drain into venous circulation. When leaving the aqueous chamber, the fluid travels through a complex network of blood vessels in the area of sclera surrounding the iris. However, these blood vessels are difficult to visualize because of the dense connective tissue. In this project, methylene blue dye and or tomato lectin, from *Lycopersicon esculentum*, conjugated with a fluorescent dye is perfused into the vasculature of the porcine eye via the anterior chamber. The fluorescent-labeled lectin is specific for vascular proteins, which allows the visualization of the vessels in the aqueous fluid outflow pathway. The tissue is cleared in DPX and examined with a laser confocal microscope, which provides a means to determine the three-dimensional architecture of the fluorescent-labeled vasculature. The information obtained from this visualization technique can be used in future glaucoma-related research.

Poster 37: *Formulation and Implementation of CRISPR Edited Glioblastoma Cells to Evaluate Triplatin-Proteoglycan Interactions*

Morgan Pitcher & Tehut Zewdu

Samantha Katner, Faculty Mentor

Proteoglycans are ubiquitous protein/carbohydrate complexes that are found on cell surfaces. They are able to regulate cell growth and vascularization, processes that are exploited by cancer cells. Heparanase, an enzyme that cleaves glypicans, can alter the structure of proteoglycans and change their bioactivity. These enzymes are overexpressed in glioblastomas and are thought to contribute to the rapid and aggressive growth of cancer. Recently, Triplatin, a polynuclear platinum complex (PPC), interacts with heparan sulfate proteoglycans (HSPGs), and thus inhibits heparanase cleavage and growth factor-proteoglycan-mediated signaling. Moreover, previous studies have demonstrated Triplatin's potent cytotoxicity in glioblastoma mouse models that may also be explained by glycan targeting in these tumors. This relationship remains incompletely elucidated. Here, we generate glypican-3 (GPC3, a HSPG) knockout glioblastoma cells using CRISPR editing with number 31 sgRNA. To verify the knockout, we use western blotting and genomic analyses. We compare Triplatin cytotoxicity in wild-type to CRISPR edited glioblastoma cells. Further, we examine Triplatin activity in patient-derived glioblastoma cell line panel and compare it to other PPCs. The further exploration of PPC selectivity for HSPGs could allow for tailored chemotherapeutic treatment to patients with glioblastoma and may pave the way for new molecular targets and more effective treatment for glial tumors in the future.

Poster 38: *The Influence of Electronic Health Record (EHR) Training on the Technostress, Job Satisfaction and Performance among Clinical Dietitians*

Ana Konatar

Sarah Kruse, Faculty Mentor

Through the American Recovery and Reinvestment Act, Electronic Health Records (EHR) implementation and demonstration of its “meaningful use” became required for all health care providers as of January 1, 2015 with a goal to improve the patient's quality of care while also increasing work efficiency and health data accessibility. Previous research has shown that physicians who use EHR systems experience low job satisfaction, productivity and have high risk for professional burnout due to technostress. The previous research was mainly focused on physicians whereas we are interested in understanding the effects of technology use among dietitians. We are still finalizing our data collection phase. However, the anticipated findings include, but not limited to, recognizing the most significant factors/predictors of the technostress levels, understand the current available EHR trainings and their effectiveness, suggest the alternative ways to mitigate the technostress and help practicing dietitians be successful with technology use. The data collection is administered through an online anonymous survey designed and implemented in Qualtrics. Once the complete dataset is obtained, the data will be analyzed using R and R Studio software. The preliminary analysis will include descriptive statistics and exploratory data analysis in order to identify the data properties and ensure all the necessary assumptions are met before proceeding to the hypothesis testing. The statistical tests may include parametric and/or non-parametric tests which depends on the population distribution assumptions obtained in the exploratory phase.

Poster 39: *Investigation of Multigenerational Gamma Radiation Exposure in Drosophila Melanogaster using an AN-400 Particle Accelerator*

Alexis Arsenault

Andrew Roberts, Faculty Mentor

Poster 40: *Synthesis Gas Engine Efficiency Optimization*

Frederick Wlizio, Ryan Hammerquist, Erick Estrada, & Daniel Stroberger

Jacob Swanson, Faculty Mentor

Climate change is a global concern in which the impact been widely discussed. A major concern of this issue is the quantity of greenhouse gases entering the atmosphere. One path to rectifying this is a renewable energy formed from biomass gasification as a carbon neutral energy alternative. Biomass gasification creates a producer gas called synthesis gas, which can be burned as fuel. Synthesis gas burning spark ignition engines have not yet been optimized for efficiency and therefore are not currently practical for consumer use. Literature reviews on recent research were conducted to find engine modifications which resulted in operational efficiency gains. This research suggested that an increase in engine compression ratio, along with advancing ignition timing to roughly 30 degrees before top dead center were optimal modifications for improving efficiency. Experiments varying compression ratio and ignition timing will be performed to validate this research. A test stand was created to take measurements

of various characteristics of a synthesis gas fueled engine. From those measurements, the efficiency can be calculated. The compression ratio for the chosen engine is easily modifiable. Multiple engines will be purchased in order to test several different compression ratios. An electronic ignition system was previously added to the test stand that creates the capability of controlling the ignition timing for the purpose of testing its effect on efficiency. Experiments varying compression ratio and ignition timing will validate this research and help advance the knowledge in how to leverage carbon neutral energy production towards reducing harmful greenhouse gasses.

Poster 41: *Mycobacterium avium* subsp. *paratuberculosis* dormancy detection through spectrophotometric analysis

Mai-Ka-Ying Yang

Timothy Secott, Faculty Mentor

Poster 42: *Phenotypic Analysis of the Developing Retina in Mice Overproducing IGF1*

Marissa Swenson

David Sharlin, Faculty Mentor

Oral Session 4 (CSU 204, 11:05 AM - 12:05 PM) Psychology and History

Examining the potential effects of cyberbullying on the development of body dysmorphic disorder

Colin Seifert

Jeffrey Brown, Faculty Mentor

More and more in today's society the prevalence of social media has had multiple consequences on the way people perceive themselves and their appearance. Body dysmorphic disorder is an extreme illness where people obsess over perceived flaws in their appearance to the point where suicidal ideation occurs in as many 80% of sufferers, with 25% attempting suicide. Research needs to be conducted to assess the impact of cyberbullying on social media platforms on the development of body dysmorphic disorder. I have created a questionnaire that combines cyberbullying components with a body esteem scale and will distribute it on Qualtrics as a way to evaluate the prevalence of body dysmorphic disorder on campus. I expect to find that there is a correlation between cyberbullying behaviors and the presence of low body esteem which can suggest the possibility of one developing symptoms of body dysmorphic disorder as a result of their experience online. The results of this study will aid in the development of interventions that will recognize the negative behaviors online and help prevent the development of body dysmorphic disorder.

Who the "Real" Victims Are: College Students' Perceptions on the Cause of Sexual Assault and Rape

Alexandria Dobson

Jeffrey Brown, Faculty Mentor

This study will examine college students' perceptions on who the "real" victims are in cases of sexual violence, as well as what causes sexual violence to occur. Minnesota State University-Mankato student participants will be given a survey containing multiple choice questions, open-ended questions, and questions in response to a vignette to obtain participants' views on sexual violence. Within the vignette, participants will be asked to identify if an act of sexual violence occurred and who, if anyone, is responsible for that violence. Based off of previous research, I suspect that most college students will have the ability to recognize who experienced sexual violence as the victim, so long as they are the "ideal/perfect victim" (sober, modestly dressed, no prior sexual contact with perpetrator, etc.). However, if alcohol or other drugs are present or if the victim is dressed in revealing clothing, I expect that participants' perceptions will change slightly and they may be more likely to victim-blame.

The Fear of Falling and Restriction of Activity in Older Adults

Maddison Hajek & Katie Garvey

Jeff Buchanan, Faculty Mentor

The fear of falling has been recognized as a serious and common problem in older adults that can lead to adverse effects such as excessive activity restriction, increased dependence on

others, and an overall decreased life satisfaction and quality of life. The purpose of this study is to examine the fear of falling in older adults and whether it leads to restriction of activities of daily living. Participants in this study will include fifteen older adults who are currently in a rehabilitation unit receiving physical and/or occupational therapy. The inclusion criteria include being over the age of sixty-five, receiving rehabilitation services, and the absence of significant cognitive impairment or a diagnosis of dementia. Participants will first complete a questionnaire (called SAFFE) that assesses fear of falling, activity restriction, and activity levels in older adults. In addition, participants will complete an in-person interview designed to obtain further information about the fear of falling and to understand how this fear affects completion of daily activities. The researchers are currently starting data collection and it is estimated that data collection will be completed by March 15. Qualitative analysis of the interview data will be conducted as well as numerical scoring of the SAFFE questionnaire. The implications of how the fear of falling affects the completion of daily activities will be discussed.

Analysis of the Lost Chance vs No Chance Theses: Accommodation and Communication

Nathan Harnit

Tao Peng, Faculty Mentor

In 1949, the Communist forces led by Mao Zedong took control of the whole of China. The Nationalist party retreated to Taiwan and, along with them, the support of the United States of America. The fate of foreign relations between China and the United States seemed grim, yet one man took an initiative. The ambassador to China, John Leighton Stuart, stayed in China in order to maintain influence and attempt to create relations with the new leaders. Due to perceptions and opposition from parts of China and the United States, Stuart failed to secure foreign relations. Some scholars argue that, due to opposition to these relations, Stuart had no chance to accommodate relations, while some say that, since he had some channels of communication, he had lost the chance.

After research into the subject, it is clear that, on the issue of policy accommodation, Stuart indeed had no chance. The opposing ideologies of the two nations could never agree. However, Stuart had multiple opportunities to meet with leading Communist leaders and maintain channels of communications. The issue with the Lost Chance/No Chance thesis is that it focuses on the issue of policy accommodation, but not on whether the two nations could disagree but still be in communication. Relying heavily on the notes and writings of John Leighton Stuart, including his *50 Years in China* and *The Forgotten Ambassador*, it can be seen that the United States may have had no chance for accommodation, but had lost the chance for communication.

