

Celebration of Student Scholarship

April 24, 2019

Program Overview	Adron Doran University Center
7:45 – 8:30 am	All student scholars and faculty mentors are to register and pick up programs and name badges (3rd floor Adron Doran University Center), Posters should be set-up at this time and PowerPoints loaded.
8:30 – 10:15 am	Oral Presentations (3 rd Floor Adron Doran University Center, Rooms 319, 320, 321, 322, 325, 326 and 329)
10:15 – 10:30 am	Break
10:30 – 11:45 am	Oral Presentations
11:45 – 12:00 pm	Break
12:00 – 1:15 pm	Oral Presentations
1:15 – 3:00 pm	Poster Presentations (Banquet Room, 3 rd Floor, Adron Doran University Center (posters left up until 5:00 pm)
3:00 – 4:00 pm	Reception (Banquet Room, 3 rd Floor, Adron Doran University Center
4:00 – 4:15 pm	Gallaher Memorial Music Performance
4:15 – 5:00 pm	Awards
5:00 pm	Removal of Posters

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Jay Morgan, President
Robert Albert, Interim Provost and Vice President for Academic Affairs
Michael Henson, Associate Vice President for Research and Dean of the Graduate School
Greg Russell, Dean, Elmer R. Smith College of Business and Technology
John Ernest, Dean, Caudill College of Arts, Humanities and Social Sciences
Chris Miller, Dean, College of Education
Wayne C. Miller, Dean, College of Science

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Office of the President

Division of Academic Affairs/Office of the Provost

Document Services/Camden-Carroll Library

<i>Jeff Bryant</i>	<i>Taunya Jones</i>	<i>Doug Snedegar</i>
<i>Sean Johnson</i>	<i>Joe Schubert</i>	<i>Rodney Watkins</i>
<i>Tammy DeHart</i>		

Research and Sponsored Programs and the Graduate School

<i>Darlene Allen</i>	<i>Michelle Emrick</i>	<i>Krys Lynam</i>
<i>Janet Cline</i>	<i>Ollie Floyd</i>	<i>Susan Maxey</i>
<i>Brenda DeHart</i>	<i>Gera Jones</i>	

Celebration of Student Scholarship Committee

<i>Steve Chen</i>	<i>Michael Henson</i>	<i>Allen Risk</i>
<i>Janet Cline</i>	<i>Philip Krummrich</i>	<i>Edna Schack</i>
<i>Laurie Couch</i>	<i>Chris Miller</i>	<i>Fujian Tan</i>
<i>Gina Gonzalez</i>	<i>Rachel Rogers-</i>	
<i>Timothy Hare</i>	<i>Blackwell</i>	

Concurrent Session Moderators

<i>Darlene Allen</i>	<i>Wayne Miller</i>
<i>John Ernst</i>	<i>Dianna Murphy</i>
<i>William Green</i>	<i>Thomas Pannuti</i>
<i>Krys Lynam</i>	<i>Jeanne Petsch</i>
<i>Susan Maxey</i>	<i>Greg Russell</i>
<i>Chris Miller</i>	<i>Ahmad Zargari</i>

Judges

<i>Ali Ahmadi</i>	<i>Lynn Eisenhower</i>	<i>Eric Jerde</i>	<i>Helen Otterson</i>
<i>Darlene Allen</i>	<i>Heba Elgazzar</i>	<i>Diane Johnson</i>	<i>Michele Paise</i>
<i>Max Ammons</i>	<i>John Ernst</i>	<i>Gera Jones</i>	<i>Tom Pannuti</i>
<i>Courtney Andrews</i>	<i>Julia Finch</i>	<i>David Keeton</i>	<i>Jeanne Petsch</i>
<i>Elizabeth Ash</i>	<i>Ollie Floyd</i>	<i>Michael Kessinger</i>	<i>Jonathan Pidruzny</i>
<i>Lindsey Barrett</i>	<i>Kathy Froilan</i>	<i>Shari Kidwell</i>	<i>Kent Price</i>
<i>Bernadette Barton</i>	<i>Morgan Getchell</i>	<i>Marie Kroll</i>	<i>Daryl Privott</i>
<i>Lauren Bates</i>	<i>Lynn Geurin</i>	<i>Philip Krummrich</i>	<i>Manuel Probst</i>
<i>Christopher Beckham</i>	<i>Sahar Ghanem</i>	<i>Michelle Kunz</i>	<i>Clarissa Purnell</i>
<i>Rachel Blackwell</i>	<i>Ashley Gibson</i>	<i>Lesia Lennex</i>	<i>Joshua Qualls</i>
<i>Mark Blankenbuehler</i>	<i>Wretha Goodpaster</i>	<i>David Long</i>	<i>Sherif Rashad</i>
<i>Megan Boone</i>	<i>William Green</i>	<i>Krys Lynam</i>	<i>Brittany Roach</i>
<i>Robert Boram</i>	<i>David Gregory</i>	<i>Adrian Mandzy</i>	<i>Angela Rowe</i>
<i>Eric Brown</i>	<i>Connie Grimes</i>	<i>Russ Mast</i>	<i>Greg Russell</i>
<i>Katy Carlson</i>	<i>David Gross</i>	<i>James Masterson</i>	<i>Markham Schack</i>
<i>Jennifer Carter</i>	<i>Dirk Grupe</i>	<i>Susan Maxey</i>	<i>Chris Schroeder</i>
<i>Doug Chatham</i>	<i>Constance Hardesty</i>	<i>Russ May</i>	<i>Alana Scott</i>
<i>Steve Chen</i>	<i>Timothy Hare</i>	<i>Jacob Meece</i>	<i>Kimberlee Sharp</i>
<i>Carol Christian</i>	<i>Shannon Harr</i>	<i>Melissa Mefford</i>	<i>Mee-Ryoung Shon</i>
<i>Ann Colbert</i>	<i>Flint Harrelson</i>	<i>April Miller</i>	<i>Delar Singh</i>
<i>Christina Conroy</i>	<i>Karen Hatfield</i>	<i>Chris Miller</i>	<i>Sunshine Stamper</i>
<i>Louise Cooper</i>	<i>Jeffrey Hill</i>	<i>Wayne Miller</i>	<i>Samuel Stapleton</i>
<i>Marcia Cooper</i>	<i>Annette Hines</i>	<i>Dianna Murphy</i>	<i>Bodie Stevens</i>
<i>Greg Corso</i>	<i>Toni Hobbs</i>	<i>Lee Nabb</i>	<i>Sherry Stultz</i>
<i>Laurie Couch</i>	<i>Shana Savard Hogge</i>	<i>Carol Neeper</i>	<i>Fujian Tan</i>
<i>John Curry</i>	<i>Jami Hornbuckle</i>	<i>Johnathan Nelson</i>	<i>Elena Volovich</i>
<i>Donald Damron</i>	<i>Lloyd Jaisingh</i>	<i>Kim Nettleton</i>	<i>Bridgette Whitt</i>
<i>David Eisenhower</i>	<i>Kouroush Jenab</i>	<i>Jen O'Keefe</i>	<i>Ahmad Zargardi</i>

2019 Posters-at-the-Capitol Participants

Posters-at-the-Capitol, an annual event collaboratively hosted in Frankfort by all of Kentucky's public institutions of higher learning, enables members of the legislature and the Governor to better understand the importance of involving undergraduates in research, scholarship, and creative endeavor. The following Morehead State University students are recognized as official 2019 participants.

Nathaniel Baker - *Mentor Adrian Mandzy*
Hannah Brewer – *Mentors Wilson Gonzalez-Espada and Robert Boram*
Susie Chaney - *Mentor Suzi White*
Tessa Collins- *Mentor Tom Kiffmeyer*
Jorden Crowe - *Mentor Gregory Corso*
Anna Gdovka - *Mentor Steve Chen*
Sydney Gordon - *Mentor Michael Fultz*
Caitlin Renee Haggard - *Mentor Bernadette Barton*
Christian Hensley - *Mentor Steve Chen*
Shelby Hester - *Mentor Tom Kiffmeyer*
Andrea Howard - *Mentor Suzi White*
Miranda Johnson – *Mentor Michele Paynter Paise*
Vanessa Leigh Jones - *Mentor Gregory Corso*
Emily Danielle Lush - *Mentor Gregory Corso*
Abigail Elizabeth Mohr – *Mentor Gregory Corso*
Lori Porter - *Mentor Thomas Pannuti*
Kelsey Purdum – *Mentor Kimberlee Sharp*
Luke Sizemore - *Mentor Kouroush Jenab*
Allie Skaggs - *Mentor Cheng Cheng*
Blake Smith - *Mentor Suzi White*
Annuet Soehnlen - *Mentor Jen O'Keefe*
Joshua Webb - *Mentor Sherif Rashad*
Chanel Wilder - *Mentor Suzi White*
Ann Wilkinson - *Mentor Jen O'Keefe*
Sydney Paige Young - *Mentor Gregory Corso*

For more information on the 2019 Posters-at-the-Capitol please go to:
<http://kynsfepscor.org/event/posters-at-the-capitol-2019/>



Our vision is for Morehead State University to be universally recognized for teaching and scholarship of the highest quality resulting in superior student success. To ensure the optimal environment for learning, Morehead State University has a long tradition of combining great teaching with success in scholarship and creative productions. Our academic programs provide a wealth of opportunities for students to work alongside experienced faculty in meaningful research and creative initiatives that stretch our students' intellectual horizons.

The faculty member who mentors students in research and other creative activities provides the stimulus that challenges imaginative minds often in new and innovative ways that would be impossible within the confines of the conventional classroom. Our deep commitment to a culture of undergraduate research results in a rich educational experience for our students and empowers our diverse population of scholars to reach their educational goals.

The Annual Celebration provides a welcome opportunity for everyone to see the products of these unique intellectual partnerships -- products that are remarkable in their originality, scope, and depth. As you review the Celebration of Student Scholarship program, you will discover a wide range of student accomplishments in individual and group research projects, creative efforts, and artistic performances across all academic disciplines.

When considering the accomplishments on display at this year's Celebration, I am confident that through the continued efforts of all those involved, our University will establish itself as a primary destination for students who wish to become both active partners in the process of discovery and exceptional citizens of our increasingly challenging world.

Now in its fourteenth year, our Annual Celebration of Student Scholarship is a time when we can all pause to reflect on the outstanding efforts of this community of scholars and to recognize the tremendous efforts of our students in research, scholarship and creative productions.

I encourage you to attend this showcase and provide your support and encouragement to our young scholars and artists, as well as to the members of our faculty and staff who have shared of their time and talent to help their students bring these projects to reality. Thank you for your participation!

Jay Morgan, President

I am pleased to be a part of the Celebration of Student Scholarship as we recognize the outstanding scholarly accomplishments of our students and their faculty mentors. Across the academy, the primary setting for teaching and learning centers around the curriculum and student engagement as related to structured classroom activities; however, it is the participation in research and creative production activities that provides an opportunity for students to transition from learner to scholar. Student engagement through inquiry that involves seeking answers to research questions or creative expression based on theories and principles provides the learner a different approach and perspective to learning.



"Out of class" experience provided by their faculty mentors have opened doors to new learning opportunities for students as they discover the depth of their own abilities through the application and investigation of knowledge. Partnering with their faculty mentor(s), students are challenged to seek answers to questions through inquiry or apply their creative skills and talents that stretch their base knowledge and compliment their learning opportunities.

This Annual Celebration is an excellent illustration of the integration of scholarship, teaching, and learning. A special "Thank You!" to faculty mentors for their contributions to the intellectual and creative development of our students. "Congratulations" to all of our student scholars for their continued success.

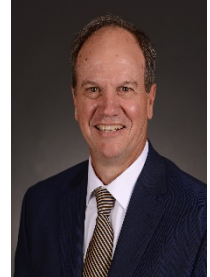
Dr. Robert Albert, Interim Provost and Vice President for Academic Affairs



The Fourteenth Annual Celebration of Student Scholarship spotlights Morehead State University as a premiere destination for all who desire a world-class education that is catalyzed by the personal mentorship of a world-class faculty. It is well accepted in academic circles that involvement in research and creative endeavor empowers students at both undergraduate and graduate levels to better analyze problems and synthesize solutions, thus helping them to better prepare for productive careers and leadership in their chosen fields, as well as to be well-informed, enthusiastic contributors to a progressive 21st century society. My congratulations and my thanks to our students and faculty for recognizing these facts and for their much-valued participation.

Dr. Michael Henson, Associate Vice President for Research and Dean of the Graduate School

The Celebration of Student Scholarship is the capstone event that recognizes the important contributions of collaborative research between faculty and student to the overall educational experience for Morehead State University students. Our students and faculty benefit tremendously from these one-on-one scholarship opportunities.



Dr. Gregory Russell, Dean, Elmer R. Smith College of Business and Technology



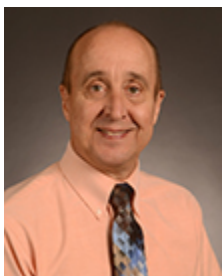
The annual Celebration of Student Scholarship has provided a consistent high quality experience for students to share their research related to P-12 education and helps to prepare students for better understanding of data-driven decision making. The research P-12 education students are conducting helps to better respond to local, state, and national trends related to research-based and theory-grounded practice. The scholarship these candidates are presenting demonstrate the lessons learned in the classroom and beyond as part of the skills of professional educations. The College of Education faculty and staff congratulate the students participating in the celebration as their projects showcase the high quality of inquiry vital to teaching and learning within teacher education.

Dr. Christopher Miller, Dean, College of Education

The Caudill College of Arts, Humanities and Social Sciences is committed to providing research and creative production opportunities for students in each of our disciplines. Scholarly engagement and creative endeavors bring students and faculty together as partners and provide advanced learning experiences for both. We are delighted to recognize these outstanding scholars and their mentors who make significant contributions to the campus, state and region. Morehead State University's commitment to academic excellence and the advancement of Kentucky is evidenced by the exceptional work showcased at the Celebration of Student Scholarship.



Dr. John Ernst, Dean, Caudill College of Arts, Humanities, and Social Sciences



The Celebration of Student Scholarship provides a wonderful opportunity to recognize and celebrate student scholarship and creative accomplishments. The relationship among faculty mentors and student scholars is enhanced when they work together to discover and disseminate new knowledge or express themselves through various forms of creativity. Student research and creative activity is an essential component of undergraduate education. Students working with faculty in scholarly activities not only experience the excitement of discovering new knowledge and solving challenging problems, but also learn important life skills that are necessary to thrive today's ever-changing world.