Oral Session 5 (CSU 203, 11:05 AM – 12:05 PM) Automotive Engineering Technology, Economics, and Education

019 E-UTV Driveline

Benjamin Thul & Erik Vorwerk

Bruce Jones, Faculty Mentor

Electric utility vehicles (E-UTV)'s are becoming more popular in the commercial industry. The design team has a prototype E-UTV that has been tested for a local manufacturer. One problematic area on the prototype E-UTV was the mechanical driveline from the electric motor to the wheels of the vehicle. The driveline determines important characteristics of the vehicle such as; efficiency, power, and drivability. The previous driveline had several problems in its design such as an old electric motor connected to a belt/pulley driven transaxle, which resulted in loss of efficiency and less than desirable drivability. A more efficient motor was built and implemented. This motor had two output shafts, allowing it to be mounted inline. This change eliminated the transaxle and belt system, reducing frictional losses and increasing space. New motor mounts were made which reduced weight compared to the older mounts. Different front and rear differentials were needed to maintain the necessary wheel speed after the motor switch. . Once the new driveline was installed on the E-UTV its performance was validated through vehicle testing. Wheel torque improved slightly with the new design which means improved drivability. Overall, the new driveline is more efficient, uses less space, and increased drivability. The driveline successfully held up to all testing and has proven to be a much better option for a production E-UTV.

2019 EUTV Electric Generator

Timothy Farrell & Owen Parker

Bruce Jones, Faculty Mentor

As hybrid and electric cars grow in popularity as a more environmentally friendly method of transportation than standard gasoline cars, the utility vehicle (UTV) industry, such as side-by-sides, has very little on the market for electric or hybrid vehicles. One reason why is batteries provide less range than combustion engines. To combat this a gasoline electric generator was installed on an electric UTV to extend its range beyond that of the battery packs alone. This will allow the EUTV to run on batteries most of the time but will also have the long-range capabilities of other UTVs if necessary. The generator also provides outlets for power tools while not charging the batteries. To apply this concept the requirements of the generator were determined based on the charger used, available space, and ergonomic requirements. A mathematical model was used to simulate different generator options to determine what their extended range would be. Mounts were designed and manufactured to mount the generator to the vehicle. Wiring diagrams of the current vehicle and battery management system were analyzed to determine how to wire the generator to the vehicle. The biggest challenges through this process were allocating space for the generator, charger, and related equipment. Through this process it was demonstrated that a generator could be implemented into an EUTV. This extended vehicle range by 50% while the generator was running. This could help hybrid electric utility

vehicles compete with standard gasoline UTV in terms of range while battery technology continues to develop.

Environmental Degradation and Economic Growth: Testing Environmental Kuznets Curve in ASEAN countries

Zhen Yang

Ken Park, Faculty Mentor

Preparing Undergraduate Students in a Science Course to be Interculturally Competent

Zachary Koestler

Elizabeth Sandell and Bethann Lavoie, Faculty Mentors

The mission of the College of Science, Engineering, and Technology is to “prepare students for professional careers and advanced study, while connecting with local, regional and global communities” (MSU, Mankato, 2018). Faculty members face a significant challenge: preparing the next generation of increasingly diverse scientists. Culturally responsive teaching uses “the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them” (Gay, 2010, p. 31). The current investigation hypothesized that course experiences may have a positive impact on the intercultural competence of undergraduate students. This investigation will report on the starting level of intercultural competence among undergraduate students. The next step will examine how the students change during their experiences in the course. For this study, the IDI version 3 (Hammer, Bennett, & Wiseman, 2003) was used as a measure of cultural competency. The investigators hypothesized that beginning scores are influenced by the students' lack of experiences with other cultures. Researchers anticipate that the scores will increase as a result of participating in the course. College and university leaders will use the results for course design and for procedural recommendations.

Oral Session 6 (CSU 201, 1:05-2:05 PM) Integrated Engineering and Automotive Engineering Technology

The Application of Augmented Reality in a Manufacturing Setting Using Microsoft's HoloLens

**Carl Hobus, Tres Wuerffel, Connor Johnson, & Jason Lambert
Jacob Swanson & Robert Sleezer, Faculty Mentors**

Recent developments in the state of the art of augmented reality have brought the technology to hobbyists and manufacturers alike. The Minneapolis based manufacturer, Design Ready Controls (DRC), elected to develop augmented reality for use in its manufacturing processes assembling complex electrical control panels because of its potential to increase production and assist quality control. An augmented reality suite comprised of a Microsoft HoloLens headset and a proprietary application was developed by Team Monstars; a student-led engineering team from Mankato State University. Team Monstars designed the application with the intent of reducing assembly time of DRC's products, specifically, the build of a high-demand and unchanging piece of hardware produced by DRC. Considerations in design and implementation such as: steps of product assembly, ergonomics of the HoloLens, dynamic environmental changes, education & training, and use of the HoloLens were addressed throughout the project. The completed application used in the HoloLens serves as a baseline for an iterative design approach for DRC to make improvements in their manufacturing processes applicable to changing products and assembly steps. The functional prototype of the augmented reality suite validates the benefits and practicality of the implementation of augmented reality in a manufacturing setting for any industry looking to reduce assembly time, increase product quality, and implement self-guided training.

Shear Panel 1020 Steel FSAE Tube Chassis

**Connor Hudalla & Thomas Alt
Gary Mead, Faculty Mentor**

The 2019 FSAE chassis was constructed in attempts to create a lightweight ridged FSAE vehicle while furthering our FSAE club's knowledge of composites. The basic structure of the car follows a typical 1020 mild steel tube chassis design as laid out by the FSAE rules. To maintain a sub 75 lb frame weight while maintaining a torsional rigidity of 700 Lb-ft/Degree. The development, has taken part over the past 6 months. The first 4 months were spent setting design goals, based on the previous year's competitions to determine what it would take to put a car in the top 25. Once the goals were set, the frame was designed with an emphasis on rigidity, ease of manufacturability, and adherence to the rules. The remaining 2 months has been spent physically building the frame, and validating the design through FEA (Finite Element Analysis) and physical testing of various sandwich panel layup designs. All of the testing processes have been meticulously documented to ensure quality repeatable results for future years to reference. The work has culminated with a 69lb FSAE rule compliant Chassis, currently being fully assembled to race in the 2019 FSAE Michigan competition. In final the Composite shear panel will allow the frame to will allow the car to perform better in areas such as maximum cornering

force (lateral g's). Better turn in at speed. Finer adjust-ability of the suspension, all while keeping the car light so accelerations and deceleration's will not be affected.

FSAE Ergonomics

Kevin Barrett, Nathan Anderson, & Dylan Henning
Gary Mead, Faculty Mentor

Racecar ergonomics is typically not the first thing that comes to mind when one thinks of automobile racing. However, without thinking about ergonomics when designing a racecar, the driver may not be able to perform to the best of their ability. In order to implement an ergonomic design, it must be applied to the frame before it is built. Formula SAE has a number of rules that need to be taken into consideration, especially when designing the seat placement, harness tabs, and steering wheel position. The team has done a fair amount of benchmarking the previous year's car and there are a few areas in need of improvement. A detailed survey was created and filled out by all the team members once they got a chance to drive the previous year's car. Pros and cons were determined in order to figure out what to keep and what to modify. The biggest complaint was the lack of legroom, so in an attempt to relieve that issue an adjustable pedal box will be implemented to accommodate for taller drivers.

Oral Session 7 (CSU 203, 1:05-2:05 PM) Automotive Engineering Technology and Biology

Small Engine Data Logging

Daniel O'Brien

Gary Mead & Bruce Jones, Faculty Mentors

Data logging is the collecting of data and parameters over time. This is useful when looking at how something is operating in real world conditions. The Minnesota Department of Natural Resources is interested at looking at the efficiency and emissions of their propane powered lawnmowers over their gasoline powered counterparts. Using the data collected, it can then be used to recreate a similar situation in a lab to do further testing. The scope of the project is to create a data logger that will be used on small engines. The data logger has to be portable to be attached to the engine while in the field. The data to be taken from the engine is the RPM and amount of air being consumed by the engine in Cubic Feet per Minute (CFM). By data logging this information, the volumetric efficiency and the amount of load that is experienced can be calculated. This information can be used to recreate a similar cycle in the lab. This can be used to make a load curve or a series of different average load points to represent field usage. This data can then be transferred to an engine or chassis dynamometer and the engine can be subjected to a situation the same as real world. From this, an emission test cycle can be ran and is tailored specifically to the usage of the engine. The emissions can then be collected and compared from the engine when using gasoline and then propane.

Use of an in-cylinder pressure sensor to increase engine performance and efficiency
Hunter Pauloski

IDENTIFICATION OF PROTEINS INTERACTING WITH THE ALPHA SUBUNITS OF ACTIN CAPPING PROTEIN

Ryan Bennett

Marilyn Hart, Faculty Mentor

Capping protein (CP) is an actin binding protein composed of an alpha and a beta subunit, which is important for actin assembly and cell motility. Whereas lower organisms have one gene and one isoform of each subunit, higher organisms have multiple alpha isoforms (a1, a2 and a3) with conserved sequences defining highly conserved subfamilies. CPa1 and CPa2 share >90% sequence identity and the regions of divergence are highly conserved among the subunits across vertebrate. In addition, CPa1 and CPa2 have distinct expression patterns in murine tissues. Endothelial cells contain only CPa2, and erythrocytes contain almost exclusively CPa1. Most tissues have both isoforms but the ratio of alpha1:alpha2 varies widely. The highly conserved sequence conservation and distinct expression patterns of CPa1 and CPa2 support our hypothesis that the CP alpha isoforms have conserved, unique and essential roles in vertebrates and will therefore, interact with unique proteins. We executed a yeast two-hybrid screen to identify proteins that interact with CPa1 and CPa2. To date, approximately 100 clones have been identified for both CPa1 and CPa2. We are currently using a liquid culture B-Galactosidase assay for quantitative analysis of the protein interactions. The clones with the strongest interactions, correlating with the highest B-Galactosidase activity, will be sequenced and analyzed using a Bioinformatic approach.

Oral Session 8 (CSU 202, 1:05-2:05 PM) Automotive Engineering Technology

Performance Oriented Airflow of an Internal Combustion Engine

Steven Zimmerman & Andrew Straka

Gary Mead, Faculty Mentor

An internal combustion engine's performance, both in power and effective efficiencies, are largely affected by the engine's total volumetric efficiency; that is the effectiveness with which the engine utilizes its cylinder displacement to pump clean air into the engine, and push out dirty exhaust before the cycle begins again. The more air pumped into the engine, or the more effectively it's done, the more power that can be made with the environment provided, or the greater fuel efficiency that can be achieved with the same engine displacement.

Therein lies a large portion of this project's research and development. The cylinder heads of an engine largely control the total amount of air that can be moved before a choked flow state is reached. The volumetric efficiency of the engine is largely determined by the effectiveness of the cylinder heads, and the respective intake and exhaust ports. Through use of a custom-grind camshaft, precision ground valves, high-strength valve springs, and a calculated machining job done to the ports and chamber in the cylinder heads, there has been a significant increase in allowable airflow into the engine, used to increase horsepower and engine torque. The cylinder heads use a SuperFlow 1020 flow bench to verify airflow abilities, and test for high and low velocity areas within each cylinder port. The camshaft is rolled on a machine and calculated with CamProPlus for determining all lobe lift values and analyzing peak airflow points based on valve lift and valve timing.

Manufacturing, from Operator Motion to Automation

Nicholas Cotton

Gary Mead & Bruce Jones, Faculty Mentors

Technological advancements are necessary within a manufacturing company to keep manufacturing costs low, the employees safe, and to output a quality product to the public. To achieve such tasks factories have been updating their assembly lines to better improve the flow, efficiency, and safety. Automation has become a large part of advanced manufacturing facilities to reach the needed goals and to meet the desired profit margins. Operators at Itron, Inc are responsible for maneuvering large boxes containing dense plastic meter housings to the beginning of the assembly lines throughout the whole work day. The result is repeated 50+ pound carries which have a negative impact on the operators physical health, the efficiency of the factory, and a lower company profit margin. By using an automated process to deliver the meter housings to the beginning of the assembly line it eliminates operator safety risks, it boosts efficiency and raises the profit margin of the company by assembling more meters on a daily basis.

Development of a Formula SAE Powertrain

Samuel Stachel, Matthew Skaaland, & Christopher Cox

Gary Mead, Faculty Mentor

Formula SAE is a collegiate engineering competition with participants from all around the world. First starting in 1981, the purpose of the competition was to give students the opportunity to participate in an exciting, and challenging hands on project to develop design, fabricating, and project management skills. Each team participating in the event will design and build an open wheeled Formula style racecar. During the competition teams will give presentations to explain all their design process as well as race their car in different events to test the ability of the car.

This year's MSU FSAE engine team has decided to use a new engine in the car for the 2019 competition. It is a 450cc single cylinder, four stroke, Yamaha engine. The team also intends to use a naturally aspirated configuration instead of putting a turbo-charger on the engine. The overarching goal for the entire engine team this year is to make 44 average horsepower while reducing overall system weight from the previous year's car. This portion of the engine team is responsible for fluids, internals, and engine breathing. The Intake system for the new engine has been completely redesigned from the ground up. Engine Internals will be upgraded from the stock configuration to maximize air flow into the engine, and increase the compression ratio. The engine runs on 100 octane fuel and uses a stock Yamaha injector.

Poster Session B (CSU Ballroom, 2:00-3:30 PM) Art, Chemistry, Communication Disorders, Corrections, Ethnic Studies, Family and Consumer Science, Geography, Health Science, Human Performance, Nursing, Psychology, Recreation, Parks, and Leisure, and Special Education

Poster 1: An Examination of the Experiences and Perspectives of Physically Disabled Students

Megan Serratore

Brittany Smith, Faculty Mentor

The purpose of this research is to gain a better understanding of the perspectives and experiences of physically disabled students. More specifically, the goal is to learn how students with physical disabilities may feel disabled by their actual disability but also perhaps feel disabled by societal biases. To perform the study and achieve results, students with physical disabilities were recruited from the Accessibility Resources Center at Minnesota State University, Mankato. Students who agreed to participate were interviewed via phone using a series of eight questions designed to elicit information about how they perceive their experiences as a physically disabled person. The interviews have yet to be analyzed, so no conclusions have currently been made based on the interviews. Once the interviews have been analyzed, the findings from this research could potentially help society better understand how social constructs can further disable people and how people can change their attitudes and behaviors to create an environment that enables rather than further disables people with physical disabilities.

Poster 2: Mental Health and Nursing Homes

Heidi Belkholm

Christine Black-Hughes, Faculty Mentor

Purpose: Mental health service provision in Minnesota nursing homes is not well known. The literature suggests a lack of mental health services available to older adults living in NHs in the US. This study's purpose was to assess the extent that NHs in MN provide residents with mental health care based on NH professionals' opinions.

Methods: Quantitative electronic survey design. Replication of a study by Molinari et al. (2009). Using a software called Qualtrics, NH administrators, social workers, and directors of nursing throughout MN were surveyed electronically about the provision of mental health services in their facilities.

Results: 133 completed questionnaires collected. Significant differences were found between professions on these topics: Who orders mental health services, difficulty providing substance abuse counseling, difficulty providing individual/group therapy, frequency of clinical social worker visits, frequency of licensed psychologist visits.

Poster 3: *Effects of Maladaptive Interpersonal Schemas on College Students' Performance*
Katlyn Jaeger, Bianca Alvarez, Ibelizet Dominguez, McKenzie Specht, & Linda Zheng
Emily Stark, Faculty Mentor

Post-secondary education has seen a rise in students affected by mental health problems. Research has shown that college students experiencing mental health problems also see a decrease in academic performance and college satisfaction (Eisenberg et al., 2007). Previous research studies have supported a connection between high mental health issues and high maladaptive interpersonal schemas--negative representations of an individual's prior experiences that influence current perceptions--which represents a possible connection between maladaptive interpersonal schemas and college students' performance (Wright, et al, 2009). The internalization of maladaptive interpersonal schemas (MIS) has been shown to positively correlate with psychological distress, and therefore, measuring MIS is a useful approach to understanding current issues that students might be facing. The purpose of our study is to find a relationship between MIS and college performance which would determine whether MIS are prominent issues among college students. We hypothesize that college students with high MIS will have low academic performance and college satisfaction. We are currently finalizing data collection; we have over 200 completed participants and are moving into data analysis of college student's performance and MIS scores at this time. If results are found to be significant, we can further research how to advise college students with high MIS in finding tools to achieve academically and mentally. If our study identifies these schemas as a prominent issue, the next step would be to research why college students experience high MIS, and how students can develop more positive schemas to improve their academic performance and college satisfaction.

Poster 4: *The Influence of Social Media on College Students*
Sarah Wall & Emily Schiltz
Emily Stark, Faculty Mentor

The purpose of this research project is to determine how social media use relates to anxiety levels in college students, and if students show evidence of addictive behaviors in their social media use. The hypothesis predicts college students who use social media more often will show heightened stress and anxiety levels, as well as difficulty in staying off social media.

Participants completed a survey that assessed their social media use habits and their anxiety levels. The participants were then randomly selected to either be in the control or experimental group. The control group continued their daily lives without any changes in social media for three days. The experimental group were instructed to stop using social media for three days. After three days, all participants returned to complete a follow-up survey about their anxiety levels and experience with social media.

Data analysis is just beginning; t-tests will be used to examine differences between the control and experimental groups in anxiety levels. Qualitative responses will be examined to understand the effects of quitting social media for three days.

Upon the completion of this projects, students will become more aware of their social media use and how it impacts their daily life.

Poster 5: *An Exploratory Study of Critical Thinking in the Workplace*

Erik Jacobson & John Walker

Emily Stark, Faculty Mentor

Critical thinking has broad implications for success in everyday life. Employers often look for strong critical thinking skills in potential candidates, and many universities are aimed at fostering these skills in their students (Lawson, 2015). Most critical thinking measures and activities used in college classrooms focus on analysis of research articles and findings, but it is not clear whether those skills are relevant to critical thinking in the workplace. The present exploratory study aims to examine participants' abilities to apply critical thinking skills learned in the classroom to specific workplace scenarios where critical thinking is necessary to come to a solution. Workplace critical thinking scenarios were developed and piloted during the fall semester and data collection is ongoing using the final versions of these workplace scenarios. Participants are asked to identify issues in both workplace scenarios as well as summaries of research findings and also complete demographic information. Preliminary results suggest that participants' year in school positively relates to critical thinking about research studies, and further analysis aims to examine whether and how those skills translate to workplace scenarios. The present study is the first to develop and test workplace critical thinking skills among students.