Dr. Wayne C. Miller, Dean, College of Science

Celebration of Student Scholarship

Concurrent Session ADUC 326

Moderators: Dr. John Ernst and Dr. Dianna Murphy

8:30 – 8:45 a.m. **Where's My Duct Tape?: An Investigation Of Kentucky Band And Orchestra Directors Self Efficacy Regarding Completion Of Instrument Repair And Maintenance**

CS - 01

*Dakota Burnette**. *Dr. DuWayne Dale, mentor*, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

Instrument repair and maintenance are important aspects of an instrumental music program. As with any subject, students must have the tools necessary to learn and grow. Student instruments, however, inevitably require repair and maintenance. Although there are professional instrument repair technicians that can complete these tasks, sending instruments to them can become a financial burden for any program, especially for poorer programs. Music programs that with directors who feel more comfortable completing instrument repair and maintenance tasks can potentially save money and keep instruments in the hands of their students.

The purpose of this study was to investigate the self-efficacy of instrumental music teachers with regard to instrument repair and maintenance. A survey instrument was created that included questions designed to explore three research questions:

- 1.) What is Kentucky band and orchestra director's degree of self-efficacy in regard to their ability to accomplish the instrument repair and maintenance needs of their program?
- 2.) What contributes to the current level of self-efficacy in Kentucky band and orchestra directors in this area?
- 3.) Do Kentucky band and orchestra directors feel there is more of a need for education in this area?

I received a total of 128 participant responses. Although the response rate was low (21%), participants represented a diverse population and provided valuable insight. Based on their responses, participants reported a varying degrees of self-efficacy in the area of instrumental repair and maintenance. A majority of participants (n=120, 93.8%) indicated that their undergraduate education in instrument repair was insufficient. In addition, a majority of participants (n=107, 83.6%), indicated they would recommend additional training in this area at the undergraduate level.

Future research is needed in this area to determine other variables affecting directors' feelings and attitudes with regard to instrumental repair and maintenance, but for the participants in this study, undergraduate training in repair and maintenance was viewed as an important area of instruction and one that needed additional focus during pre-service music teacher preparation.

8:45 – 9:00 a.m. Using Art To Teach Global Issues

CS = 02

Kaitlyn Rhoden*. Dr. Joy Gritton, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

It is very important that children of today are exposed to the arts, since they may not have extensive exposure at their schools. While art is an important outlet for stress and creativity, it can also be used to teach global issues. For this project, the children attending the Haldeman Community Center After School Program participated in activities using a variety of media to address two primary themes: the environment and cross-cultural diversity. Children were able to meet a special guest from the Morehead-Rowan County-MSU Community Recycling Center and learn more about recyclable materials. They were encouraged to use these materials in their projects. As part of coordinated activities at the After School Program, the children also learned about other cultures, practiced art forms from those cultures (including origami, mask making, and rain makers), and created sets for a play in which the children “traveled” to different regions and experienced other cultures. The goal was for them to gain understanding and respect for the earth and its different peoples. This project was supported by an UG Fellowship from MSU.

9:00 – 9:15 a.m. The Impact Of Gender On Musical Instrument Selection

CS = 03

Chloe Spener*. Dr. Lola Aagaard, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

Research has found that a student’s gender may be linked to the musical instrument he or she chooses to play in music class. For instance, many more females than males choose flute and clarinet, while males are much more likely than females to choose tuba, trumpet, and percussion. This review of literature highlights the nature vs. nurture reasoning for this phenomenon. Instrumental music was originally a wholly male-dominated field, leading to a historical deficit of females in certain instrument families that continues to influence the psychology of musicians today. These social stereotypes affiliated with instruments and gender may have a particular impact on student’s eventual choice of an instrument, as nurture has also proven to be a large influence on human development. As it relates to nature, physically, humans develop differently between males and females. Some of these differences lead to physical advantages, such as a larger bone structure leading to ease of carrying larger instruments in males. Neurological differences may be at the root of the male dominance in percussion sections. Studies have shown that higher levels of testosterone during fetal development influence physical abilities required of a percussionist. Researchers who interviewed female percussionists found many described themselves as “tom boys” when they were young girls.

9:15 – 9:30 a.m. The Art Of Exhibitions

CS - 04

***Nicole Duff**. Ms. Melissa Yungbluth, mentor, School of Creative Arts,
Caudill College of Arts, Humanities and Social Sciences**

The Undergraduate Fellowship in The Art of Exhibitions focuses on the management, design, installation and promotion of arts programming specific to large-scale university exhibitions and events within a university context. Nicole Duff was engaged in the hands-on creation and management of art events during the 2018-2019 academic year including six large-scale faculty, student, and professional artist exhibitions, the annual Halloween Costume Contest and Rocky Horror Picture Show, and the eighth annual Craft Bizarre: MSU Student Art & Craft Sale. Duties included exhibition design, installation, creation of wall-mounted exhibition text, event management and hospitality, art handling, receiving, and public relations. Her work included hosting evening and weekend programming as well. This fellowship is designed to prepare a student to begin a business in arts entrepreneurship and/or a career in arts administration. Supported by the CCAHSS and Department of A&D.

9:30 – 9:45 a.m. Roots Folks Celebrating The Diversity Of Traditional Music

CS - 05

***Elizabeth Bowman**. Mr. Nathan Kiser, mentor, School of Creative Arts,
Caudill College of Arts, Humanities and Social Sciences**

Roots Folks is an Instagram account containing interviews with people who share a common connection through traditional music. It focuses on highlighting the everyday people that may not be considered part of the traditional music community and traditional music genres that aren't typically thought of as being part of that blanket-term. The posts are created by recording the subject with a portable recorder, transcribing it, and taking a picture of them during that same time frame.

**9:45 – 10:00 a.m. Raising Awareness In An After School Program: Ag All Around Us And
In Our Every Day Life**

CS - 06

***Madison Stachler**. Dr. Joy Gritton, mentor, School of Creative Arts,
Caudill College of Arts, Humanities and Social Sciences**

This project involved K-5 students participating in the Haldeman Community Center After School Program with the intent to teach the children to recognize, appreciate, and contribute to agriculture in their daily lives. Resources provided by the U.S.D.A. and non-profit organizations were used to coordinate agricultural lessons (USDA, 2018; Nutrients for Life, 2018). Topics addressed were: animal behavior and plant life; appropriate care for animals and gardens; and the importance of maintaining habitat and biodiversity. The project offered students an opportunity to participate in hands-on, small scale activities that could be related to the larger agricultural industry, and also helped to promote themes fostered at the Haldeman Community Center, such as kindness, personal responsibility, working together cooperatively, and respect for others. At the conclusion of the project, there was anecdotal evidence of increased student motivation and interest, including students trying to implement lesson topics at home.

10:00 - 10:15 a.m. Mindfulness At The Haldeman Community Center After School Program

CS-07

***Tiffany Justice**. Dr. Joy Gritton, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The Haldeman Community Center strives to provide a place for community members to meet for fellowship, to foster the visual and performing arts, and to help sustain and enhance the economic, educational, recreational, and social well being of the community's residents. The Haldeman After-School Program offers a safe, child-centered, nurturing enrichment program for elementary students. Participating children enjoy physical activities, a nutritious snack, a planned learning activity, and help with their homework. For this project, children participated in coordinated mindfulness activities (including shame reduction and sensory awareness) that concentrated on two themes: recognizing emotions (and their origins), and boosting happiness and engagement. The project has given the children at Haldeman an opportunity to learn the skills necessary to navigate drugs, poverty, and other social problems, and to emerge happy and healthy.

10:15 – 10:30 a.m. Break

10:30 - 10:45 a.m. British Gay Activism In The 1980s: A Response To The Thatcher Era

CS-08

***Elizabeth DeBord**. Dr. Alana Scott, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Margaret Thatcher was elected Prime Minister of Great Britain in May 1979 during a period of political and socioeconomic instability. Her Conservative Party policies gained her enough party support to allow her to remain PM until 1990. Meanwhile, her social policies provoked outrage among minority groups, and her time in office saw an increase in LGBT activism. An examination of Thatcher's time in office through the activities of the rising gay rights movement can determine the effect of Thatcher's tenure on such activism. Was the increase in LGBT activism during the 1980s a response to the politics and public persona of Margaret Thatcher? Speeches and laws passed by the Thatcher government are a good reflection of the social climate of 1980s Britain and Thatcher's own opinions on social issues. Accounts of protests across Britain organized by LGBT activists show unintended mobilizing effects Thatcher's policies had on the gay rights community. Using speeches, personal correspondence, surveys and records of activism supported by secondary sources, this paper examines the role Thatcher had in the growing gay rights movement in 1980s Britain.

10:45 - 11:00 a.m. How To Manage A Rock And Roll Band On Low Budget

CS-09

***Daria Denysenko**. Mr. Glenn Ginn, mentor, School of Creative Arts,
Caudill College of Arts, Humanities and Social Sciences**

For my research with Dr. Glenn Ginn, I conducted an experience-based study. My first semester doing research, I was the assistant producer for the rock and roll show that the commercial music ensemble had on November 15th at the Morehead Conference Center. I was in charge of communicating every rehearsal detail to all the members of the commercial music ensemble, make a seating chart for the show, invite the media from Morehead State University to make and publish a story about the show (The Trailblazer), make sure the money for every detail of the show was accounted for, make sure all the band members meet the dress code before the show, promote the show on social media. Moreover, the day of the show, I had to set up the hospitality table for the band, make sure all the personnel was present, set up the ticket sale table, set up sound reinforcements, help the sound crew set up all the equipment on stage, put the stage decorations, make sure the seats were reserved for the people on the seating chart, and make sure every person in the band and sound crew knew the schedule and was present backstage on time before the show started. The result was that we got 500 people in the audience and had great feedback from fellow musicians and a lot of audience members that attended the show.

In the spring semester of 2019, the band was recording a commercial ensemble CD containing only the original tunes that members of the band had composed. I was in charge of creating a brochure for the commercial music program, researching CD duplication companies and comparing prices and value, and making sure members of the band knew when and where they had recording sessions. Moreover, we had three concerts for the unplugged series at the Rowan County Public Library. I was in charge of contacting band members and making sure they were present for the concert, help set up all the equipment, and promote the concerts on social media. We had great turn outs for all the concerts at the library and we successfully recorded a CD as well as made a brochure for the commercial music program.

11:00 - 11:15 a.m. Down The Rabbit Hole: A Graphic Novel

CS-10

***James Davidson**. Ms. Lisa Mesa-Gaido, mentor, School of Creative Arts,
Caudill College of Arts, Humanities and Social Sciences**

Alice in Wonderland by Lewis Carroll is a childhood classic with many different forms of adaptations. The project provides a new contemporary take on this classic, showcasing the protagonists with antagonistic, darker undertones. With this graphic novel, many current concepts are explored relating to social, emotional, and mental health issues. An intimate and raw view of the beloved childhood characters is presented. Character depictions are more mature, crude, and unnerving. This is a multi-year project, with the 2018-2019 focus being on drafting and editing the manuscript for the novel. Multiple manuscript drafts are edited and will be used to create the final panel scripts, which will be merged with drawn images; the final stage will require scanning the images to create digital files, which will be color corrected and edited in Photoshop. Thorough and meticulous research in collaboration with many of the departments on campus, in combination with personal studies of other artist's graphic novels, are used to create an accurate and in-depth graphic novel incorporating concept ideas, character analysis, and storyboarding. This research project was supported by an Undergraduate Research Fellowship.

11:15 - 11:30 a.m. Budgeting For A Gallery

CS-11

***Kaylee Thornsberry**. Ms. Melissa Yungbluth, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

This presentation will touch on all aspects of incoming and outgoing monetary transactions pertaining to running, working for and exhibiting in a gallery. I will go over budgetary items from everyday expenses such as electricity, water, gas, to special cases as shipping artwork and receptions. Other items that will be gone over include staff positions and salaries, as well as contract positions and salaries and all related insurance needs. Galleries also have to budget not only for office materials, but supplies for the upkeep of the space, hanging and lighting of artwork. Lastly, I will be going over incoming money for things such as selling of artwork, memberships and guest donations.

11:30 - 11:45 a.m. Art Of Cultural Programming

CS-12

***Bethany Pace**. Ms. Melissa Yungbluth, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The Undergraduate Fellowship in The Art of Cultural Programming focuses on the logistical planning, management and marketing of arts programming specific to large art and design exhibitions and events within a university context. Embedded within the arts programming hosted by the Claypool-Young Art Gallery, UR Bethany Pace focused on the coordination and management of art events during the 2017-2018 academic year including six large-scale faculty, student, and professional artist exhibitions, the annual Halloween Costume Contest and Rocky Horror Picture Show, and the eighth annual Craft Bizarre: MSU Student Art & Craft Sale. Duties included event management and hospitality, art handling, receiving, and public relations. Her work included hosting evening and weekend programming as well. This fellowship is designed to prepare a student to begin a business in arts entrepreneurship and/or a career in arts administration. Supported by the CCAHSS and Department of A&D.

11:45 – 12:00 p.m. Break

12:00 - 12:15 p.m. The Social Integration Of International Studies: A Collection Of Case Studies

CS-13

***Leighann Neal**. Dr. Donell Murray, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

A collection of case studies reveals the benefits of greater self-esteem, less anxiety, reduced stress and increased retention for international students involved in the International Peer Mentoring Program (IPMP) at Morehead State University (MSU) during the 2018 - 2019 school term. IPMP is a student organization at MSU which was created in Fall 2016 by Dr. Donell Murray. This organization was designed to assist international students to become acclimated to university life and American culture through peer mentoring. Mentors and mentees are paired based on commonalities such as personality traits, hobbies and language skills. A series of self reports were administered in the form of surveys and interviews conducted throughout this time frame. The hypothesis is that by giving international students a structured social outlet, they will benefit by developing social skills and adapting to their new environment during their study abroad experience.

**12:15 - 12:30 p.m. Movement In The Elementary General Music Classroom:
Developmentally Appropriate Practice**

CS-14

***Austin Wood*. Dr. Michele Paynter Paise, mentor, School of Creative Arts,
Caudill College of Arts, Humanities and Social Sciences***

Elementary music teachers use a variety of movement activities in the classroom to enhance musical learning. In this study I used hand motions to teach a song to elementary-aged students. I taught the same lesson to two different groups of students, one with and one without hand motions. I assessed each group by recording them singing a song by themselves into a microphone at the end of the lesson. I then asked a panel of judges in various academic fields to measure the accuracy of the recordings, using a copy of the sheet music. Results are discussed and suggestions for future research are given.