Poster 6: *Mapping informal settlements of Syrian refugees in Aarsal, Lebanon*

Ameen Hassan

Rama Mohapatra, Faculty Mentor

Population and Housing Change in Aarsal, Lebanon due to Forced Migration of Syrian Refugees between 2011-2018

Forced migration has been an issue since the beginning of civilization and even today it is a big challenge for the world. In general terms, it refers to the internal displacement of people and movement of refugees. One of the main push factors of forced migration is armed conflict and a living example is the Syrian civil war that started in 2011. This war resulted in more than 6 million internally displaced persons (IDP) and approximately 5.5 million refugees. Many fled to neighboring countries such as Turkey, Jordan, and Lebanon. Lebanon is the second largest Syrian refugee hosting neighboring country with more than 1.5 million of them. This influx contributed to a significant increase in Lebanon's population density by nearly 37 percent from 400 to 520 persons per square kilometer. One of the Lebanon's village (Aarsal) that lies in the Northeast region bordering Syria alone hosts nearly 25, 000 registered refugees and thousands more unregistered. The village witnessed substantial changes in housing and population due to that. As this is a volatile region, it is difficult to gather first-hand information at a frequent interval to monitor the changes to the housing and population. Fortunately, with the advancement in the field of remote sensing and big data analysis we have the ability to gather daily data for such regions. Using these sub-meter resolution data from 2011 and 2018, the present study aims to quantify the intensity of change to the settlements and estimate the population.

Poster 7: *Defining Sex Trafficking: A Systematic Review of the Psychological Literature in the United States*

Tasia Virnala & Raina Kor

Eric Sprankle, Faculty Mentor

Introduction: While efforts to raise awareness about sex trafficking have been successful over the past couple years, the issue is becoming increasingly conflated with adult sex work in public policy and media reporting. What is unclear, however, is how psychology researchers are defining sex trafficking in their studies. The purpose of the current study is to conduct a systematic review of the US psychology literature to explore how sex trafficking is academically and scientifically defined. Methods: A funnel approach was used to conduct a systematic review of the literature using PsycINFO with the search terms sex trafficking and psychotherapy or mental health, mental disorders, mental illness, and trauma. Studies were excluded if they were conducted outside the US or if they focused on child sex trafficking. Results: The initial search yielded 268 results. Of those, 23 met inclusion criteria for this review. Out of the 23 studies, 74% included some variation of “force, fraud, or coercion” as part of the definition of what constitutes sex trafficking, whereas 9% of the studies did not include these components. Additionally, 17% of the studies provided no operational definition of sex trafficking. Discussion: The diversity of these results suggests that sex trafficking is often misinterpreted and categorized as sex work. This lack of consistency in the definition of sex trafficking can lead to a harmful conflation with sex work and is an underlying weakness in research on sex trafficking. Future research can broaden this systematic review to include non-US studies.

Poster 8: *Comparing Two Stress Reducing Interventions for College Students Significance of the Research Project*

Madison Jewell

Carlos Panahon, Faculty Mentor

Anxiety and stress are common among college students and come from many sources such as the pressures of making new friends, coping with lifestyle changes, and the pressure to be successful academically (Lent et al., 2002; Ross, Neibling, & Heckert, 1999). Britz and Pappas (2010) found that 51% of undergraduate students stated they are “often” or “always” stressed. As a result of the high levels of stress and anxiety and their negative effects, it is important to identify effective interventions that can help reduce these levels for college students. One effective class of interventions for addressing stress and anxiety is mindfulness-based interventions (MBIs). MBIs emphasize the regulation of attention with a focus on being present, open, and accepting (Carsley, Heath, & Fajnerova, 2015). The research within this area is generally promising. Therefore, it is important to compare stress reducing techniques within the college setting. This study compared a brief MBI (coloring a mandala) to a brief stress reduction seminar in a sample of 83 college-aged adults. Participants were randomly assigned to either condition. They completed the State Trait Anxiety Inventory to determine their stress state, and a survey of perceived effectiveness and use of MBIs before and after the intervention. Both interventions significantly reduced stress state and trait levels for all participants. The participants stated that

each condition was acceptable, and that they would easily be able to practice mindfulness-based activities.

Poster 9: *Applying Peer-Tutoring to Spelling in an Elementary Classroom*

Alyssa Molnar & Nicholas Linell

Shawna Petersen-Brown, Faculty Mentor

Technological advancements, such as spell-check, auto-correct, and predictive text, have contributed to a decreased emphasis on spelling in today's schools. However, it is important to remember that spelling supports the development of reading and writing skills. Spelling teaches and reinforces decoding and encoding, the skills required for reading and writing individual words using phonetic strategies. Despite the importance of acquiring spelling skills, few evidence-based spelling interventions exist (Reed, 2012). Peer tutoring has been defined as an instructional strategy that helps teachers individualize instruction, while providing students ample opportunity to be actively engaged during instruction. The benefits of peer tutoring include the ability to individualize instruction, increase active student engagement, and increase the extent to which students receive immediate feedback (Sideridis, et. al., 1997). Each of these features has the potential to enhance student learning. The purpose of this study is to examine if applying a peer tutoring intervention in a 3rd grade classroom will enhance spelling skills of elementary students compared to typical classroom spelling instructions. Results and implications of the study will be discussed.

Poster 10: *Choose your Topic! An Investigation on How Choice Affects Elementary Students' Writing Productivity*

Kaylin Zukowski & Kayla Gross

Carlos Panahon, Faculty Mentor

Writing is a skill that people use throughout their lifetime. If this skill is not developed appropriately during elementary school, it is often difficult to be remediated. The skill of writing sets the tone for elementary-aged students' academic and social success. With a high percentage of school-aged children struggling with their writing skills, interventions that help students lay the foundation for future writing and educational success should be examined. Therefore, the purpose of this study is to investigate if providing participants with a choice at a classwide level will increase their writing productivity. Participants were recruited from two third-grade classrooms. During the initial section of the study, both classes were presented with one story starter. Next, students in one classroom were presented two story starters for 4 weeks while students in the other classroom were still presented with one story starter. Each session, participants were presented with a story starter (e.g. "The best thing that ever happened to me was..."). Participants in the choice condition were asked to select which writing prompt they would like to write about that day. All participants had one minute to think about their story, and then three minutes to write. The dependent variable was the total words written by each student. It was hypothesized that students in the classroom who were provided with two story starters would write more than students presented only one story starter. Results of the study and their implications will be discussed.

Poster 11: *Defining "Above-And-Beyond" School Behavior*

Sidney Knapper & Breana Stang

Kevin Filter, Faculty Mentor

Defining “Above and Beyond” behaviors is important because teachers need to distinguish between behaviors that are expected of students and behaviors that should be praised or rewarded. Having a clear definition of what behaviors should be considered “above and beyond” would help professionals conduct school-wide behavior programs focusing on improving student behavior. Through our current research, we hope to identify what behaviors school personnel would categorize as “above and beyond” to help define this type of behavior. People attending the PBIS conference on November 7th-9th of 2018, were asked to fill out our survey. Participants in our study included 164 teachers, administrators, and other school personnel from different areas in Minnesota. The participants completed a survey consisting of three different sections. One section asked participants to list behaviors that they would consider “meeting expectation” in different school settings (e.g., the classroom, the hallway, the lunchroom). The second asked participants to do the same with “above and beyond” behaviors in the same school settings. The final section had a series of forced choice questions, asking the participant to decide whether a behavior is “meeting expectation” or going “above and beyond”. We anticipate our results to show which behaviors participants would consider “above and beyond” behavior and which behaviors they would consider “meeting expectation” based on three parameters: self vs. others, prompted vs. unprompted, and active vs. passive. We predict that participants will choose more “above and beyond” behaviors that involve helping others, are unprompted, and are active behaviors.

Poster 12: *Lie Detection in Interviews*

Danielle Curtis

Emily Stark, Faculty Mentor

The majority of people might think they are experts at telling a truth from a lie. However, research has indicated this is not always the case, and people in general are no better than chance at accurately detecting deception. The aim of this research study was to see if participants would be able to distinguish truth tellers from liars in a professional environment. Many employers rely on interviews to make hiring decisions, but candidates who lie could gain an unfair advantage. Therefore, understanding deception detection in the specific context of employment interviews is an important topic. In the current study, participants viewed videos of honest and deceptive interview responses, rated the response as a truth or a lie, and also rated the subject on their likeability, trustworthiness, and how likely they would be to hire this individual. Initial findings indicate that participants were unable to recognize deceit from truth. Interestingly, they were also more likely to hire the lie-tellers as compared to truth-tellers. Current data collection is focused on replicating these findings and understanding what cues participants are using to determine whether statements are true or false, to gain more insight into how they are responding to these interview responses. These findings would indicate that interviewers may be more likely to believe deceitful candidates, potentially leading them to hire the wrong candidate.

Poster 13: *Law Enforcement Students Preconceived Estimations on False Reporting Sexual Assault & Rape Myths*

Avery Whooley

Pedro Thomas, Faculty Mentor

I conducted research by administering a ten question survey to students who are in lower-level Law Enforcement courses. The basis of the survey is to gather their preconceived beliefs about the prevalence of false reports of sexual assault and their general belief in rape myths. By conducting this research my hope is to draw attention to how potential law enforcement officers may either be prepared to interact with potential victims of sexual assault, or require more training and preparation in their undergraduate years in order to be competent in dealing with sexual assault victims. The survey sample is relatively small and will be completed in the beginning of March which is when I will be able to accurately analyze the data that has been compiled. I am expecting that the results are fairly progressive and that respondents will have been able to recognize rape myths and the low prevalence of false reporting sexual assault with a fair amount of accuracy. In the era of #MeToo and mass media publicizing of sexual assault, I expect college students to be more cognizant than their older counterparts. Regardless of the results, I will be turning over the data to the Law Enforcement director, Dr. Pat Nelson, for her to be able to gauge if this is something that needs further addressing in the Law Enforcement Undergraduate Program.

Poster 14: *Gender Impact on Lie Detection in Job Interviews*

Anna Hagan & Shamini Abeykoon

Emily Stark, Faculty Mentor

According to past research, people are usually unable to distinguish between someone who is lying and someone who is telling the truth (Bond & DePaulo, 2008). The purpose of this study is to analyze lie detection in the specific situation of job interview scenarios, and the extent to which the gender of the person being interviewed influences participants' ability to detect whether they are lying or telling the truth. The methods used to gather data include participants (N = 90, data collection is ongoing) watching videos of people, both male and female, either telling the truth or lying to common employment interview questions. Specifically, participants identified whether they would hire the interviewee based on their likability, trustworthiness and truthfulness as well as indicating if the participants thought the response was a lie or the truth. Expanding on past research, preliminary results suggest that in these job interview scenarios, participants are generally unable to tell whether someone is lying -- participants actually tended to rate the liars as more likable and trustworthy than the truth-tellers. Current analyses are focusing on how the gender of the person telling the truth or the lie influences participants' ratings. These results suggest that employers are unable to make fully informed hiring decisions due to deception in job interviews.

Poster 15: *The Challenges in the Cultural Adjustment Process among International Students at Minnesota State University, Mankato*

Esther Cho

Kebba Darboe, Faculty Mentor

The purpose of this research is to examine the challenges of international students at Minnesota State University, Mankato. The major challenges include educational programs, stress factors in the cultural adjustment process, and communication with faculty and staff. This study hypothesizes that cultural adjustment process will be met with some challenges that Tinto's student integration model (1975) addresses.

Historically, international students not only largely contributed to the economic sector of the United States by providing billions of dollars annually, but also provided great workforce with quality educational background. Despite social and economic contributions from international students, there were not many researches focused on the challenges of international students, for example, their social involvements, which play crucial role in the cultural adjustment process.

In addition, this research collects data through an online questionnaire consisting of 16 items. Data is analyzed using computer software called Qualtrics. The questionnaire asks international students variety of questions regarding their cultural adjustment process, social involvement and educational programs.

The findings of this research will be beneficial to university administrators, faculty, students and staff, for instance, it can facilitate the designing various educational resources that can help international students in their cultural adjustment process.

Poster 16: *Deception Detection and the Role of Gender in Determining Truthfulness*

Taylor Lyng & Kevin Sperle

Emily Stark, Faculty Mentor

Past research suggests that our ability to detect when someone is lying is no better than chance (Shaw & Lyons, 2017). This study aimed to look at these claims within the context of employment. Participants watched a series of videos containing simulated job interview questions pertaining to different skill sets commonly asked for. Individuals in the videos answer truthfully or deceptively and it is the objective of the participant to determine the sincerity, likeability, trustworthiness, and willingness to hire each person in the video series along with whether the individual told the truth or not. After participants viewed the videos, they filled out an attitudes and personality scale. Data analysis for this experiment is still in the process. Our study specifically looks at how gender impacts lie detection and the ability to evaluate an individual's trustworthiness, likeability, and hireability. We hypothesize that the results will show us that women who lie are rated more highly overall on the likeability, trustworthiness, and hireability scales than men who lie, but men who tell the truth are rated more highly than women who tell the truth. We believe that studying lie detection in employment practices is important to apply to real world interviewing, determining whether or not interviewees are being honest when being considered for job opportunities, therefore adding integrity to the company and workplace.

Poster 17: *The Effectiveness of Tootling in an Elementary Special Education Classroom*
Brennah McCorkell & Mia Hansen
Alexandra Panahon & Carlos Panahon, Faculty Mentors

Many teachers struggle to manage students' classroom behavior (Lum, Tingstrom, Dufrene, Radley, & Lynne, 2017). Students and teachers tend to focus on disruptive behavior, which can lead to ignoring prosocial classroom behavior. Tootling is a class-wide intervention that helps students and teachers focus on prosocial behaviors rather than disruptive behaviors. Tootling is the opposite of tattling: instead of a student reporting on peer disruptive behaviors, students report on peer prosocial behaviors (e.g., a student sharing with another student). During the tootling intervention, students set a goal of how many tootles are needed to earn a class wide reinforcement (e.g., a pizza party). Researchers have found that tootling was effective in decreasing disruptive behaviors and increasing prosocial behaviors in the general education classroom (Cihak, Kirk & Boon, 2009). This project will be conducted in a middle school special education classroom and will use an ABAB withdrawal design with follow up. Students' disruptive and prosocial behaviors will be measured. After data collection, a social validity scale will be given to the teacher regarding the perceived ease of intervention implementation. At a two-week follow-up, maintenance data on disruptive and prosocial behaviors will be collected to investigate the durability of the effects of tootling. Preliminary results and implications of the findings will be discussed. We predict that implementing tootling in the special education classroom will result in an increase in students' prosocial behaviors and a decrease in disruptive behaviors.

Poster 18: *Comparing the Effectiveness of an iPad Intervention to an Analog Intervention*
Olivia Marquette
Shawna Petersen-Brown, Faculty Mentor

Correct spelling of words has been shown to increase a student's academic success in reading and writing. Unfortunately, spelling is often neglected in schools. Therefore, it is important for researchers to identify effective interventions to improve elementary students' performance in spelling. One area that should be explored is the use of technology to deliver spelling interventions. For instance, tablets are increasingly incorporated into classrooms; however, few tablet applications are research-based. The purpose of this study is to investigate the effectiveness and acceptability of implementing a technology-based intervention (Spelling Star on an iPad) versus the traditional method of paper and pencil (cover-copy-compare; CCC). Spelling Star and CCC have similar instructional features: students are presented with a correctly spelled word, spell the word from memory, receive immediate feedback, and continue attempting as needed until they spell the word correctly. Third grade students struggling with spelling will participate in both interventions. Each students' cumulative acquisition of words on end of week spelling tests will be measured to identify the most effective method. It is hypothesized that the iPad intervention will be more effective and acceptable than the CCC intervention. Results of the study and their implications will be discussed.

Poster 20: *Controversial Truths? Investigating if Need for Cognition Influences Changing Your Mind about Contentious, But Factual Knowledge*

Ibelizet Dominguez & Ali Barijis

Karla Lassonde, Faculty Mentor

Poster 21: *Interpreting Emotional Intent in Text Messages*

Erik Jacobson, Samantha Bennett, Monica Nelson, & Johnathan Pintar

Moses Langley, Faculty Mentor

With the introduction of new technologies, communication through the internet and text messaging is becoming increasingly necessary. Communication using these methods often lacks important context cues, potentially making it difficult to convey emotional intent. The present study examined participants' abilities to interpret emotions for text messages in different styles. Positive, neutral, and negative sentences were developed and were converted into abbreviated, grammatical, and emoji styles. Participants were presented a random message and asked to interpret its sentiment. The researchers of the present study predicted that proper grammar and emojis would increase emotional context and increase interpretability of the messages. A 3 x 3 repeated measures ANOVA revealed reliable main effects of text message style and of the messages' emotional intent. Notably, the ANOVA also revealed a statistically reliable style x intent interaction, indicating that the effects of text message style differed across the three emotional intent conditions. For positive messages, mean interpretability was greater for emoji messages than for grammatical messages, and both styles were more accurately interpreted than abbreviated messages. For negative messages, mean interpretability was greater for grammatical and emoji styled messages than for abbreviated messages. For neutral messages, no effect of style was observed. These results suggest that, when compared to the use of abbreviations, the use of proper grammar and emojis in text messages may serve to clarify certain emotional intentions more than others. Whereas the present study found that their use clarifies positive and negative intentions, their use was not found to clarify neutral intentions.

Poster 22: *Piloting the Cognitive Training Program LEARN for College Student Success*

Madison Glende & Dorothy Nakibirige

Karla Lassonde, Faculty Mentor

Most students who set foot on college campuses across the nation have no formal instruction on learning. Retention and graduation rates from institutional data reveal that, of all the Minnesota State, Mankato students who started in the fall of 2011, 36% transferred to other schools and only 48% of the students graduated in six years. Is it possible that poor learning strategies are partly to blame for these outcomes? A research team of faculty and students have observed this skill deficit first-hand, and they aim to fill this void with the instructional learning program aptly named LEARN. Developed from fundamentals of cognitive psychology, LEARN stands for five crucial knowledge components: L for LISTEN, E for ELABORATE, A for ASSOCIATE, R for RETRIEVAL, and N FOR NIGHT (Lassonde, 2018). Approximately four-hundred and fifty students enrolled in large sections of Introduction to Psychological Science experienced a pilot version of LEARN during two course periods of the semester. Only 10% of these students

reported having previous formal training in learning. Findings and the future development of the LEARN METHOD will be discussed.

Poster 23: *The Influence of Semantic Priming on Recall for Slang Language Used on Social Media*

Alexis Lofton, Nick Lucke, Dylan Askvig, & Ashley Baumann
Moses Langley, Faculty Mentor

Smith and Mackie's (2015) RICOR model describes mechanisms by which closely connected people may unconsciously adopt one another's behaviors into their own responses and behaviors. Although the RICOR model was intended to describe how this might occur through in-person, interpersonal interactions, it also makes predictions about how the phenomenon could develop through the interpersonal connections maintained through social media. Recently, Cole, Ghafurian, and Reitter (2017) used the ACT-R model to describe the proliferation of new word adoption within subreddit communities. Their study highlighted how interpersonal online interactions do, in fact, influence language behavior and supported the RICOR model's predictions regarding the potential for online environments to enable individuals to unconsciously incorporate the behaviors of others. The present study was an attempt to build upon this research and explore how exposure to the slang language prevalent on social media might affect participants' language behavior and memory for word lists. Using a semantic priming paradigm, participants encoded lists of semantically related (e.g., apple-pear) or unrelated (e.g., barn-glass) word pairs. Half of the target words within the pair were conventional (non-slang) American English words (e.g., beach-sunset) and half were unconventional (slang) American English words (e.g., unsettled-shook). During a subsequent memory test, participants were asked to recall the target words. Consistent with the predictions of the RICOR and ACT-R models, the present study found stronger semantic priming effects for slang words than non-slang words. The implications of these results for future research and language behavior between closely connected people on social media are discussed.