**12:30 - 12:45 p.m. The Effects Of Music And Breathing Exercises On Tic Frequency In
Adults With Tourette Syndrome**

CS-15

***Miranda Johnson*. Dr. Michele Paynter Paise, mentor, School of Creative
Arts, Caudill College of Arts, Humanities and Social Sciences***

Many people with Tourette Syndrome experience tics that disrupt daily activities. The purpose of this study was to examine the effects of breathing and music on adults with Tourette Syndrome. Using calming breathing exercises, carefully created playlists, and a simple musical work, the researcher led participants through guided exercises to determine if there was a correlation between tic frequency, stress, and music. Participants completed reflections after each session and all sessions were video-recorded. After analyzing videos and reflections, the researcher looked for changes in tic frequency, both observed and perceived by each participant. Results of the study are reported and suggestions for future research made.

12:45 - 1:00 p.m. The Impact Of Pacifism: Quakers In American History

CS-16

***Cristen Brockett*. Dr. Alana Scott, mentor, School of Humanities and
Social Sciences, Caudill College of Arts, Humanities and Social Sciences***

After appearing in the colonies in the late seventeenth century, Quakers helped shape America. Following their ideals of pacifism and equality, Quakers sought to end slavery, increase women's rights, and aid war efforts in peaceful ways. In particular, they engaged in abolitionist efforts on both sides of the Atlantic. Several constitutional amendments (16, 17, 18, and 19) resulted from Quaker endeavors. Using speeches by Quaker women, political treatises of both English and American Quakers, and official court records, this paper will examine the various instances in which Quakers, either directly or indirectly, affected the outcome of what was to become the United States of America.

1:00 to 1:15 p.m. Majoring In Music Effects Of Family, Gender, And Former Teachers

CS-17

Janessa Broadhurst**. *Dr. Michele Paynter Paise, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

Music majors often experience a lack of support while in college because many perceive that it is not a "real" profession. The purpose of this study is to investigate the obstacles that music majors face at Morehead State University. Results will be discussed and suggestions for future research will be made.

Concurrent Session - ADUC 322
Moderators: Dr. Jeanne Petsch and Dr. Susan Maxey

8:30 – 8:45 a.m. Penning Consciousness: Underrepresented Voices Of 20th Century American Female Poets

CS - 18

Elizabeth VonMann*. Dr. Sylvia Henneberg, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences

This project seeks to analyze three American women poets over the course of North American literary history in order to track the evolution of female poetry. The timeline will begin with H.D. and Gertrude Stein, and then will move on to Audre Lorde. These three women will be used as case studies to determine possible gaps in literary canon formation. The ways in which creativity and politics interrelate is at the crux of this work. The project assumes that each poet made a substantial and unique contribution to the evolution of both women's poetry and women's rights that is not sufficiently recognized

8:45 – 9:00 a.m. The Impact Of A Legal Studies Program On Graduates' Legal Practice In Rural Kentucky

CS - 19

Matthew Hezseltine*. Dr. Kelly Collinsworth, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

MSU is one of few four-year Legal Studies programs approved by the American Bar Association for paralegal education. However, the majority of our students at this time desire to attend law school rather than working as a paralegal. This project looks at graduates from our program in the last ten years to attempt to quantify benefits from the program for future attorneys and whether the preparation of the program assisted graduates in returning to rural areas to practice.

9:00 – 9:15 a.m. The Problem With Dying: Identifying And Correcting Barriers To Self Representation In Probate Matters

CS - 20

Michala Gabbard*. Dr. Dianna Murphy, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

Dying is hard, but the aftermath of a death can be harder. In addition to grieving for a loved one, the surviving family must maneuver through complicated, unfriendly legal procedures and forms to settle the affairs of the deceased. Many attorneys find the current court forms difficult, and sometimes impossible, to understand and use. This problem is exacerbated for those trying to complete the forms without legal assistance. As a result, pro se applicants often improperly complete forms causing long delays in the settlements of estates. The research aims are twofold. First, to redraft the legal forms to remove the barriers they pose to pro se applicants. Second, to design a clinic that could assist in the proper completion of more complex documents to ensure proper transfer of low-valued real estate. This project received generous support from MSU's Undergraduate Research Program.

9:15 – 9:30 a.m. Radical Jurisprudence: Edward C. O'Rear

CS ▪ 21

***Nicholas Anderson**. Mr. Leonard J. Dunman, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Throughout the course of this year, my mentor and I have worked to flesh out the character of the late KY Court of Appeals Justice, Edward C. O'rear. O'rear's staunch conservative disposition was best reflected in his dehumanizing perception of the black man. Justice Edward O'rear's opinion in the 1908 case Berea College v. Commonwealth of Kentucky best illustrates his ill demeanor towards the black man. Edward C. O'rear is one of countless political figures of the era who facilitated racial divisions leading into the later half of the 20th century. An illustration of his life is reflective of white supremacy and the desire to preserve white dominance at all costs in a nation slowly progressing towards racial equality.

9:30 – 9:45 a.m. Queer Victims And Offenders In The Holocaust

CS ▪ 22

***Molli Huffman**. Dr. Rebecca Katz, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Lesbian, gay men and transgender people remain the hidden victims of the Nazi Holocaust. While heterosexism led to the persecution, arrest, deportation, and incarceration of LGBTQ individuals in concentration camps; internalized homophobia resulted in the sexual exploitation of young boys and men by prison camp guards. Conversely, Ernst Rohm, the leader of the Stormtroopers or Brown shirts, promoted gay male sexuality as a hegemonic performance of German masculinity based on Greek queer militarism as LGBTQ people were being rounded up for arrest. This qualitative work explores memoirs written by gay survivors of the Holocaust. Court testimonies of victims and depositions of a bisexual guard, Irma Grese, also are reviewed. Findings unravel a web of medical experimentation designed to convert gay concentration camp prisoners as well as consensual sexual relationships between internees and guards. The development of brothels for both guards and prisoners illustrates further sexual objectification of gay and straight women. This sexual twilight zone is exemplified by gay victims who developed sexual relationships with guards in exchange for food or other special privileges.

9:45 – 10:00 a.m. Men's Understanding Of Toxic Masculinity

CS - 23

***Caitlin Haggard**. Dr. Bernadette Barton, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Hegemonic masculinity, more colloquially referred to as toxic masculinity, is a set of practices that promote the dominant social position of men, and the subordinate social position of women. Toxic masculinity socializes men to see masculinity itself in hierarchical terms, ranking men according to how well they embody and present as the alpha male: the toughest, strongest, and least emotional. Researchers find that toxic masculinity is responsible for a number of negative social consequences including dangerous risk-taking, acts of violence, and the numbing of empathy. Drawing on interviews with 10 male millennials, this research explores how aware men are of the concept and constraints of toxic masculinity while in college. We theorize time spent getting an undergraduate degree as a key turning point in men's self-conception. Many men get to college and are enlightened by the openness and diversity among campus. This presentation illustrates that young men have varying degrees of understanding of toxic masculinity, particularly as regards their own behavior. We find that subjects have an easier time seeing the negative consequences of toxic masculinity in others than themselves.

10:00 – 10:15 a.m. Leipzig Dig: Applying Public History Methodologies Through A Social Media Presence

CS - 24

***Nathaniel Baker**. Dr. Adrian Mandzy, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

In Leipzig, Germany, an international archaeological team co-directed by Adrian Mandzy, Ph.D and André Schürger, Ph.D was created for an excavation of the 1813 Battle of Leipzig (also known as the Battle of Nations). This project was created for three reasons: 1) to illustrate the need of battlefield archaeology as a tool in understanding history, 2) to demonstrate why battlefields need to be recognized and protected as archaeological resources and 3) To study and understand the significance of the Battle of Leipzig. With those project goals in mind, a vehicle for the information found at Leipzig was required in order to succeed. Ranging from Late Summer 2018 to Early Winter 2019, the Facebook page Leipzig Dig was created as a means of using a social media platform to act as an accessible bridge for information between academia and the public. This allowed me to be in a leadership environment while working with a diverse team from across the world on a regular basis. Being updated with educational on-site videos, videos of oral presentations at the 2018 Fields of Conflict Conference and artifact and team photos, the Facebook page was very successful with over 10,000 views and 250+ followers. With that in mind, the presentation would explain the process of creating Leipzig Dig, maintaining its viewership and adapting academic findings into a digestible format.

10:15 – 10:30 a.m. *Break*

10:30 – 10:45 a.m. *Public Perception Of Ohio State University Influenced By Urban Meyer’s Crisis Causing Decision*

CS - 25

Laiken Hobbs*. Dr. Morgan Getchell, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences

Scandals that lead to a reputational crisis situation are not uncommon in collegiate sports. In August 2018, Urban Meyer was placed on paid administrative leave after it was suspected he failed to report one of his former assistant coaches had been domestically abusing his wife. The Ohio State University Board of Trustees established an independent board to lead an investigation into the case. Their goal was to determine what and how much Meyer knew about these allegations. The final ruling of the investigation was that Meyer would be suspended for the first three games of the season. Many accused OSU of handling domestic abuse allegations poorly and believed Meyer avoided harsh penalties to ensure that a winning football program was preserved. I have applied image repair theory to determine how the public perception of Ohio State University was influenced by Meyer’s actions and the decision to keep him an employee of the university. To answer my research question, I used content analysis on tweets from the social media platform Twitter. This research aims to determine the influence a domestic violence case with a third party involvement has on a public university.

10:45 – 11:00 a.m. *Two Nations, Two Founding Arguments, One State: The Intellectual Roots Of The Israel Palestine Problem*

CS - 26

Alexandra Quillen*. Dr. Jonathan Pidluzny, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

One of the most controversial geopolitical issues in the world today is the relationship between Israel and Arab Palestinians. Even before Israel’s official establishment as a recognized nation-state in 1948, Jewish immigration to Palestine has caused anxiety in Muslim communities across the globe. At least since the 1948 war, Palestinians have endured often harsh treatment from Israeli security forces, including expulsion from their historical homeland (and homes) in high numbers. As a consequence of the 1948 and 1967 wars, hundreds of thousands of Palestinian refugees live under occupation today, giving rise to one of the most difficult problems in international relations: how to resolve tension between Israel and Palestine given both nations have strong claims to the same geographical territory as a basis for their nation state.

Surprisingly, in spite of all the attention the Israel-Palestine problem has received, most treatments fail fully to consider each party’s powerful political claims. Though Zionism and Islamist exponents of Palestinian statehood represent different religions, the intricacies of their claims and their deeply religious sentiments align in surprising ways. Additionally, much like the religious claims to the land, powerful factions on both side are making secular claims to justify their claims to the land. A great deal can be learned by considering the leading political theorists on both sides. Focusing on the writings of prominent Zionists at the turn of the century (in particular, Theodor Herzl and Ze’ev Jabotinsky), and leading exponents of Palestinian independence (including Yasser Arafat and Hamas ideologues), this project aims to provide a more detailed and thorough account of each party’s claims. This project received generous support from MSU’s Undergraduate Research Program.

11:00 – 11:15 a.m. *Feminism In Appalachia: The Origins And Evolution*

CS - 27

Tessa Collins**. *Dr. Thomas Kiffmeyer, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

In the late twentieth century, modern feminism in Appalachia bloomed during the labor crisis caused by the mechanization of the coal industry and the War on Poverty. In 1964, President Lyndon B. Johnson launched the War on Poverty. With his visit to Martin County, Kentucky, he placed Appalachia directly in the public eye. Volunteers flocked to Appalachia in hopes of aiding the region. The volunteers, however, seldom recognized that Appalachian communities need structural change, not simple enrichment programs. Prior to the War on Poverty, Appalachian women had led social justice movements throughout the region that battled the political corruption of local county governments and the economic dominance of the coal industry. The lines between race and gender were blurred as more demanding issues occupied the minds of Appalachians. Poor, working-class black and white women fought for better health care, higher wages, safer working conditions, and equal educational opportunities to better the Appalachian communities. These women were not only loyal wives of coal mines, rather, they were activist and caregivers for their families and communities. For the majority of Appalachian women, the issues went beyond social and economic inequality and included racial and gender issues. This broader gaze influenced how Appalachian feminism evolved. During the 1970s, a fundamental change happened within the minds of Appalachian women. Dire economic circumstances pushed many women to work in coal mines. Women were directly exposed to sexism and racism as women tried to establish themselves as laborers. Appalachian women became more specifically focused on direct oppression related to gender inequality while continuing the fight for social and economic justice to absolve the corruption in the coal industry. Modern scholars are currently re-examining the activism led by Appalachian women. The re-examination of their activism has proven that it is crucial to examine women's efforts through a gendered lens. Appalachian historians are now examining how gender was an influential spark that led social and economic activism throughout the region.

11:15 – 11:30 a.m. *Battle Of The Crater Artifact Survey*

CS - 28

Christopher Linneman**. *Dr. Adrian Mandzy, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

This presentation details a research experiment conducted at the site of the Battle of the Crater, an important part of the large Siege of Petersburg campaign of the Civil War. On-site archeologists and undergraduate research fellows conducted a metal-detecting survey with the goal of analyzing artifacts that could be found at the battlefield. Artifacts from before, during, and after the Battle of the Crater were recovered, providing the research team with a timeline of the area. The bullets and other military materials recovered were of particular interest, and provided a clearer depiction of the order of battle than can be ascertained from written primary sources, many of which do not corroborate one another. Using the recovered munitions from the battle, I hypothesized that there was a front of the battle which had not been documented in previously discovered primary sources. Evidence for this hypothesis includes the existence of a significant number of fired munitions along a high rise of the battlefield, representing an area where an offensive push was made. Most of these bullets impacted at high velocity, which likely means they were fired at close range, implying the existence of the previously undiscovered front. To find further evidence, an experiment was carried out in which authentic Civil War era munitions were fired from various ranges and were then compared to the artifacts recovered at Petersburg. There is a strong correlation between the experimental rounds and the rounds recovered from the battlefield, indicating that there was indeed a front of the battle at the location under study. Using a combination of metal-detecting surveys, primary source analysis, and practical experiments, I was able to gain a better understanding of one of the most important battles of the American Civil War.