Poster 24: *Learning about Cognition and Memory Makes you More Intelligent!*

Brandy Seth & Esther Okaro
Karla Lassonde, Faculty Mentor

College students have experienced testing events their entire academic lives, yet very few have formal instruction in how learning and memory work. Two groups of participants, one group enrolled in the psychology course Introduction to Cognitive Psychology, and another group, who were psychology students but not enrolled in any specific course, had their intelligence assessed. The National Institute of Health Toolbox Cognitive Battery (NIHCB) was administered to students at the beginning of the semester and then again at the end of the same semester. Cognition was measured by a series of tests assessing thinking, attention, memory, judgment, and problem solving. Assessment results were organized by two types of intelligence domains: The first, crystallized intelligence, is named for being firmed up and resistant to change in adulthood. The second, fluid intelligence, has been shown to improve with practice in learning and remembering. Students enrolled in the Cognitive Psychology course showed significant improvements in both types of intelligence when scores were compared between time 1 and time 2. Benefits realized by college students trained in human cognition will be discussed.

Poster 25: *Now Hear This; Descriptions of Auditory Regions in Select Carnivores*

Katie Schmitz

Bradley Arsznov, Faculty Mentor

In mammals, primary auditory cortex processes auditory stimuli. Both gross morphological and cytoarchitectonic descriptions of primary auditory cortex (A1) have been previously described in the domestic dog. These areas include the auditory cortical areas of core, belt, and parabelt regions. It is lesser known how these regions are organized in species that exhibit similar environmental stimuli recognition. In this exploratory study, we examined the structure-function relationship of the primary auditory cortex in the domestic beagle (*Canis lupus familiaris*) and the spotted hyena (*Crocuta crocuta*). Previous research suggests that domestic dogs (*Canis lupus familiaris*) outperform monkeys (*Macaca mulatta*) in listening tasks related to primary auditory regions. The relationship between sensory stimuli and social stimuli has long been investigated. Spotted hyenas are a matriarchal species that live in clans of up to 90 individuals. Within these clans exists complex social hierarchies. These hierarchies vary significantly from the social structure of the domestic dog. Therefore, primary auditory cortex may be larger or show differing organization in an animal with a more complex social structure when compared with an animal with less social complexity and vocalizations. Here, we describe the areas including the auditory cortical areas of core, belt, and parabelt regions in these select carnivore species.

Poster 26: *Is Your Dog More "On The Ball" Than You Think?*

Mariah McGaha, Kathryn Strobel, & Katlyn Jaeger

Bradley Arsznov, Faculty Mentor

Human-animal interactions play a significant role in our everyday lives. There are numerous interspecific interactions between humans and non-human animals, yet none are more striking than the social relationship that exists with the domesticated dog. Dogs were among the earliest species to be domesticated, with evidence of purpose-bred breeding dating back approximately 14,000 years. Each of these breed purposes potentially pose a wide variety of cognitive demands on the dogs that may ultimately influence brain organization and evolution. Recently, the systematic assessment of cognitive abilities in domestic dogs has gained interest in the fields of psychology and cognitive science. This study aims to examine cognitive abilities in the domestic dog (*Canis lupus familiaris*) utilizing citizen science research methodology. Specifically, here we seek to (1) assess the public perception of the cognitive abilities in their dogs and (2) raise awareness through active participation in dog cognition research from the perspectives of psychology and cognitive science. Furthermore, this research will increase our understanding of (3) brain-behavior relationships in dogs and (4) provide insight into brain organization and evolution. This research will also help to (5) highlight possible varying sizes in brain structures between individual dog breeds. Currently we are collecting data through an online survey and establishing connections with participants for the citizen science portion of this study.

Poster 27: *Role Models as a Resilience Strategy for Transgender and Gender Non-Conforming Individuals.*

Nimotallahi Quadri

Jeffrey Brown, Faculty Mentor

Transgender and gender non-conforming individuals are at a high risk of suffering from social and health difficulties due to experience of discrimination. Research has shown that having role models has helped to develop resilience towards stigma experienced by this community, in order to increase positive outcomes. The goal of this research is to find how effective having role model as a method of resilience is, as well as its correlation to positive life outcomes. A vital step will be to ascertain the effect of gender matched role model versus non gender matched role model. An online questionnaire based will be conducted to assess positive outcomes of role models, both gender-matched and non-gender matched, as a resilience strategy. The hypothesis of this study is that having a gender role-matched will correlate to positive social and psychological outcomes.

Poster 28: *What Worked?: An exploratory investigation into the symbolic importance of family strengths*

Katie Koebele, Nicole Motz, Danielle Bjornheim, Kelsey Wall, & Kali Pecha

Dan Moen & Jae Min Lee, Faculty Mentors

'What Worked' is a retrospective cross-sectional, quantitative research study about the perception of family strengths according to young adults. Specifically, this study investigated family strengths as participants reflected on their own, unique childhood experiences in the following three categories: (1) Parental Love (What did your primary caregivers do to show love?); (2) Family Bonding (What did your family do to bond?); and (3) Parenting (How did your parents shape you into the person you are today?). This study surveyed college students and asked their reflection on family experiences and what worked for them. The analytic sample size was 47 respondents after excluding those with incomplete answers. This study conducted descriptive and word cloud analyses.

This study found that 'laughter', 'affection' and 'support' were the most frequently answered words in the Parental Love category. In the Family Bonding category, 'events', 'vacation' and 'dinner' were found. Those of the last category were 'affection', 'discipline' and 'support'. This study found it notable that the word 'support' was the leading fundamental in both the first and third category. Guided by symbolic interaction theory, this study hypothesizes that these young adults will be more likely to practice similar family strengths in their own families of creation. Findings from this study can provide clues into what current, young adults value in terms of family.

Poster 29: *Parents Perspectives on Preschool Children's Play*

Sadie Elsenpeter, Peyton Stutelberg, Alyssa Watkins, Monica Muth, & Hannah Johnson

Heather Von Bank, Faculty Mentor

Preschool-aged children want to explore the outdoors, play with their friends and take risks. However, parents' perspectives about play may impact children's access to different types of

play. This study focuses on the ways that parents' perspectives and behaviors influence their children's access to playful activities. Parents of 3-5-year-old children participated in an online survey which inquired about their perspectives on different types of play (i.e. dramatic, exploratory, risky), if they encouraged or discouraged their child to engage in these forms of play, and why. Other factors analyzed in this study include the gender of the child and parent, the parent's marital status (i.e single or partnered), and the number of children who live in the household. This study seeks to discover parents' perspectives on play, how their view shapes their behaviors to allow children to play in a variety of ways. Results will shed light on how parents of young children view play and their willingness to allow their children to explore, discover and take risks.

Poster 30: *Emotional Challenges/symptoms and Learning Experiences of College Students with a Traumatic Brain Injury*

**Lindsay Kothe, Stephanie Grams, & Jessica Neaton
Hsinhuei Sheen Chiou, Faculty Mentor**

The purpose of this research is to bring attention to the emotional challenges and learning experiences that college students' face with a traumatic brain injury (TBI) in an educational setting. Our research questions include: Do college students with TBI experience emotional challenges? What are their biggest challenges their faced with? Based on our literature review, college students have acquired a TBI experience varies emotional symptoms at different levels of severity that can impact their academic abilities significantly.

Eleven college students with an acquired traumatic brain injury were recruited. A survey was administered to gather perspectives from college students with a TBI. The survey consisted of multiple choice, and yes/no question formats were used to collect results. A 5-point rating scale was used to determine the severity of symptoms each student experienced. The survey gathered information about emotional challenges and the academic experience of each participant. The questions were formed to gather information about their college experiences prior to and after their TBI. All survey responses were collected on the secured Qualtrics website and used for data analysis. Data as analyzed by the research team using descriptive, quantitative and qualitative statistics.

Results showed that after acquiring a TBI, college students most commonly reported; feelings of frustration, depression, anxiety, mood swings, and reduced motivation. These emotional symptoms were likely to associate with a reduced quality of academic performance.

Poster 31: *Psychosocial Status and Learning Experiences in College Students with Traumatic Brain Injury*

**Bridget Hoban, Koryn Greskowia, & Emma Gale
Hsinhuei Sheen Chiou, Faculty Mentor**

A Traumatic Brain Injury (TBI) is an injury that disrupts normal brain function. Some symptoms of TBI include headaches, nausea, fatigue, depression, and anxiety. These symptoms may impact ones psychosocial status which relates to the social factors of individual thoughts and behaviors and learning abilities of the individual. The effects of this injury are often not visible to others.

The primary goal of this research is to identify how college students with a TBI view their own psychosocial status and the impact it has on their learning experiences.

Eleven college students with a traumatic brain injury diagnosis were recruited and completed a survey to gather their perspectives. We analyzed the demographics and two questions relating to psychosocial status and learning using a 5-point rating scale. All survey responses were on the secured Qualtrics website and used for data analysis. Data was analyzed by the research team using descriptive, quantitative and qualitative statistics.

Results showed that after brain injury, students felt misunderstood, lonely, less respected and less accepted. These feelings correlated with a reduced quality of relationships with friends. In regards to academics, students reported that after injury they had the most difficulty with socializing with other students, achieving success, participating in extracurricular activities, and disclosing or identifying with their brain injury.

Poster 32: The Study of Exercise Duration on Rate and Accuracy of Reading in Children with Disabilities

Courtney DeBettignies & Caitlin Barr

Megan Mahowald & Brooke Burk, Faculty Mentors

Rec N' Read is a program where college students help children with learning disabilities work on literacy skills while also incorporating a recreation component in order to motivate children. The purpose of this study was to explore if exercise duration had any effect on rate and accuracy of reading in children. Participants included nine elementary-aged children who have significant difficulty with reading and writing. Amount of time in recreation was alternated per session; the first week was forty minutes and the next week was only ten minutes. Immediately after the recreation component was completed, a reading assessment, DIBELs, was used to calculate rate and accuracy of reading. After the first DIBELs reading was conducted, regular literacy work was implemented for the next thirty minutes and then DIBELs was completed for a second time. Data was analyzed using paired sample t-tests to determine differences between the two conditions. In conclusion, from this research project we have learned that some type of recreation and exercise has an influence on work effort and ability. These findings can not only help improve on Rec N' Read strategies but can also be applied to schools and how children actually learn and perform their best.