11:30 – 11:45 a.m. Myths And Metaphysics

CS ▪ 29

***Jacob Tackett**. Dr. Christina Conroy, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The current understanding of how western philosophy began was that early Greek thinkers called the Pre-Socratics diverged from mythological explanations of nature to more philosophical explanations and that they succeeded in this without much outside influence. This project examines the mythological explanations of the world by Egyptian, Persian, and Indian cultures and the philosophies of the Pre-Socratics to find possible mythological ideas embedded in early western philosophy. By examining the historical context of the Pre-Socratic time period, a review of prior research, and a comparison of Pre-Socratic philosophy versus the mythology of Egypt, Persia, and India we find evidence of influence on early Western thought. This project argues that the Pre-Socratics' metaphysics were heavily influenced by these cultures and that the Pre-Socratics did not diverge completely from the mythological explanation of nature that these cultures provided, but rather that they took a logical step forward in the sophistication of human thought.

11:45 – 12:00 p.m. Break

12:00 – 12:15 p.m. A Study On Life Satisfaction Of Older Adults: What Makes Us Tick With Time?

CS ▪ 30

***Rebecca Gilliam**. Dr. Lynn Geurin, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

America is in the midst of an unprecedented demographic shift. Older adults, ages 65 and older, are living longer and quickly becoming the fastest growing segment of our population (National Institute of Health, 2016). The population rates of older individuals is currently passing children at rapid speed (U.S. Census Bureau, 2018). The baby-boom generation started turning 65 years of age in 2011, and the generation will continue to explode on the scene for several more years to come. This swing in demographics has made research on older adults even more relevant. Past research and stereotypes have all too often focused on problems with aging rather than successful maturation. Some of the more recent research on older adults has shifted to examining life satisfaction (Bailly, Gana, Herve, Jouliau, & Alaphilippe, 2014; Dumitrache, Windle, and Herrera, 2015; Mathur, 2014; Rajhans, 2015)

The purpose of this study was to explore what factors impacted life satisfaction from a sample of older adults in Eastern Kentucky. The study examined both demographic and socialization variables on the level of life satisfaction experienced by the participants. The study utilized a convenience sample (N = 50) of voluntary participants with diverse ages from 66-99. Life satisfaction was measured from the Satisfaction with Life Scale (Pavot, 2013). Findings suggest a correlation between several of the expected demographic variables, but also socialization variables were significantly related to increased life satisfaction among older adults.

This study confirms the need for older adults to experience various forms of socializing; e.g. family, friends, social media, in order to lead more full and satisfied lives. This research also has implications for assisting social workers and other human service professionals to provide resources and interventions that promote better life satisfaction among older adults in general and for at-risk populations. Gerontology practice should consider developing more programs that enrich the social environment of older adults. Overall, the study draws attention to an important population and the findings have implications for social work policy and practice.

12:15 - 12:30 p.m. Kentucky As A Window Through Which To View Slavery

CS = 31

***Alexa Potts**. *Dr. Philip Krummrich, mentor*, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Although Kentucky does not figure prominently in modern travel writing, there was a time between the pioneer days of Daniel Boone and the outbreak of the Civil War when Kentucky appeared regularly in books written by those who traveled the United States. One main reason for the interest in Kentucky during this time was that curious bystanders wished to view the peculiar institution of slavery without venturing into the deep south. These travel writers approached slavery with preconceived notions, but their experiences with the establishment determined whether or not these preconceived notions were maintained after a sojourn through the state. An analysis of what some of these travelers experienced in the way of slavery and how their preconceived notions were shaped as a result provides insight into the British reaction to the peculiar institution that dominated the American south.

12:30 - 12:45 p.m. Agricultural Education At The Haldeman Community Center After School Program

CS = 32

***Heather Smith**. *Dr. Joy Gritton, mentor*, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The younger generation is moving further and further away from agricultural-related activities and careers, often because they do not know much about agriculture. This project helps link children and agriculture. Participants learn healthy foods to eat and how to effectively grow some of these in their raised bed gardens. They are taught how agriculture is important in their daily lives. The children also learn to recognize the relationship between the needs of different animals and plants, and study their habitats. It is hoped that the Haldeman children will gain a greater appreciation for gardening, will leave knowing how to properly care for plants and animals, and will develop habits that promote compassion and respect for all living things.

Concurrent Session - ADUC 325
Moderators: Dr. Wayne Miller and Dr. Ahmad Zargari

8:30 – 8:45 a.m. Pollen Analysis, Sugar Analysis, And HMF Determination Of Kentucky Honeys

CS - 33

Rebecca Jenkins*. Dr. Brandon VanNess, mentor, Department of Biology and Chemistry, College of Science

Honey is a complex and interesting substance comprised of several organic compounds that differ based on botanical origin. Eight samples of various Kentucky honeys were collected for experimentation and evaluation. In this ongoing experiment, each sample will be evaluated for (including a reference, industrial processed clover honey) hydroxymethylfurfural content with UV-vis, reducing and inverted sugar identification using the Lane-Eynon method (as well as, in the future, HPLC analysis), and pollen analysis through microscopic identification. Although there are several different types of honey, the experiment will be controlled by using only clover honey.

The goal of this experiment is to 1.) identify and analyze the organic components of honey and 2.) determine whether Kentucky honey contains identifiers specific to the region when compared to the standard and/or other studies done on the topic. In the future, careful analytical procedure will be taken in order to determine the amounts and identities of compounds found in the honeys chosen to run the experiment on. In doing this, the greatest focus will be on flavonoid and phenolic compound identification, in which flavonoids/phenolics will be separated from the sugars and other polar compounds using Amberlite XAD-2. The utilization of HPLC will take advantage of retention times established in other academic articles (in addition to spiking with standard flavonoid/phenolic samples as needed) to determine the identities of the chemicals present in honeys farmed in Kentucky.

8:45 – 9:00 a.m. Withdrawn

CS - 34

Withdrawn

9:00 – 9:15 a.m. Dust Lichen (Lepraria) Species Identification Using Thin Layer Chromatography

CS = 35

***Hannah Stegemann**, Dr. Allen Risk, mentor, Department of Biology and Chemistry, College of Science**

Lichens are organisms composed of algae and fungi. There are three main categories of lichen growth forms, crustose (firmly attached to the substrate, difficult to remove), fruticose (branching), and foliose (leaf-like). A category of crustose lichens, called the dust lichens, are the focus of the present study. A dust lichen looks very powdery and the thallus is composed of soredia-like granules. Dust lichens are very common and are found on trees, rocks, and soil all over the world. Species of dust lichens are difficult to distinguish on the basis of morphology and simple chemical tests such as KOH (potassium hydroxide), and C (bleach), thus an alternative method to identify them is needed. Thin-layer chromatography, TLC, is a chemical procedure that uses a solvent system to separate substances based on their chemical properties. It has been used by various researchers for a variety of separation procedures. The purpose of the present research is to properly identify dust lichens found in the local eastern Kentucky region. Thus far, after four TLC runs with solvent C (toluene and glacial acetic acid), one species, *Lepraria finkii*, has been positively identified based on the presence of atranorin, zeorin, and stictic acid. *Parmotrema hypotropum* and an authoritatively identified specimen of *Lepraria finkii* were used as standards for confirmation. This research was supported by an Undergraduate Research Fellowship and a grant from the Morehead State University Department of Biology and Chemistry.

9:15 - 9:30 a.m. Do Black Shales Potentially Affect Human Health As Well As Water Quality Of Streams In Eastern Kentucky?

CS = 36

***Elizabeth Hereford**, *Mitchell Grothaus**, Dr. Geoffrey Gearner, Dr. Timothy Hare, Dr. Charles Mason, mentors, Department of Biology and Chemistry, College of Science**

We explore the impact of radioactive and heavy metal-containing black shales on the water quality of eastern Kentucky streams. Collected data include microbiological, chemical and physical properties of the water, and aquatic environmental testing. Stream sites in Rowan County related to black shale were sampled five times over a thirty-day period during the recreational season and monthly thereafter to assess concentrations of, heterotrophic bacteria, total coliform bacteria, and *Escherichia coli* through the membrane filtration method and various culture media. Additional stream sites in Lewis, Bath, and Fleming Counties were sampled and tested in the same manner. We monitored the dissolved oxygen, conductivity, total dissolved solids, pH, temperature, and discharge for the same aquatic sites. Conductivity and pH had elevated levels in the water running directly through the Sunbury Shale compared to upstream and downstream of the shale. The aquatic environmental testing included basic environment health grading by checking the wildlife and habitat variation in the stream. Previous research indicates that environmental factors contribute to cancer risk and undertake this research to define the nature of the interaction to improve health outcomes in eastern Kentucky. This project was supported by the Undergraduate Engagement Fellowship.

9:30 - 9:45 a.m. Dendroclimatology Of Oaks (Quercus) In The Eagle Lake Watershed, Rowan County, Kentucky

CS = 37

***Katherine DeBurger**, *Lindsay Wetzel*. *Dr. Allen Risk*, *mentor*, Department of Biology and Chemistry, College of Science**

Forests are critical ecosystems that improve air and water quality, provide natural flood control and habitats that promote biodiversity. Forests also contain many resources for human use, such as lumber and pharmaceutically useful substances. Thus, the relationship between environmental variables and forest growth is an important area of inquiry. Dendroclimatology is the study of the relationship between annual tree ring growth and prevailing regional weather patterns, including temperature, precipitation, and drought. In order to assess this relationship, five 20x20 meter plots were randomly positioned within the Eagle Lake watershed. Two samples were extracted, using an increment borer, from each tree over 10 cm in diameter at breast height (DBH) from each plot. Each core was dried, glued to a mount and sanded to expose the annual rings. After cross dating (verified independently by at least two researchers), the ring widths of oak species (*Quercus*) were determined using a Velmex measuring system. COFECHA, a quality control software, was used to confirm or correct ring dates. Future work will include standardization of ring widths with ARSTAN. Correlation analysis will then be used to examine the relationship between local climate data and standardized widths of each tree ring. This project was supported by the Department of Biology and Chemistry and the Pryor Fund.

9:45 - 10:00 a.m. Color, Moisture Content, And Free Acidity Analysis Of Local Kentucky Honey

CS = 38

***Chelsea Fitzpatrick**. *Dr. Brandon VanNess*, *mentor*, Department of Biology and Chemistry, College of Science**

Honey, which is mostly sugar and water, has many interesting compounds and properties that have been explored in this experiment. Eight samples from across the state were collected for analysis including two industrial processed reference honeys. In this experiment, each sample will be evaluated for its color by way of UV-Vis with reference to the Pfund scale, moisture content through refractometry, and free acidity by means of titration.

The goal of this experiment is to collect a database of properties that Kentucky honeys contain while also having the intention of comparing them to other honeys around the world to be able to determine if Kentucky honey has a distinct identifiable footprint. The main goal in doing this is to identify the flavonoid and phenolic compounds in Kentucky honey. This will be done by separating the sugars and other polar compounds through an HPLC column filled with Amberlite XAD-2. This will be the most likely place to find these identifiers in the honey.

10:00 - 10:15 a.m. Arboreal And Terrestrial Lichen And Bryophyte Species Richness In The Eagle Lake Watershed, Rowan County, Kentucky

CS = 39

***Jessica Dale**, Dr. Allen Risk, mentor, Department of Biology and Chemistry, College of Science**

A lichen is a symbiotic relationship between algae and fungi. Bryophytes are non-vascular plants consisting of mosses, liverworts, and hornworts. These organisms can conduct photosynthesis, indicate pollution, provide building material for animals, and can be locally diverse in a forest. Besides their aesthetic appeal in nature, lichens have had a significant impact throughout human history. Lichens have been used as food, dye for clothing, medicines, and decoration. Three 20 X 20 m plots were established to assess arboreal and terrestrial lichen and bryophyte species richness in the Eagle Lake watershed. A white oak was chosen to center each plot and doubled rope technique was used to access the trunk and crowns of understory and overstory trees. Samples were collected from soil, rocks, woody debris, understory shrubs/trees, and a single overstory tree within each plot. Preliminary results for the arboreal zone, in study plot 1, consisted of two liverwort, five moss, and 14 different lichen species. The terrestrial zone consisted of 10 liverwort, 21 moss, and 34 lichen species. The preliminary data for the arboreal zone, in study plot 2, consisted of one liverwort, seven moss, and 12 lichen species. The terrestrial zone supported one liverwort, 17 moss, and 13 lichen species. Future efforts will include finishing collecting and identifying specimens from study plot 3. This research was supported by an Undergraduate Research Fellowship and the Pryor Fund.

10:15 – 10:30 a.m. Break

10:30 - 10:45 a.m. Palynology Of Pleistocene And Holocene Sediment Core BBL 3, Big Bone Lick, Kentucky

CS = 40

Lucille M. Steiner*¹, F. Maggie Stephenson², Sara S. Olmsted¹, Dr. Jen O'Keefe (mentor)², William Andrews, Jr.³ ¹Craft Academy for Excellence in Science and Mathematics, College of Science; ²Department of Earth and Space Science, College of Science; ³Kentucky Geological Survey, University of Kentucky, Lexington, KY

The initial study of eight samples obtained from Big Bone Lick State Historic Site in 2012 produced an abundant and diverse palynofloral record that spans the upper Pleistocene to middle Holocene. Here we present the first palynological study of the BBL 3 core, obtained by the Kentucky Geological Survey in July 2004. 33 new subsamples were obtained, following the original sampling pattern and processed using disaggregation, enzymes, and density separation methods. The residues are charcoal and palynomorph-rich; non-pollen palynomorphs (NPPs) are especially abundant. The plant pollen and spores recovered do not match the documented mesobotany for the site. Tulip poplar (*Liriodendron tulipifera*), Copperleaf (*Acalypha* sp.), grape (*Vitis* sp.), and Pinks (*Silene* sp.) pollen are absent, as are lichen spores. This likely represents preservational bias and flooding of local signals by transported pollen. The NPP is dominated by fungi. These include mutualistic (mycorrhizal), parasitic, and saprophytic taxa, including known dung fungi. The mycorrhizal fungal flora is dominated by spores of ecto- and ericoid mycorrhizal fungi. Diverse dung fungi point toward the presence of a variety of herbivores and carnivores already known from their bones, but also toward the presence of geese, the bones of which aren't preserved at Big Bone Lick.

10:45 - 11:00 a.m. Geochemistry And Possible Source For The Hooper Ash, Lower Wilcox Group, Texas

CS - 41

***Kala Brown**, Dr. Jen O'Keefe, Dr. Marshall Chapman, mentors,
Department of Earth and Space Science, College of Science**

The Hooper Formation coal seam exposed at McKinney Roughs Nature Park in Western Bastrop County, Texas contains an in situ volcanic ash. Little was known about the ash prior to investigations that began in Spring 2018. XRF and XRD geochemistry confirmed that the ash has been altered to a composition known as “tonstein.” Tonstein studies are important because they are isochronous stratigraphic units. Tonsteins are primarily kaolinitic but tend to be high in trace elements, as well. Tonsteins can be used to trace volcanic sources and provide age control for their surrounding rocks. This tonstein has a chemical composition that suggests it originated in an andesitic-rhyolitic eruption. Known similar-age eruptions upwind occurred in the Trans-Mexican Volcanic belt or the Sierra Madre Occidental, depending on the season of eruption, as prevailing winds are either westerlies in the winter and southerlies in the summer. This project was completed as part of ESS 499C: Senior Thesis.