Poster 33: Cognitive and Learning Challenges of a College Student After Having a Traumatic Brain Injury

Amber Kral, Bri Ciaccio, & Brittaney Kroll

Hsinhuei Sheen Chiou, Faculty Mentor

The purpose of this research is to examine the cognitive and learning challenges a college student faces in the educational setting after they have suffered from a traumatic brain injury (TBI). Our research questions include: How do college students report their cognitive challenges, and what are the most commonly reported cognitive symptoms/difficulties? What study skills are being affected due to these cognitive difficulties in college students with a TBI?

Eleven college students with a traumatic brain injury diagnosis were recruited. A survey was used to gather perspectives from college students with a TBI. A 5-point rating scale, multiple choice, and yes/no answer formats were used to construct the survey. The survey gathered information about cognitive and learning challenges of current college students who have sustained at least one traumatic brain injury. The questions were formed to gather information about their college experiences prior to and after their TBI. All survey responses were collected on the secured Qualtrics website and used for data analysis.

Data will be analyzed by the research team using descriptive, quantitative and qualitative statistics. Data analysis is still in progress.

Poster 34: *Exploring parent perceptions of services for children with literacy disorders*
Sarah Moenkedick & Shelby Voight
Megan Mahowald, Faculty Mentor

This qualitative research study focused on parent perceptions of the services their children with literacy disorders receive. Data was gathered through semi-structured interviews that lasted approximately 30 minutes. Participants include parents of children who participate in Rec N' Read. Children who attend Rec N' Read are elementary-aged and have a wide disability range. Each child has been assessed and significant literacy deficits exist. Rec N' Read is a program that targets literacy skills, following a 30-minute intervention of physical movement. Interview questions consisted of the following categories: parent involvement, perspectives on improvement, outside assistance and perception, motivation, and improvements/suggestions. After obtaining interview data, recordings were transcribed, and parents' responses were examined for themes. The information obtained will allow us to provide a more detailed understanding of any underlying factors that impact children with disabilities and contribute to facilitating more competent services.

Poster 35: *Exploring the Decision Making Process of Students Being Dismissed From Speech-Language Pathology Services In Educational Settings*
Kaylee Merritt & Abbie Meyer
Megan Mahowald, Faculty Mentor

The inevitable part of speech therapy is the dismissal of the student from special education caseload. Speech-language pathologists are faced with the challenge of deciding when a student should be dismissed from their service and all the factors that are involved in that decision-making process. This study specifically explores the potential reasoning around why seven students were dismissed from speech-language pathology services in an educational setting. We explored the decision-making process of the speech-language pathologist that leads them to come to the decision to dismiss a student from their service. Data was collected from a larger study including speech-language pathologists in a large, urban school district in a Midwestern state. Participants were children with diagnosed language disorders. The data sources include a qualitative rubric used to analyze a language sample (collection of a child's tellings across five different tasks), reviewing the educational file and a survey regarding the speech-language pathologists perceptions. The implication of this study is that there are multiple factors that can influence a speech-language pathologist's decision to dismiss a student from services.

Poster 36: *Impact of Chorus Experiences on Individuals living with Alzheimer's Disease and other Dementias and their care partners*

Samantha Davis & Kalley Hoffmann

Hsinhuei Sheen Chiou & Kristen Abott-Anderson, Faculty Mentors

The purpose of this research is to examine how music influences behavior, memory, and social interactions of individuals living with Alzheimer's disease and other associated dementias and their care partners. Previous research has been conducted that suggests music is beneficial in decreasing agitated behaviors, stimulating memory, increasing socialness, and maintaining a positive quality of life for people living with the disease. Research participants include the individuals living with Alzheimer's disease or associated dementias (AD/OAD) and their care partners, who participate in a chorus program in the Midwest. The chorus program includes participating in rehearsal, concert performances, and social interaction between other members involved in the chorus. Individuals living with AD/OAD and their care partners were surveyed using a rating scale to answer questions inquiring about their experiences in the chorus such as enjoyment of music, perceived ability to participate in the chorus, and social interactions in the chorus. Analysis of quantitative data will be conducted using descriptive and correlational statistics as well as descriptive analysis of qualitative data. Data collection is still ongoing. We expect to see similar results to previously conducted research such as positive behaviors, stimulation of memories, and increased socialness and quality of life.

Poster 37: *Music Experiences: Before vs. After Alzheimer's from the Care Partner's Perspective*

Kianna Martinson, Tinotenda Mupambo, & Angeline Jorgenson

Hsinhuei Sheen Chiou & Kristen Abott-Anderson, Faculty Mentors

Caregivers are typically provided care through family members, friends, or spouses known as, care partners. Literature has shown that music can potentially alter the moods and behaviors of people with Alzheimer's dementia and other dementias (AD/OAD). The purpose of this study was to examine how music has affected people with AD/OAD through their care partners perspective. The care partners recruited for this survey study participated with someone with AD/OAD in a choir program in southern Minnesota. The survey questions ask the care partners their opinions on how much their partner with AD/OAD could participate and how much they would enjoy participating in the choir program. Data analysis is on-going. We expect the music and social interactions to lift moods of those with AD/OAD in the choir program from the care partner's perspectives.

Poster 38: *The Impact and Perception of Choral Engagement Before and After Individuals Have Acquired Alzheimer's Disease: A self-reported, qualitative study*

Alle Bowman, Ashton Lee, & Jordan Anderson

Hsinhuei Sheen Chiou & Kristen Abott-Anderson, Faculty Mentors

Purpose: Music therapy provides multiple benefits to emotional well-being, agitated behaviors, and even cardiovascular health, and is provided to a wide scope of individuals, including Alzheimer's patients. Persons with Alzheimer's that have used music therapy methods have expressed psychosocial, emotional, physical, and cognitive benefits from treatment sessions.

This research project gathers self-reported data from individuals with Alzheimer's dementia or other associated dementias (AD/OAD) on their experiences with a weekly chorus practice to explore the effectiveness of choral experience as a therapy approach. Our research questions are: 1.) How is chorus experience beneficial for individuals with PWA? 2.) Are there any reported differences before and after having Alzheimer's?

Methods: Research participants include individuals with AD/OAD in a choral program from a rural community in the Midwest. Participants attended the chorus for rehearsal, social interaction, and concert performance. Survey questions include items about ability to participate in choral activities, social aspects of the chorus, participation in activities outside of choral activities, and perception of socialization since becoming a member in the chorus. Data will be analyzed by the research team using descriptive and correlational statistics as well as descriptive content analysis of qualitative data.

Results: The data collection is on-going. Findings will provide information about the ability of individuals living with AD/OAD to participate in a social and music-related program as well as any benefits of participation in choral activities for both the individual living with AD/OAD and their care partner.

Poster 39: *Formation of DNA Adducts with 2,5-Thiophenedicarboxaldehyde and Arginine*
Shelby Bonnemier
Danae Quirk Dorr, Faculty Mentor

Certain aldehydes, when in the presence of the amino acid arginine, can react with DNA and form DNA adducts. 2,5-Thiophenedicarboxaldehyde is a compound consisting of a five membered aromatic ring containing sulfur. Aldehydes with structures similar to 2,5-thiophenedicarboxaldehyde have been found to form DNA adducts and therefore have the ability to kill cancer cells. In this project, the necessary compounds 2,5-thiophenedicarboxaldehyde, arginine, calf-thymus DNA (ct-DNA), and deoxyguanosine were combined in equimolar amounts in buffer. After reacting, the enzymes DNase I, alkaline phosphatase, and phosphodiesterase I were used in order to prepare the samples for analysis. Following filtration, high-performance liquid chromatography (HPLC) was utilized as a way to qualitatively analyze the reaction products.

Poster 40: *Case Study Comparison on Literacy Growth Over Time*
Alyssa Novak & Ellyssa Hoversten
Brooke Burk & Megan Mahowald, Faculty Mentors

Rec 'N Read is a literacy and recreation intervention program offered at Minnesota State University, Mankato. The purpose of this study is to analyze literacy growth of two children through pre and post assessments over the entire time that they attended the Rec 'N Read program. Two elementary aged children were selected for a case study analysis. One child is an 8-year-old girl who has difficulties with reading and spelling. The second child is a 6-year-old girl who also has difficulties with reading and spelling. Both students have attended Rec 'N Read since summer of 2018, but one attends sessions once a week and the other attends twice a week. We will use case study methodology to analyze individual growth and will compare the two

children's reading and spelling scores from pre and post assessments. The Qualitative Reading Inventory (QRI) and Words Their Way Spelling Inventory were administered and scored to obtain data over time. We hypothesize the scores on the pre and post assessments will increase and more improvement will be seen with the child who comes twice a week due to more literacy intervention.

Poster 41: *Exploring How Recreation Impacts Behavior and Outcomes of Literacy Intervention*

Kira Haglin

Megan Mahowald, Faculty Mentor

The purpose of this research project is to explore how a recreation activity conducted before a literacy intervention session impacts behavior throughout literacy intervention and literacy outcomes. Two participants were enrolled in Rec N' Read Literacy Sessions which included 30 minutes of small group recreation activities and 60 minutes of individual literacy intervention. One participant received individual literacy intervention in a typical clinical session. Both literacy intervention programs were based around the following key steps: word work, read with, write with, and talk with. The data collected included: behavioral charting, probe data, and comparing pre-intervention and post-intervention literacy assessments.