11:00 - 11:15 a.m. A Changing World: Ecological Transitions In The Paleocene–Eocene Manawianui Drive Section, Bastrop County, TX

CS - 42

***F. Maggie Stephenson*¹*, Dr. Jen O'Keefe (mentor)¹, Dr. Thomas Demchuk², and Dr. Christopher Denison³, ¹Department of Earth and Space Science, College of Science, Morehead State University, Morehead, KY, ²RPS Group, Houston, TX, ³Astra Stratigraphics, Bastrop, TX**

Wilcox and Claiborne Group strata from Bastrop County, TX contain a diverse pollen and spore flora, including many important ecological indicator fungi and other non-pollen palynomorphs. The section consists of tidal-laminated silty mudstone from the uppermost Paleocene Sabinetown Formation, which is cut out by multiple channel features that contain subbituminous coals. The coals and channel-fill silty mudstones are unconformably overlain by cross-bedded sandstones of the Eocene Carrizo Formation. Of interest is how the non-pollen palynomorph spectrum tracks ecological changes from the base of the channel-fill through the Carrizo. The coals record mangrove swamps (*Pseudodelitchia* sp., *Nigrospora sacchari*, and *Ascobolus* sp.) that give way to hardwood hammocks (*Dwibeeja* sp., *Cortinarius spinosus*, and basidiospores), that transition to sawgrass marshes (*Acrogenospora gigantea*, basidiospores, and desmids). Carrizo deposition is abruptly different, and likely occurred on a shallow shelf offshore from a brackish tidal marsh bordered by a palm savannah (*Kamatella* sp., *Nigrospora* sp., *Lacrimasporites* sp., *Papilonospora* sp., *Virgaria* sp., and *Arthrinium* cf. *A. peteroconium*). Upsection, we see abundant fungi (*Striadiporites bistriatus*, *Delitschia* cf. *D. varisporiia*, *Entoloma triangularis*, and basidiospores) as well as rotifer loricas. This project was completed as part of a previous undergraduate fellowship and ESS 476: Directed Research.

11:15 - 11:30 a.m. Chemical Separation Of Minerals From Kaolinitic Volcanic Ash

CS - 43

***Eli Martin III*, Dr. Jen O'Keefe, Dr. Marshall Chapman, mentors,
Department of Earth and Space Science, College of Science***

The Hooper formation coal exposed in the McKinney Roughs Nature Park near Bastrop, TX, contains a weathered volcanic ash parting, or tonstein that is of variable thickness. The ash is extremely weathered and much of the original material has been converted to kaolinite. The sheer quantity of kaolinite makes observation and identification of remaining mineral phenocrysts very difficult. Many methods exist for removal of refractory kaolinite from heavy-mineral containing rocks, however, they utilize dangerous or extremely expensive reagents to do so. Development of a cost-effective method using heat and weak KOH solutions was effective and permitted the following minerals to be identified: Fe-hornblende, hydrated quartz, perthite, zircon, mica, and opaque minerals unable to be identified using transmitted light. This project was completed as part of ESS 499C: Senior Thesis.

11:30 - 11:45 a.m. An Overview Of Peat Forming Ecosystems Preserved In Hooper Formation Rocks At McKinney Roughs Nature Park

CS - 44

Ashton Killen*, Dr. Jen O'Keefe, mentor, Dr. Christopher Denison, (Astra Stratigraphics), Mr. Nicholas Cowey (McKinney Roughs Nature Park), Dr. Thomas Demchuk (RPS Group), Department of Earth and Space Science, College of Science

Onshore and nearshore sedimentary rock from the Hooper Formation, lower Wilcox Group, exposed in McKinney Roughs Nature Park are among the best exposures of the Hooper Formation, which is very poorly known. In this area, sandy tidal heterolithics underly a single subbituminous coal seam with two splits. Here we present analysis of the original sampling of exposures in the park, collected in 2017. The tidal heterolithics contain an abundant and diverse palynoflora, dominated by tree pollen, including members of the chestnut family, walnut family, and palms. The coals contain an abundant, but much less diverse flora dominated by freshwater algae and dinoflagellate cysts but also contain willow, sedge, dogwood, and bald cypress pollen. This is consistent with peat development in ponded-freshwater coastal wetlands, similar to those present near Brazos Bend State Park today. This project was supported by an Undergraduate Research Fellowship for academic year 2018-2019.

11:45 – 12:00 p.m. *Break*

12:00 - 12:15 p.m. Do Radioactive Black Shales Affect Human Health In Eastern Kentucky?

CS - 45

Mitchell Grothaus*, Robert Grigsby*. Dr. Timothy Hare, Dr. Geoffrey Gearner, Dr. Nathan Coker, Dr. Charlie Mason, mentors, Department of Earth and Space Science, College of Science

We explore the impact of radioactive and heavy metal-containing black shales of the Ohio and Sunbury formations on public health in eastern Kentucky. Previous research indicates elevated rates of a variety of cancers in eastern Kentucky that cannot be adequately explained by behaviors such as diet and tobacco use. We collected samples for radiation and chemical analyses to determine the potential presence of cancer-causing natural exposures. Dosimeters, devices for measuring ionizing radiation, were placed in the following four counties: Rowan, Bath, Fleming, and Lewis. And each of these counties, fifteen dosimeters were placed in a stratigraphic sequence which a variety of rock types. Ten dosimeters were placed in the black shale units and the remaining five dosimeters were placed in different lithologic units below, in-between, and above the black shale units as controls. The results indicate that the Sunbury Shale and the lower Huron Member of the Ohio Shale emit the most radiation of the black shales tested and that the black shale units emit a higher level of radiation overall. Whereas the other formations (composed of various lithologies other than black shale) used for control, emit little to no radiation. We used an Atomic Absorbance Spectrometer to chemically analyze the Sunbury Shale for vanadium, arsenic, and selenium. Future research will test the association between elevated cancer-causing exposures and cancer incidence rates. This research seeks to define the nature of the interaction to improve health outcomes in eastern Kentucky. This project was supported by the Undergraduate Engagement Fellowship and by a Research and Creative Productions Committee grant.

12:15 - 12:30 p.m. Epidemiology Of Parvovirus In A Rural Veterinary Clinic

CS - 46

Kate Webb*. Dr. Jennifer Dearden, mentor, Department of Kinesiology, Health and Imaging Sciences, College of Science

Canine parvovirus (CPV) is a debilitating, highly contagious, and often deadly infection occurring in unvaccinated puppies and dogs. In fact, according to the American Veterinary Medical Association, most deaths from CPV occur within the first 48-72 hours from the onset of clinical symptoms. It is critical that puppies and dogs are brought to veterinarians as soon as possible for evaluation. Anecdotal reports from veterinarians have stated that prevalence of CPV in rural areas is increasing, but the extent is unknown. The purpose of this study was to understand the epidemiology and distribution of CPV affecting puppies aged 0 weeks to over 1 year in a single, rural veterinary clinic. Factors such as age, type of ownership, county of residence, sex, breed, and mortality were recorded from data previously obtained in a veterinary clinic's Henry Schein's AVImark electronic medical record system over a 10-year period (2008-2018). A total of 620 records of CPV data were reviewed. Almost one in three puppies tested (31%; n=193) was positive for CPV. Just over 27% (n=53) of the puppies were reported as known deaths. The years 2016-2018 saw the largest number of tests with 61% (n=377). Of 49 breeds tested, the breed with the highest number of deaths was among the mixed breed (n=112), followed by beagle (n=9) and chihuahua (n=3). Private owners were the most likely to bring in puppies for testing (64%; n=397), with rescue staff next (32%; n=196) and finally shelter staff (4%; n=27). The findings of this study elucidated cause for further research into the prevalence and mortality of CPV in puppies among a wider distribution and to map out the dispersal of cases in order to identify common points of exposure. Research on CPV by veterinary epidemiologists is critical to reduce infection and ultimately, to save lives.

12:30 - 12:45 p.m. Using Differential Equations And Other Mathematical Tools To Predict The Rates Of Multiple Antibiotic Bacterial Drug Resistance

CS - 47

***Sarah Little**. Dr. Timothy O'Brien, mentor, Department of Mathematics and Physics, College of Science**

Mathematics has proven time and time again to be a useful tool in advancing medical knowledge. A key example includes the use of differential equations and mathematical models to depict and predict onset rates of multiple antibiotic bacterial drug resistance. This project will investigate a single complex model developed by Dr. Bahatdin Daşbaşı and Dr. İlhan Öztürk, which is used to predict rates of multiple antibiotic bacterial drug resistance. Components of this model and their validity will be evaluated. Additionally, this project will attempt to modify the model to increase accuracy by accounting for other external factors. Differential equations, MATLAB software, and an increased biological understanding of antibiotic resistance development are some examples of tools used within this project. The ultimate goal is not only to make progress on developing a more accurate model to be used by medicinal researchers, but is also to demonstrate the link between the vast fields of mathematics and biology.

12:45 - 1:00 p.m. Special Transformations Of Tensors

CS - 48

***Steven Evans**. Dr. Timothy O'Brien, mentor, Department of Mathematics and Physics, College of Science**

Out of the many interpretations of tensors, the interpretation of the multidimensional array is unique since it is dependent on the chosen basis for the underlying vector space. The representation of a tensor, as a multidimensional array, can be changed by altering the chosen basis. Given the right choice, this results in a representation that is particularly easy to work. The concept of tensors is introduced and how to find these special bases is explored.

1:00 to 1:15 p.m. Reviving A Vintage “Dynamo” For Use In The Lab

CS - 49

***Nathan Jones**. Dr. Jennifer Birriel, mentor, Department of Mathematics and Physics, College of Science**

The “Principles of the Dynamo” lab is a vintage Cenco laboratory experiment, it demonstrated the fundamentals of AC generators and also emphasized basic graphical analysis. The original lab used a dynamo and a sensitive galvanometer. Galvanometers are analog devices for measuring current with a needle that swings against a background scale. When measuring a transient electrical current produced by a dynamo, reading errors in the data collecting process can be large. To mitigate this and to give the students experience working with modern data collection, we replace the galvanometer with a Vernier instrument amplifier and current sensor. We report the results of our experiment here and discuss some equipment problems we encountered early on in the project.

Concurrent Session - ADUC 329
Moderators: Dr. Thomas Pannuti and Mrs. Darlene Allen

8:30 – 8:45 a.m. The Lunar Ice Cube Mission: Safety, Assembly, Integration, And Testing

CS - 50

Kristen Ammons*. Dr. Benjamin Malphrus, mentor, Department of Earth and Space Science, College of Science

In 2020, the most powerful rocket to date-- the Space Launch System (SLS) EM-1-- will be launched by NASA with 13 secondary payloads in the form of 6U CubeSats (satellites about the size and shape of a shoe box). Among these payloads is Morehead State's Lunar IceCube, a science mission designed to observe water ice deposits on the Moon. In developing this mission, it is very important to adhere to NASA-defined standards for the satellite to perform its mission and in order to keep the satellite from harming the SLS and other payloads. Processes and activities in safety engineering ensure that the satellite meets every one of numerous NASA-defined requirements. Using several government databases, NASA documents, and data processing tools, the team is developing control plans and preparing material (testing reports, numerical analyses, verifications, validations, and specifications) to meet required checkpoints, such as the Phase II Safety Data Package/Safety Review (closed 12.10.18) and the Phase III Safety Data Package/Safety Review (to be presented on April 11, 2019). Additional tasks include preparing a cleanroom environment and developing test plans for individual subsystems.

8:45 – 9:00 a.m. NGC 1566: A Temperamental Changing Look AGN

CS - 51

Rebecca Mikula*. Dr. Dirk Grupe, mentor, Department of Earth and Space Science, College of Science

The Seyfert Galaxy NGC 1566 was detected in an X-ray outburst by INTEGRAL in June 2018 and triggered several observatories with follow-up observations including the Neil-Gehrels Swift Observatory. I will report on the long and short term X-ray and UV/Optical light curves and how we can explain this outburst by an accretion disk instability. Interestingly, optically NGC 1566 is a 'changing look' AGN which changes its optical spectroscopic classification from a Seyfert 1.5 type to a Seyfert 1. In addition, strong coral iron lines were found in the current optical spectra. High-resolution X-ray spectroscopy also suggests the presence of outflowing gas with velocities of 500 km/s.

9:00 – 9:15 a.m. Lunar Ice Cube: Safety Verification And EPS Subsystem Testing

CS ▫ **52**

***Katerina Winters**. Dr. Benjamin Malphrus, mentor, Department of Earth and Space Science, College of Science**

The most powerful rocket to date, NASA's Space Launch System (SLS) EM-1, is set to launch in 2020. Thirteen secondary payloads, in the form of 6U CubeSats, satellites about the size and shape of a shoe box, will be launched by the rocket. One of these secondary payloads is Morehead State University's Lunar IceCube (L-IC) whose mission is to scan the Moon's surface to study and track water ice and other volatiles. Built at the university, L-IC must adhere to NASA standards and requirements to guarantee that L-IC will not harm the SLS or the other payloads during the launch. Morehead State's Safety Engineering Team, comprised of three undergraduate students, a graduate student and faculty members, is responsible for ensuring adherence to these requirements. Hazard Reports are part of the criteria that must be met to launch on the SLS. In order to complete Hazard Reports, safety verifications must be established, approved, and closed. The closure of verifications is accomplished through adherence to NASA standards, internal and NASA reviews of L-IC's design, and test results. Extensive testing must occur with all of L-IC's subsystems and with the integrated spacecraft. This presentation describes the verification and testing of one of the primary spacecraft subsystems, the EPS (Electrical Power System). Comprised of five components from a third party supplier, the EPS distributes power to the other subsystems, keeping them powered and functioning. The components of the EPS are the battery module, EPS module, PDB (Power Distribution Board), DASA (Deployable Articulated Solar Array), and the solar panels. The EPS and its components must undergo a variety of tests before satellite integration.

9:15 – 9:30 a.m. Long Term X Ray Monitoring Of The Highly Variable Active Galactic Nucleus RXJ2217.9-5941

CS ▫ **53**

***Alanna Cavins**. Dr. Dirk Grupe, mentor, Department of Earth and Space Science, College of Science**

I will report on the long-term UV and X-ray monitoring of the Narrow-Line Seyfert 1 galaxy RXJ 2217.9-5941 with the Neil Gehrels Swift Observatory. RXJ 2217.9-5941 was detected as a bright soft X-ray source by ROSAT (Grupe et al. 1998). However, when it was observed again in 1998 by ASCA it indicated a drop into a deep minimum X-ray flux state. When Chandra observed it again in February and August of 2003 (Grupe et al. 2001, 2004) it had dropped by a factor of 30 compared with the ROSAT observations. Swift started monitoring it in 2006 and continues to the present time. According to the Swift observations in addition to Chandra, RXJ 2217.9-5941 has been in a very deep minimum state for almost 20 years. In addition to the strong X-ray long-term variability, RXJ 2217.9-5941 still exhibits strong variability on shorter time scales. I will also discuss how its X-ray spectrum can possibly be explained by a partial covering absorption model.

9:30 – 9:45 a.m. Withdrawn

CS - 54 Withdrawn

9:45 – 10:00 a.m. Data Analysis On The Narrow Line Seyfert 1.5 Galaxy, 1H0419-577

CS - 55 *Tyler Thomas. *Dr. Dirk Grupe, mentor, Department of Earth and Space Science, College of Science***

I will be presenting on the long term X-Ray monitoring on the Narrow Line Seyfert 1.5 Galaxy, 1H0419-577. Swift data has been analyzed for this project, beginning in 2008. This source is a bright soft x ray source, ranging in the 0.3 to 10 keV area. This source is also considered highly variable, meaning it varied by a factor of more than 5 when changing from a period of high intensity to a period of low intensity. According to previous information the observations from ROSAT and ASCA the source has shown a broad emission line feature at the iron band, which is typically common for this type of Seyfert 1.5 Galaxy. In addition I will also discuss the UVOT data analysis that comes from the Swift observations.

10:00 – 10:15 a.m. A Spatially Resolved Spectroscopic Study Of The Galactic Supernova Remnant Kesteven 75 With The Chandra X-Ray Observatory

CS - 56

***Jacob Wagoner**. Dr. Thomas Pannuti, mentor, Department of Earth and Space Science, College of Science**

We present a spatially-resolved spectroscopic study of the Galactic supernova remnant (SNR) Kesteven 75 (G29.7–0.3) with the Chandra X-ray Observatory. We have analyzed archival pointed observations with a total effective exposure time of 350 kiloseconds made of this SNR. Kesteven 75 is an example of a composite SNR: such SNRs produce detectable X-ray emission from both a central pulsar and an expanding shell of shocked stellar ejecta and swept-up material. The interaction between X-ray emission from these two portions of the SNR is expected to play a crucial role in the evolution of the SNR but remains a poorly understood phenomenon. Kesteven 75 is a particularly remarkable composite SNR given its extremely young age of approximately 700 years (as indicated by the estimated age of its pulsar). Furthermore, preliminary spectroscopic analysis of the shell of Kesteven 75 indicates that the X-ray emission is produced by stellar ejecta rather than swept-up material, consistent with the argument for a young age of this SNR. Our spatially-resolved spectroscopic study is searching for spatial variations in the spectral properties of the X-ray luminous southern and eastern rims of the SNR shell: preliminary results will be presented and discussed.

10:15 – 10:30 a.m. Break

10:30 – 10:45 a.m. A Deep Chandra X Ray Observation Of The Nearby Spiral Galaxy NGC 7793

CS - 57

***Mitchell Nichols**. Dr. Thomas Pannuti, mentor, Department of Earth and Space Science, College of Science**

We present an analysis of a deep (four pointed observations with a total exposure time 190.32 kiloseconds) observation of the nearby spiral galaxy NGC 7793 with the Chandra X-ray Observatory. With its face-on orientation, elevated star formation rate and proximity to Earth (based on its estimated distance of 3.91 Megaparsecs), NGC 7793 is an attractive target for the study of the endpoints of stellar evolution (namely supernova remnants and X-ray binaries) in a spiral galaxy. Furthermore, the high angular resolution capabilities of Chandra (approximately 1" at 1 keV) make it well-suited for searches for X-ray counterparts to sources detected at other wavelengths. We have reduced the datasets from the Chandra observations using the CIAO software package and we detect an increased number of discrete X-ray sources within the optical extent of the galaxy over the 0.5 to 7.0 keV energy range in comparison to previous analyses. Additionally, a multi-band analysis shows that the vast majority of detected X-ray sources do not possess an optically identified counterpart. We also find from spatial analysis of an HI image of NGC 7793, that there is an extension of the HI emission toward the southeast that is not present in the optical extent of NGC 7793 in other bands.

10:45 – 11:00 a.m. Predicting The NCAA Tournament With Ordinal Logistic Regression

CS ◻ **58**

***Clifton Popp**, Mr. Randy Ross, Mr. Richard Blanton, mentors,
Department of Mathematics and Physics, College of Science**

In this project, I aimed to find a way to predict the often unpredictable NCAA Men's Division 1 Basketball Championship (or the Tournament for short). Many people will cast their predictions for the outcome of this tournament through "bracket challenges" all across the world. I decided that for my project, I would generate a model that would take past years of data and apply that to predict the winners of matchups in the current Tournament. This generates a bracket that is based strictly on Mathematics. My goal in this is to see how well the model can stack up against people around the world using ESPN's Bracket Challenge while using as much math and as little intuition as possible. I hope that through this, the model will be able to predict March Madness.

11:00 – 11:15 a.m. Modular Bootstrap Bounds At Finite Central Charge

CS ◻ **59**

***Casey Christian**, Dr. Joshua Qualls, mentor, Department of Mathematics
and Physics, College of Science**

Conformal field theories (CFTs) describe many physical phenomena, ranging from phase transitions to quantum gravity. By considering unitary 2d CFTs with modular-invariant torus partition functions, we find new universal constraints on the CFT spectrum for finite central charge. In addition to directly constraining consistent CFTs of, for example, low-dimensional condensed matter systems, these bounds on the number of states translate into bounds on black hole entropy in theories of three-dimensional quantum gravity.

11:15 – 11:30 a.m. Modelling Behavior Index Fund Using Differential Equation

CS ◻ **60**

***Binamrata Sharma**, Dr. Timothy O'Brien, mentor, Department of
Mathematics and Physics, College of Science**

An index fund is a type of mutual fund with a portfolio constructed to track the components of a market index, such as the Standard & Poor's 500 Index (S&P 500) or Dow Jones. When trading index funds, instead of tracking performance of the individual companies in the portfolio, we track their average. In my research I have analyzed how growing interest and investment in index fund can influence the overall performance of the market and value of individual stocks.

11:30 – 11:45 a.m. Investigating The Anode Heel Effect

CS = 61

***Casey Christian**, *Dr. Ignacio Birriel¹*, *Mr. Michael Gossman²*, *mentors*,
**Department of Mathematics and Physics, College of Science¹, Tri State
Regional Cancer Center²****

The anode heel effect is a variation across an x-ray beam that is a result of the geometry of the anode head; it results in a decrease of the intensity of the beam from the cathode side to the anode side of the resulting radiation. This experiment, conducted at the Tri-State Regional Cancer Center in Ashland, KY, was an investigation of the heel effect at energy levels of 75kV, 140kV, and 6MV. An ArcCHECK dosimeter, which is a cylindrical imaging phantom that contains 1386 n-type silicon diodes arranged in a helix over the apparatus, was used to acquire beam profiles and dose distribution plots of x-ray beams for the energy levels. It was noticeable from the plots that the anode heel effect had visible effects at both 140kV and 75kV, and that the severity of the effect increased with decreasing beam intensity.

11:45 – 12:00 p.m. *Break*

12:00 – 12:15 p.m. Gender Inequality In MSU's MPATE Rotational Physics Device

CS = 62

***Donald Matthews**, *Dr. Ignacio Birreil*, *Mr. James Adkins*, *mentors*,
Department of Mathematics and Physics, College of Science**

At Morehead State University, we redesigned a device used during our annual Mathematics, Physics and Advanced Technology Exploration (MPATE) Day. The device is intended to give students a hands-on activity demonstrating the interaction between kinematic and rotational motion, and stimulate interest and understanding in introductory physics class environments. This study investigates the gender inequality of the construction of the device. The preliminary data show that a gender inequality is present. We will propose a potential solution for this inherent gender inequality.

12:15 – 12:30 p.m. Documenting Night Sky Brightness In Central And Eastern KY In The LRGB Color Bands

CS = 63

***Madison Howard**, *Dr. Jennifer Birriel*, *mentor*, **Department of
Mathematics and Physics, College of Science****

The use of artificial light at night is fundamentally altering the spectral signature of the night sky. In the past, both high and low pressure sodium light fixtures emitted mostly in the middle of the spectrum with strong yellow emission. Newer, more energy efficient LED lighting emits more strongly in the blue end of the spectrum; blue light scatters more effectively than shorter wavelength light. Therefore, the spectral signature of the night sky is being significantly altered and both glare and sky glow are expected to increase with increased use of LED lighting. We will use two sets of portable detectors consisting of a bank of four data-logging Unihedron Sky Quality Meters to measure the spectrum of the night sky at various locations in Kentucky. Our experimental setup will measure the brightness of the night sky in the clear (L), red (R), green (G), and blue (B) filter bands simultaneously at a dark sky site and a site with artificial illumination. Before deploying our detectors, we first need to do an intercomparison between both sets of detectors. Here, we discuss our early efforts and future plans.

12:30 – 12:45 p.m. Cosmic Muon Detection With A DSLR

CS = 64

***Jared Castle**. Dr. Jennifer Birriel, mentor, Department of Mathematics and Physics, College of Science**

In a 2010 article in Astronomy Education Review a digital single-lens reflex camera was used to detect cosmic muons. We originally hypothesized that the number of cosmic ray hits on a DSLR camera should decrease as the angle that the CMOS chip makes with the horizontal increases. We used a Nikon D7000 camera with a light-tight lens cap attached, and secured it to an incline plane to allow us to change the angle of inclination of the CMOS chip. We collected five, 3-minute exposures at ISO 6400. We performed a visual search of each image for cosmic ray strikes using an image manipulation program. The angles used were: 0, 20, 30, 45, and 90 degrees all with respect to a horizontal plane. We derived an uncertainty equivalent to the square root of the number of counts. Our results show no significant evidence of angular dependence. This seems reasonable since cosmic muons do not follow a purely vertical path and we collect contributions from multiple showers occurring at different locations in the sky. We were able to corroborate previous results indicating that DSLR CMOS chips appear to capture cosmic muons at about half the predicted rate of one per cm² per second. In the future, plan to examine the effects of overhead power lines.

12:45 – 1:00 p.m. A Simple Solar Limb Darkening Experiment

CS = 65

***Ethan Caudill**. Dr. Jennifer Birriel, mentor, Department of Mathematics and Physics, College of Science**

The brightness of the solar disk is greatest at its center and decreases moving outward to the limb: this is the so-called “limb darkening effect”. Here, we demonstrate how solar limb darkening can be measured using modest equipment. We use a solar projection scope (a modified “Solar Scope”) and a cellphone camera to record data. Using SalsaJ, we examine the limb darkening effect both qualitatively and quantitatively. We explain our methodology and discuss how to use this as a laboratory activity that requires a very low learning curve.

1:00 – 1:15 p.m. Use Of Translation Services To Improve Patient Outcomes In Rural Teaching Hospitals

CS = 66

***Abby Dietsch**, *Ashlee Gross**, *Makayela Banks **, *Rachel Branham **. Ms. Suzi White, mentor, Department of Nursing, College of Science**

According to the United States Census Bureau American Community Survey, more than one in five people that live in America speak a language other than English at home. This creates a nursing practice issue because the number of non-English speaking individuals in the United States is skyrocketing. As a result, nursing staff needs to be equipped to effectively communicate with non-English speaking patients during hospitalization and treatment. A literature review of 20 research studies identified that in-person translation was preferred over electronic translation services. Two of the reasons for this preference included decreased 30-day readmission rates and overall cost effectiveness. The purpose of this quality improvement project was to understand nurses perception of under use of translation services when providing patient care. Four areas of nurses perceptions related to cost, time, benefits, and drawbacks. A questionnaire addressing these areas was developed and staff nurses were invited to complete for data collection purposes.

Concurrent Session - ADUC 321
Moderators: Ms. Kryz Lynam and Dr. Chris Miller

8:30 – 8:45 a.m. Mathematical Modeling Of The 2017-2018 Influenza Season

CS = 67

***Benjamin Fitch**, Dr. Michael Dobranski, mentor, Department of Mathematics and Physics, College of Science**

The spread of the influenza virus and disease has plagued humans for millennia. In recent history, the 1918 influenza pandemic swept the world resulting in a staggering death toll of fifty to one-hundred million people worldwide. Mathematical modeling of the spread of the influenza virus is essential in the development of methods in disease prevention. In the project, we applied the SIR epidemiological model to the 2017-2018 influenza season. Euler's Method was used to approximate the solution to the SIR model with estimates for the initial susceptible population, and transmission and recovery rates. We then used Microsoft Excel Solver to improve these estimates. Addition of a second virus strain was implemented to produce a model that better reflects the physical world. Finally, a curve was produced in the single-strain and two-strain models.

8:45 – 9:00 a.m. Correlates Of Acceptance Of Autonomous Vehicles

CS = 68

***Jorden Crowe, Marissa Childers, Sydney Young, Vanessa Jones**,
Dr. Gregory Corso, mentor, Department of Psychology, College of Science**

Completely autonomous vehicles are rapidly approaching a plausible reality. They have the potential to not only reduce roadway congestion and rush hour traffic but to also provide independent mobility for disabled people. Regardless of the benefits, autonomous vehicles must first be accepted by users. The purpose for our research was to investigate personality and demographic characteristics as they relate to the acceptance of autonomous vehicles. We collected data using online survey takers through Amazon Services (TURKers). A total of 105 TURKers responded, but because some of the survey takers provided incomplete surveys, only the data from 83 participants were usable. Participants completed the Self-Driving Car Acceptance Scale (SCAS) survey (Nees, 2016), a Big-Five survey, and a demographic survey. A series of correlational analyses between the SCAS and the Big-Five surveys and between the SCAS and the Demographic surveys were performed. Additionally, a factor analysis (varimax rotation and Kaiser normalization) was performed on the SCAS survey data responses which identified three factors related to acceptance of autonomous vehicles. The correlational analysis between personality characteristics and SCAS provided insights into specific characteristics associated with the acceptance of autonomous vehicles. Likewise, the analysis between SCAS and demographics shows specific negative relations between education and trust, among others. This research was supported by a MSU Undergraduate Research Fellowship.