Poster 42: *College students' length of time and canine/handler interactions at drop-in canine therapy program*

Madeline Leibham

Michelle McAlarnen, Faculty Mentor

Drop-in canine-therapy programs on college campuses have grown rapidly in the United States (Crossman & Kazdin, 2015). These drop-in programs are meant to help students decrease stress, anxiety, and homesickness while increasing well-being and mood (Grajfoner, Harte, Potter, & Mcguigan, 2017; House, Neal, & Brackels, 2018). Though there is initial research on the effects of animal therapy on individuals (Binfet, Passmore, Cebry, Stuik, & McKay, 2017), the recency of this research area means there is a limited understanding of student motivation, experience, and preferred visit length. This research study aims to learn who attends, why they attend, and what students hope to gain from the experience, as well as the length of time and number of interactions students have with canines and handlers during a drop-in session. In order to address these aims, we will conduct survey and observational research during Hound Hugs & Kanine Kisses Program sessions. This poster will present initial data from only the observational research portion of this study. Observational data on students' length of time at the event and number of interactions with therapy dogs and handlers will be collected. This information can help researchers understand the length of time and number of interactions participants naturally seek out during their visit (i.e., "dose-response relationship"). With the findings from this research, we hope to give supporting statistics as to how college students engage with the canines and handlers to help inform future programming on college campuses.

Poster 43: *The Relationship between Interpersonal relationships and overall well-being*

Liya Yemiru

Joseph Visker, Faculty Mentor

The purpose of this study was to assess whether the relationship between interpersonal relationships and overall well-being in college students. Having good interpersonal relationships is recognized as an essential key factor to better one's mental health. Existing literature suggests that having good interpersonal relationships has a beneficial outcome on overall health. A total of 94 university students participated in this study by taking a self-report questionnaire which was comprised of both Likert-type and modified Likert-type items. Demographic variables (age, race, sex, marital status, and year in school) were also assessed. The data was analyzed using SPSS. The results of a Pearson Correlation revealed a moderate, positive, statistically significant relationship ($r(92)=0.410$, p

Poster 44: *EMERGENCY PREPAREDNESS AMONG COLLEGE STUDENTS*

Annabel Sampson & Kayla Erickson

Joseph Visker, Faculty Mentor

Emergency preparedness for university students presents a unique challenge, given their limited budgets and potential dependence on parents/caregivers who may live long distances away. However there is lack of data pertaining to the level of preparedness among university students and an understanding factors beyond finances that may impact their willingness and ability to prepare for emergencies. The objective of the study is to assess emergency preparedness among university , perceptions of their ability to handle emergencies, awareness of university policies/procedures and more. We will be distributing paper surveys with about 25 questions to various students in different classes and organizations. With the responses, health educators and other interested persons such as school authorities and others will evaluate if there's a need for more education and awareness on what needs to be done during emergencies.

Poster 45: *Study the Causes of Sleep Deprivation among MNSU Students*

Prerana Khatri KC & Barsha Lamichhane

Joseph Visker, Faculty Mentor

Sleep deprivation is the condition when a person does not get enough sleep. According to the study conducted by the American College Health Association at Minnesota State University, Mankato, 25.5% of students reported sleep difficulties (2018), but they have not examined factors associated with sleep quality. Therefore, the purpose of the research is to study sleep quality among university students as well as factors that may contribute to poor sleep quality. The self-report instrument assesses amount and quality of sleep along with potential disturbances to sleep, such as pain, snoring, and more. A sample of university students will be assessed and the results of the study may assist health educators as they develop programs to increase sleep quality.

Poster 46: *Organic label's effect on sensory and hedonic evaluation of popcorn*
Michael Anderson, Hannah Thompson, Abeer Albakri & Kris Olson
Joye Bond, Faculty Mentor

The halo effect describes a phenomenon where a label positively influences consumers' perceptions of the product. Previous research has shown organic labels influence consumer perception of product flavor, healthfulness and increases consumer willingness to buy. A study evaluating yogurt, chips, and cookies failed to find significant difference between identical products labeled “organic” and “regular”. Another study found that an organic label on wine significantly increased evaluation by consumers. Currently, there is no research regarding the halo effect on organic popcorn. The purpose of this research was to determine if there is an organic halo effect on pre-popped popcorn, specifically consumer flavor perception. In this study, 50 participants at a retail grocery store were asked to taste two identical popcorn samples. Both samples were conventionally produced by the same company. One sample was labeled “organic” and one sample was labeled “non-organic.” The participants tasted each sample and ranked their liking of the flavor on a 9-point hedonic scale where 1= “dislike extremely” and 9 = “like extremely.” Consumers were asked to provide their gender, age group and answered a question about the frequency of their organically-labeled food purchasing habits. The results of the study showed that participants liked the flavor of the “organic” popcorn significantly more ($p=.018$) than popcorn labeled non-organic, providing evidence there is a halo effect of an organic label on pre-popped popcorn. Further research could include evaluating if consumer education about the halo effect prior to sensory evaluation mediates the halo effect of an organic label.

Poster 47: *Longitudinal case study of literacy outcomes for two elementary aged children*
Emily Ganley
Megan Mahowald & Brooke Burk, Faculty Mentors

This project explores two elementary aged children with significant literacy difficulties that participated in the Camp Maverick: Rec N' Read program for two consecutive years including summers and after school sessions. The purpose of this project was to explore the similarities and differences in the two participants as well as the progress they made over the two years. Data sources included literacy assessment, pre and post sessions, behavioral data during sessions and parent interviews. Case study methodology will be used to explore data sources and compare differences due to disability profile. The progress results will be determined by looking at the pre and post assessment data over the course of the two years as well as the parents input on changes since initial enrollment. Findings will aid in creating literacy intervention plans for a variety of disabilities.

Poster 49: *Sexual Health Knowledge and Education Assessment among University Students*
Arliah Cox
Joseph Visker, Faculty Mentor

Sexuality education exists to help individuals learn about the physical, emotional, cognitive and social aspects of sexuality (United Nations Educational, Scientific and Cultural Organization, 2018). The goal behind this form of education is to empower and equip young people with

knowledge and skills necessary to enhance their health and well-being. This education helps young people develop healthy relationships, make informed decisions, understand influences on attitudes and behaviors, and much more. There has been issues among the US population regarding young people who have not received comprehensive sexuality education as well as those who have never received sexuality education at all. Further, there is a concern of where sexuality information is obtained in absence of school-based or parental education. The purpose of this study it to evaluate the quality of sexuality education student's received and the source from which it came. A cross-sectional design using a self-report instrument will be used. Data collection will occur in March and results will be pending. Upon completion of this study, educators as well as health professionals will be able to identify the areas of sexuality education that are lacking, and may allow for a restructuring of curriculums and supplemental materials.

Poster 50: *Hand Grip Strength Among Rock Climbers, Active, and Sedentary Populations*
Russell Lindahl & Matthew Heiling
Jessica Albers, Faculty Mentor

Hand grip strength has been found to be a prediction of overall muscular strength and endurance. Studies show varied results about the relationship between the hand grip strength of active rock climbers and the grip strength of people who do not participate in rock climbing. One study found that rock climbers had better grip strength that the non-climbers. Purpose: The purpose of this research was to analyze the differences and/or similarities in hand grip strength between people of differing lifestyles with differing levels of activity. Methods: Participants for this study were primarily college-aged students. The participants completed a consent form, a demographics survey, a hand-grip self-efficacy questionnaire, as well as a physical ability survey. Once that was completed, participants' hand grip strength was measured using a hand grip dynamometer. Three trials were taken for both the dominant hand and the non-dominant hand. Participants were offered a small package of fruit snacks or a granola bar as compensation for their participation. Results: Data is currently being collected through the start of March, 2019. Conclusions: Data will be analyzed, and results and conclusions will be presented at the conference.

Poster 51: *High school sport injury influence on current physical activity and physical activity motivation*

Tyler Hobson, Bailey Hofmeister, Jessica Weideman, & Krista Gadiant
Jessica Albers, Faculty Mentor

During the transition from high-school to college, it is difficult to maintain physical activity as motives and priorities shift. This is of particular interest with former high-school athletes as their physical activity was regimented and assigned. Additionally, if you were injured in high school, that injury might prevent you from being physically active and it might scare you from be physically active as you fear the injury reoccurring. Purpose: The purpose of this study is to understand how high school sport-related injuries influence current physical activity levels and sources of motivation to be physically active in college. Methods: Current college student who participated in high-school sport were asked to participate in the online survey. Participant were asked to report their high school sport participation and high school sport injury occurrences. The Godin Leisure-Time exercise questionnaire, Physical Activity as a Vital Sign questionnaire,

and Motives for Physical Activity Measure-Revised were used to assess physical activity levels and motives. Results: Data is currently being collected through the start of March. Conclusions: Data will be analyzed, and results and conclusions will be presented at the conference.

Poster 52: *Eco Friendly Clay - Lessons from Ayurveda*

Shveta Agarwal

Mika Laidlaw & Todd Shanafelt, Faculty Mentors

Ayurveda is an ancient system of medicine which originated in India and teaches about different aspects such as life, human beings, diseases and food. This knowledge has continued in day to day lives of people of Indian subcontinent and they have practiced it unconsciously for 5000 years. There are many interesting things which are now adapted by the Western Civilization from this knowledge, the most notably being Turmeric. In this project I used the knowledge from Ayurveda to create a clay which is eco friendly and utilizes ingredients such as Fuller's earth, sandalwood powder, rose water and plant based glue. These ingredients are not only natural and found abundantly on earth but also have many medicinal properties. Fuller's earth is used for facial and body cleansing/acne, sandalwood powder is used for flu symptom relief and rose water is great for eyes. The clay was used both in hand building and wheel building to create a swing and drinking vessels/vase. The products made from this clay are lighter than traditional clays such as earthenware/white stoneware. They are also less porous and require low firing temperatures which reduces their carbon footprint.