9:00 – 9:15 a.m. Effects Of Drug Abuse On Oral Hygiene And Recovery Following Oral Surgery

CS = 69

***Aubrey Bennett**. Dr. Ilsun White, mentor, Department of Psychology, College of Science**

Drug abuse has a significant impact on physical health. This study examined drug abuse effects on oral health and the speed of recovery after oral surgery. Physical and oral health were assessed in six patients who received oral surgery at a dental clinic and their history of drug abuse was examined, focusing on two classes of drugs, narcotics and methamphetamine (METH), a psychostimulant. The physical assessment measured observable conditions, including general physical condition (hair, skin, cuts, infection), weight loss, and pain sensation. The oral health assessment measured condition of gums (red or puffiness), teeth (discolored or broken), x-rays (abscess or damage), and odor. The recovery period was measured by the number of days took to recover from surgery without infection or other subsequent problems. Compared to controls, patients with a history of drug abuse scored lower on assessment of both physical and oral health, reflecting poor physical and oral hygiene. Moreover, drug users required a longer recovery period after oral surgery. Interestingly, compared to controls, drug users showed a higher pain threshold. This was primarily due to use of ibuprofen, acetaminophen, or both. Present findings suggest that drug abusers develop periodontal diseases, leading to a greater possibility for surgical intervention. Consistent with previous report that use of narcotics delays recovery period (Preeti, 2015), present findings provide further evidence that a history of drug use can predict a longer recovery time following oral surgery.

9:15 – 9:30 a.m. XMM Newton Observations Of The Galactic Supernova Remnants G32.4+0.1 And G359.1-0.5

CS = 70

***Lori Porter**. Dr. Thomas Pannuti, mentor, Department of Earth and Space Science, College of Science**

While nearly 300 supernova remnants (SNRs) are now known to exist in our Galaxy, only a tiny fraction of these sources have been studied in significant detail at multiple wavelengths. To remedy this situation and to improve our knowledge of general properties of SNRs and SNR-related phenomena, we are analyzing a sample of pointed archival X-ray observations made of poorly-studied Galactic SNRs with the XMM-Newton Observatory. We present here the initial results of our spatially-resolved spectroscopic analysis of two sources in our sample – G32.4+0.1 and G359.1-0.5 – which exhibit unusual X-ray properties for Galactic SNRs. While the majority of Galactic SNRs produce X-ray emission via the thermal bremsstrahlung process, the X-ray emission from G32.4+0.1 appears to instead be synchrotron radiation from extremely relativistic cosmic-ray electrons accelerated by the SNR. Furthermore, while the X-ray morphologies of Galactic SNRs are shell-like, the X-ray morphology of G359.1-0.5 is not shell-like but instead is center-filled.

9:30 – 9:45 a.m. Revisiting Streptavidin Biotin Interaction With Enhanced AFM Techniques

CS - 71

Bradley Mahaffey*, Dr. Jennifer Birriel, mentor, Department of Mathematics and Physics, College of Science

Single molecules force spectroscopy (SMFS) is a type of atomic force microscopy (AFM) that's aims to characterize mechanical properties of molecules and resolve kinetic parameters and energetic landscapes. This has historically been performed with substrate and cantilever chemistry functionalization that does not yield high quality data in a timely manner. When data is recorded, it can be misconstrued, due to nonspecific adhesions of biomolecules, as an interaction of a complex or unfolding of a protein. Additionally, when a ligand binds to its receptor, the complex can be at a disposed orientation with respect to an assumed vertical application of force. We apply the program, as adapted from previous work, to establish a centered force pulls routine, in attempt to represent the recorded force as accurate as possible. With these enhanced AFM techniques, we can correct for any misconceptions as to the kinetics and energetic of the Streptavidin-Biotin complexes interaction.

9:45 – 10:00 a.m. Medication Labeling And Consumer Needs

CS - 72

Jorden Crowe*, Kirsty Beckett, Marissa Childers, Sydney Young, Vanessa Jones. Dr. Gregory Corso, mentor, Department of Psychology, College of Science

Prior research on labels for over-the-counter (OTC) medications suggests that consumers most accurately obtain information when the drug name and dosage amounts are placed in a highlighted box located in the upper-right-hand corner of the label. However, most of the research on the labels for OTC medications lacks consumer collaboration. The lack of consumer involvement inspired us to evaluate OTC medication labels. We asked the following three questions: (A) what information consumers would like on over-the-counter medication labels, (B) does highlighting information on the labels improve retention of that information, and (C) does brand name or generic packaging influence consumer choice. We investigated the first question by giving participants medication descriptor items and asked the participants to place the descriptor items they found important on a blank label and to place the most important descriptor items in a smaller highlighted box contained within the blank label. The most frequently listed items in the small box were drug name, dosage, and purpose. We investigated the second question by presenting participants with labels that differed in the information that was placed in the highlighted box and asked questions about the information on the label. For the third question, we presented multiple types of labels and asked participants to rank order the different types of labels based on trustworthiness and aesthetics. The results from this research may result in better-informed consumers of over-the-counter medication. This research was supported by an MSU Undergraduate Research Fellowship.

10:00 – 10:30 a.m. *Break*

10:30 – 10:45 a.m. Teacher Engagement And Student Questioning

CS - 73

***Kelsey Purdum**. Dr. Daniel Grace, mentor, Department of Early Childhood, Elementary and Special Education, College of Education**

This study seeks to find whether randomly pulling popsicle sticks to call on students to answer the teacher's questions during a fifth-grade social studies class will increase students' academic engagement. Students in the classroom that are low achieving or who are more withdrawn may not have as many opportunities to engage in class discussion. This research attempts to increase the range of students that is selected to answer questions thereby increasing student opportunities for involvement. Asking questions can be an effective way to monitor student learning and to formatively assess students. This study will investigate if the strategy of randomly pulling popsicle sticks increases student academic engagement rates, therefore providing a research-base for its effectiveness as a teaching strategy.

10:45 – 11:00 a.m. Subjectivism: The Modern Malady

CS - 74

***Gabe Foit**. Dr. Timothy Simpson, mentor, Department of Foundational and Graduate Studies in Education, College of Education**

Clive Staples Lewis was more than a mere fictional writer. He was a devout Christian, a mind of unfathomable genius, and, perhaps most importantly, a keen observer of educational philosophy and practice. In Lewis' work *The Abolition of Man*, he analyzes modern educational practice to reveal its underlying assumptions. Further, he describes in vivid detail, like a painter at a canvas, the mind, heart and appetites of modern man formed by modern education. Within his description and analysis, he identifies a fundamental presupposition that carries deleterious consequences for humans and human civilization. Lewis's mission is to alert us to this presupposition, its potential consequences, and calls us to return to an ancient, but vital, presupposition in order to avoid the abolition of man. Not unlike a doctor's visit, the symptoms of modern man must be observed, an illness diagnosed, a prognosis—good or bad—made, and a treatment plan followed in order to obtain a cure. Accordingly, this presentation will begin by identifying and describing the symptoms of modern man and the root cause of the sickness, with a special focus on the educational system. The presentation will then briefly explore the prognosis of modern man if the sickness goes untreated. Next, the presentation will elucidate Lewis' call for a return to an ancient presupposition about man and reality. More specifically, this presentation will identify what kind of educational system Lewis recommends in order to restore man and society to health and prevent a recurrence of the modern malady.

11:00 - 11:15 a.m. High Stakes Assessments

CS - 75

Jordan Turley*. Dr. Lola Aagaard, mentor, Department of Foundational and Graduate Studies in Education, College of Education

High-stakes assessments measure student achievement and have been central to education debate and reform for a very long time. Norm-referenced achievement tests (such as the Comprehensive Test of Basic Skills [CTBS]) were in use in many districts decades prior to No Child Left Behind (NCLB) legislation in 2000. NCLB was a broader attempt to require widespread use of standardized tests tied to strict accountability standards. Proponents of high-stakes tests maintain they force teachers to do a better job, which is worth the stress that it puts on both students and educators. In the view of their supporters, high-stakes testing is linked to improvement on other national and international tests. Research indicates, however, that holding educators to the unrealistic goal of getting all students up to standard at the same time resulted in an array of negative consequences that were not intended by the original legislation. Reforming U.S. educational methods to cultivate students' intrinsic motivation might be a more powerful force for achievement than applying extrinsic motivation through rewards and sanctions and would have fewer negative consequences. This project was supported by an Undergraduate Research Fellowship.

11:15 – 11:30 a.m. Equitable Technology Integration: Kentucky Technology Integration Certification

CS - 76

Stacie Slusher*. Dr. Jeannie Justice, mentor, Department of Foundational and Graduate Studies in Education, College of Education

The study investigates the current digital divides experienced by educators and students and rationalizes the creation of a certification for the technology integration specialist role. The literature review chronicles the access and use divides; however, newer literature revealed the emergence of another type of digital divide related to opportunity. The study discusses the need and advantages of a credential for a technology integration specialist and the potential impact of such a credential.

11:30 – 11:45 a.m. **Educational Accountability: A Historical And Philosophical Evaluation Of School Responsibility**

CS - 77

***Victoria Nash**. Dr. Timothy Simpson, mentor, Department of Foundational and Graduate Studies in Education, College of Education**

Since the colonial era, American schools have been held responsible for producing an array of student outcomes. The traditional reading, writing and arithmetic represent only a small sample of such outcomes. While educational accountability is accepted and expected by the American public, contention arises when we seek to identify “who” should be held accountable, “for what” outcome, and “with what consequence.” The answers to these questions remain controversial, elusive, and challenging, even today. Yet, the current American educational system persists in the expectation and use of school accountability, specifically test-based accountability. Is an accountability system conducive to producing good schools and capable students? This paper will attempt to address this question by first reviewing the basic notion of accountability and briefly recounting its history in American education. We will give special attention to understanding the purpose, assumptions, and mechanics of test-based accountability. We will then turn to educational philosopher Harry Broudy for a penetrating analysis of educational accountability. His examination affords us the opportunity to identify potential concerns with any educational accountability system. As a result, we are in a better position to understand both the potential and limitations of using accountability systems to produce good schools and capable students.

Concurrent Session - ADUC 319
Moderator: Dr. Greg Russell

8:30 – 8:45 a.m. A Southern Regional University Navigating A New Normal

CS - 78

***Rachel Wallace**. Dr. Ahmad Hassan, mentor, School of Business Administration, Elmer R. Smith College of Business and Technology**

As with most institutions of higher education, KSU has been struggling in the midst of a decade state funding cuts, increased rivalry, and the performance-based funding system. In addition, KSU is located in a region that is hard-hit from the severe economic downturn caused by coal-mining closings. Since the onset of the economic downturn in 2008, the institution has gone through the process of “trimming the fat” to maintain operational efficiency and solve the dilemma of addressing the harsh fiscal environment without resorting to tuition increases which undermine its mission of creating affordable and accessible education to low income or first-generation students.

Institutions of higher education like any organization need to effectively change themselves in order to keep with the pace of changes in their environment and thus survive and grow. Organizational changes can be overall strategic changes, which will cause subsequent changes in multiple functional areas. The purpose of this case is to gain a better understanding of the challenges posed by both the internal environment and external environment of the institution, and the strategies the institution adopt to deal with the challenges caused by environmental change.

8:45 – 9:00 a.m. Social Network Analytics Using Machine Learning

CS - 79

***Craigory Coppola**. Dr. Heba Elgazzar, mentor, School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

The goal of this research project is to analyze the dynamics of social networks using machine learning techniques to locate maximal cliques and to find clusters for the purpose of identifying a target demographic. Unsupervised machine learning techniques are designed and implemented in this project to analyze a dataset from YouTube to discover communities in the social network and find central nodes. Different clustering algorithms are implemented and applied to the YouTube dataset. The well-known Bron-Kerbosch algorithm is used effectively in this research to find maximal cliques. The results obtained from this research could be used for advertising purposes and for building smart recommendation systems. All algorithms were implemented using Python programming language. The experimental results show that we were able to successfully find central nodes through clique-centrality and degree centrality.

9:00 – 9:15 a.m. Design And Implementation Of An Innovative System For Automatic Recognition Of ASL Using Machine Learning

CS - 80

***Joshua Webb**. Dr. Sherif Rashad, mentor, School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

Deaf and hearing-impaired persons learn American Sign Language (ASL) as their natural language. There is a need for a new innovative technology that will enable deaf and hearing-impaired persons to communicate without difficulty anytime and anywhere with persons who do not know ASL. We explore in this research project the problem of automatic conversion from ASL to speech using motion sensors and machine learning. The goal of this project is to design a smart system to capture and recognize hand gestures using Leap Motion sensors, Unity game engine, and machine learning algorithms. The new proposed system will be able to work in an adaptive way to learn new signs and to expand and improve the dictionary of the sign language. Initial experimental results show that the proposed system is promising . This system will have a wide range of applications for healthcare, education, gamification, entertainment, and many other applications.

9:15 – 9:30 a.m. Capital Structure And Profitability: A Case Study Of U.S. Manufacturing Companies

CS - 81

***Cuibing Wu**. Dr. Nilesh Joshi, mentor, School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

The objective of this study is to investigate the relationship between capital structure and profitability of companies in the manufacturing industry. Historical data (2009-2018) is collected from the annual reports of a sample of 15 U.S. manufacturing companies for this study. Applying the panel analysis techniques, the regression models of capital structure and profitability ratios are empirically constructed. The results reveal that the capital structure plays an important role in overall profitability of the underlying organization. Particularly, the Coverage Ratio (CR), Total Debt to Equity (TDE), Debt to Tangible Worth (DTNW) ratios, which reflect the capital structure, have statistically significant impact on the two profitability ratios: Return on Assets (ROA) and Return on Invested Capital (ROIC). Furthermore, it has been observed that the Firm Size (FS) as a control variable in this research also has an effect on the firm's profitability.

9:30 – 9:45 a.m.

Automatic Work Schedule Generator Application

CS ▪ 82

Tyler Gilliam*. ***Ms. Connie Grimes, Dr. Sherif Rashad, mentors***, **School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

The Automatic Work Schedule Generator Application is a program designed to take in employee shift needs as input and create a work schedule based on these needs that best compensates all the employees without the manager having to do any adjusting to the work schedule themselves initially. Employers like call centers, retailers, and nurse's offices face an issue with scheduling due to the drastically irregular schedules needed to be worked compared to that of a larger company that has normal 1st, 2nd, and 3rd shifts. This application will look to lessen the need for constant schedule reevaluation from the shift manager and introduce the ability for more direct employee input through a request and notification system. Building better communication between the employer and the employees is also an important goal that this application will seek to fill, as the mobile application will encourage a more direct back-and-forth between the shift manager and the employees. This way, even if the schedule generator doesn't comply with every employee on the schedule, the employee can make a request and it can be observed by other employees and the shift manager, and the request can be filled by either a cooperating employee, by the schedule generator readjusting, or manually by the shift manager if necessary. I've made the decision to turn this program into a mobile application because not only will the communication be more direct, but as an application, the notification of the schedule request will be made and delivered to all those effected very quickly so conflicts can be worked out well before the shift needs to be filled. This schedule generator looks to improve upon some of the common difficulties involved with scheduling including schedule conflicts, open shifts, unforeseen call-offs, or unwanted schedule patterns. The application is designed in java and will be presented as a mobile application that can be tested by users.

9:45 – 10:00 a.m.

A Study And Implementation Of Low Level Graphics APIs

CS ▪ 83

Andrew McCoy*. ***Dr. Heba Elgazzar, mentor***, **School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

In 2013, AMD in cooperation with DICE began development of the rendering low-level rendering API known as Mantle. Mantle differed from its contemporaries such as OpenGL and Direct3D through its focus on low system overhead achieved through granting applications more explicit control over hardware performance, moving tasks away from the API's driver and establishing a potential gain in performance at the cost of more work on the part of the programmer. In 2015, Microsoft released DirectX 12, which included Direct3D 12. Direct3D 12 follows the same low-level design philosophies of Mantle. AMD later gave mantle to OpenGL developers Khronos Group, who absorbed the API into their glNext initiative, later renamed the Vulkan API. This project will focus on exploring the differences between the development experience and performance of low-level APIs and more traditional high-level APIs, using Vulkan and OpenGL as the focus. The project will center on the difference in starting a project with OpenGL and starting one in Vulkan, as well as compare performance between two identical pieces of software developed with each.

10:00 – 10:15 a.m. A Graph Theoretical Analysis Of Magic: The Gathering

CS - 84

James Bowman**. *Dr. Robin Blankenship, mentor, Department of Mathematics and Physics, College of Science

In his 2006 paper, Jacob Chodoriwsky used graph theory to develop methods through which to grade Magic: the Gathering deck-building and predict tournament results. This presentation will build upon Chodoriwsky's work by using a different graph model. Common shapes in graphs to find archetypes and strategies, among other findings will be discussed.

10:15 – 10:30 a.m. *Break*

10:30 – 10:45 a.m. Factors Determining The Use Of And Access To Broadband Access In Eastern Kentucky Counties

CS - 85

Karly Potts**. *Dr. Ali Ahmadi, mentor, School of Business Administration, Elmer R. Smith College of Business and Technology

The purpose of this paper was to investigate the factors determining the broadband Internet access and/or use in eastern Kentucky. Internet Access, as the dependent variable, was postulated as being a function of two factors, income level and educational attainment. The data from the United States Census Bureau regarding the median household income by county, and Kentucky's educational attainment by percentage of high school graduates or higher were collected. A multiple regression model, as well as two simple regression models, were tested. The results of the study indicated only the level of education attainment in the counties was a significant factor in the use and access to Internet use.

10:45 – 11:00 a.m. NASA MSU Deep Space Network X Band Feed Control Software System

CS 86

Jeremiah Lowe*. Mr. Jeff Kruth, mentor, Space Science Center

Morehead State University has been offered the unique opportunity to be a node on the Deep Space Network (DSN). The DSN is the means by which ALL of the information from NASA deep space probes is returned to earth. This network is run for NASA by the Jet Propulsion Lab (JPL) and consists of 3 locations on the earth. Morehead is #4! In order to perform this function, MSU must add additional features & infrastructure to the 21 meter Space Tracking Antenna. One of the upgrades is the addition of a \$300,000.00 Feed System operating at X band (7-8 GHz).

The Feed System is very complex and must have electronic monitoring & control capability, as it is remotely operated. It contains items such a cryogenically cooled Low Noise Amplifier (LNA), first of its kind in the USA! This project involved the creation of the software routines that perform the monitor & control of the system. This software runs on a Raspberry Pi single board computer that is attached to an MSU designed & built interface printed circuit board. In turn, this Pi computer system will be remotely controlled by a special, dedicated computer system, called the Network Monitor & Control computer (NMC) in the Mission Operations Center at the Space Science building.

My job is part of this very large, complicated project, and has been to write the control and monitoring systems of the feed, which is part of the NMC subsystem. I am solely responsible for the software of the feed's internal command and control system, which handles directing the signal paths in the feed (very important so that the transmitter does not damage the LNA), setting operational modes like polarization, and making sure everything internal to the feed is within nominal limits (temperature, voltages, network, etc.). This software is written in Python3 and running on a Raspberry Pi 2 (25\$ handheld computer running debian linux). The Pi computer, backbone of all the systems in the feed, controls the feed, as well as collects all the operation data for a history file. Additionally, I have helped architect the entire NMC computer system and will be involved in all the software tasks, including creating a custom modular interface to control a variety of other sub-systems, based on my experience with the feed system.

11:00 – 11:15 a.m. Implementation Of The SPICE Observation Geometry System For The Lunar Ice Cube Mission

CS ▪ 87

Jacob Schabert**, *Dr. Benjamin Malphrus*, *mentor*, *Space Science Center

In remote-sensing science missions, understanding the observational geometry of the mission is exceptionally important in achieving the science goals. Without this information, the mission scientists would have a set of data with no feasible method of correlating it with a physical point for future reanalysis or practical applications. To meet this requirement, NASA JPL's Navigation and Ancillary Information Facility (NAIF) has developed and supported a data system and set of tools called SPICE. To meet its science requirements, SPICE is being used by Lunar IceCube as its basis for ancillary information. Lunar IceCube is a CubeSat developed by Morehead State University in partnership with NASA Goddard, NASA JPL, NASA IV&V, Busek, and others. It is one of the thirteen CubeSats selected to launch as a secondary payload on Exploration Mission 1 (EM-1) the first launch of the Space Launch System. This work will result in a well-structured set of SPICE-readable data and a SPICE-based software tool to interpret observational geometry data for the Lunar IceCube mission which will allow correlation of the observations with features on the Lunar surface. This research was supported by Kentucky's Space Grant Consortium, NASA JPL, the Morehead State University Space Science Center, and the Hal Rogers Undergraduate Fellowship for Space Science.

11:15 – 11:30 a.m. A Study Of The Quasar PKS2135-147

CS ▪ 88

***Leonard Aue*, *Parker Poulos**, *Dr. Dirk Grupe*,¹ *Dr. Wolfram Kollatschny*,² *mentors*, *Space Science Center*¹, *Institute for Astrophysics, Goettingen*²**

I present a long-term variability study of the Quasar PKS2135-147. PKS2135 was first optically identified in 1966 as a quasar (Bolton & Eckers, 1966), and is variable on the scale of months to years (Angione 1971). It has been observed by SWIFT since 2013, and the optical data analyzed in this study is from 2016. I will discuss the X-Ray variability of this source, as well as the results of the optical spectra and UV data.

Concurrent Session - ADUC 320
Moderator: Dr. William Green

8:30 – 8:45 a.m. The Royal Canadian Mounted Police: Can You Change A Sexual Culture?

CS - 89

***Colby Birkes**. Dr. William Green, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The Royal Canadian Mounted Police, the federal police force headquartered in Ottawa, was created in 1873. By the mid-twentieth century, women were employed as RCMP lab technicians, but not permitted to serve in policing positions until 1974. Since then they have not been treated equally, because of the RCMP's sexual culture which is resistant to change. My research paper and its presentation explore the RCMP's institutional culture and practice of sexual harassment, explain why it has been so difficult to change this culture, and evaluate the proposals to establish an independent board to oversee the complaint process, a merit board promotion process, and external review board to serve as a liaison between legislators and the RCMP leadership. The documentary research and interviews for my paper and its presentation were conducted in Ottawa, Canada during my participation in the 2018 Canadian Parliamentary Internship Program and were supported by a Canadian Studies Scholarship.

8:45 – 9:00 a.m. The Golden Doors: Immigration Policies In Canada And The United States

CS - 90

***Brandon Bryer**. Dr. William Green, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The Statue of Liberty's pedestal has engraved in a bronze plaque the words of Emma Lazarus's poem The New Colossus, "Give me your tired, your poor, your huddled masses I lift my lamp beside the golden door!" How brightly does Liberty's lamp light the golden doors of the United States and Canada and admit "the homeless tempest-tossed" to their promised lands? To answer this question, my paper will describe the structure, procedures, and objectives of each nation's immigration policies; explore their points of divergence and how their policies reflect their laws, domestic interests, and national identity; examine the rhetoric and policies of Prime Minister Justin Trudeau and President Donald Trump that suggest a fundamental shift in their nation's immigration policies; and that, while the differences are substantial and fundamental, there are ideas that can migrate across their border which are pragmatic enough to be incorporated into each nation's immigration policies.

9:00 – 9:15 a.m. Missing And Murdered Indigenous Women And Girls

CS - 91

***Hanna Stettner**. Dr. William Green, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Missing and murdered Indigenous women and girls is a Canadian human rights crisis and a national tragedy currently confronting the national government. The National Inquiry Into Missing and Murdered Indigenous Women and Girls is the first major governmental initiative to explore this crisis. Independent of federal, provincial and territorial governments, its five Commissioners have a mandate to examine and report on the systemic causes of all forms of violence against Indigenous women and girls. My paper and its presentation discuss the victimization of and discrimination against Indigenous women, examine the work of the National Inquiry, and explore the views of three Members of Parliament -- Nikki Ashton, Jenny Kwan, and Georgina Jolibois -- who are critical of the Inquiry's transparency and accountability. The documentary research and interviews for my paper and its presentation were conducted in Ottawa, Canada during my participation in the 2018 Canadian Parliamentary Internship Program and were supported by a Canadian Studies Scholarship.

9:15 – 9:30 a.m. Canadian Immigrant Integration Programs: What Can The United States Learn?

CS - 92

***Emily Ball**. Dr. William Green, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Canada is well-known worldwide for its open immigration policies which have become the foundation of Canadian society and vital to its economy. The federal government supports integration programs to assist new immigrants to become accustomed to life in Canada with needs assessments and referrals, language assessments and training, employment services, and community connections. The Migrant Integration Policy Index of 2015 which examined eight key immigrant integration policies -- labor market mobility, family reunification, education, health, political participation, permanent residency, access to nationality, and anti-discrimination -- ranked Canadian integration as among the best in the world. My research has found that these Canadian integration programs are successful and that similar policies could be adopted by the United States to improve its integration programs. The documentary research and interviews for this paper and its presentation were conducted in Ottawa, Canada during my participation in the 2018 Canadian Parliamentary Internship Program and were supported by a Canadian Studies Scholarship.

POSTER SESSION – 1:15 PM – 3:00 PM

ADUC Ball Room

P - 1

The Portrayal Of Women In Movie Musicals From The 1960's To Present Day

Eliza Eaches*. Dr. Michele Paynter Paise, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

Movie musicals have been a staple of media for nearly a century. This particular type of media communicates values also seen in society, such as gender depiction and representation. The purpose of this study is to examine the portrayal of women in movie musicals as it relates to concurrent societal standards and expectations of women. Results are discussed and suggestions will be made.

P - 2

Photography Practicum: Learning The Basics Of Managing A Fine Art Photography Studio

Darcy McDaniel*. Dr. Robyn Moore, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences

The photography practicum provides Art and Design student researchers with the practical experience of managing a fine art photography studio. Students learn how to operate, manage, and maintain industry standard fine art archival inkjet printers as well as a fifteen station traditional black and white darkroom. This project provides essential expertise and knowledge that students, as lab monitors, both share with other students and incorporate into their own fine art practice and professional activities. Student researchers learn how to mix, store, and dispose of photographic chemistry, provide daily assistance to undergraduate and graduate photography students, and generate ideas for improvements to the lab. Students also contribute to the ongoing revision of the Photography Lab Manual, which specifies best practices and operating procedures for future photography lab monitors. The practical knowledge gained from this experience is highly valuable to colleges, universities, community colleges, artist co-ops, and professional photography labs that seek to employ individuals to manage and teach both digital and analog photography practices. This research was funded with an Undergraduate Research Fellowship.

P - 3

Fundraising Practices For New Symphony Orchestras In The United States

***Alyssia Bunts**. Dr. Ellen Mosley, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

The majority of symphony orchestras in the United States were founded before 1960 and have cultivated significant endowments that provide stability and ensure the success of their nonprofit organizations. The Cave Run Symphony Orchestra (CRSO) in Morehead, Kentucky is less than ten years old and will benefit from research into the best methods for fundraising and grant applications for an organization of its age and size. We have conducted extensive research into available grants for the CRSO, identified community partners and events that had a potential for collaboration, and prepared a paper and presentation exploring the "best practices" new nonprofits in the arts have implemented with success in similar organizations. Through this research, we have found that early implementation of grant writing and community support are vital in producing a successful new nonprofit organization in the arts. While the challenges of maintaining a successful nonprofit organization are amplified for newer organizations, it is possible to still produce a wildly beneficial and financially stable organization.

P - 4

Does Music Make A Difference For At Risk Students?

***EmaLee Copeland**. Dr. Michele Paynter Paise, mentor, School of Creative Arts, Caudill College of Arts, Humanities and Social Sciences**

Music participation is often believed to be a contributing factor to student success. The purpose of this study was to examine the perceptions of music students who have been identified as "At-Risk." The researcher distributed a survey to students in an urban school in Kentucky. Once the surveys were collected, she compiled the data and made connections between students' perceptions of success, music participation, and outside struggles such as having a parent in jail, teenage pregnancy, poverty, and drug use in the family. Comparisons between age, gender, level of participation, and other factors were also examined.

Information Seeking Behaviors Following A Livestock Disease Outbreak

***Madison Wallace**. Dr. Morgan Getchell, mentor, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences**

In 2013, an outbreak of Porcine Epidemic Diarrhea Virus (PEDv) infected the United States hog population, resulting in significant losses for the pork industry. This outbreak demonstrated not only the need for improved biosecurity practices in the livestock production industry, but also improved communication with stakeholders during all phases of the crisis. The purpose of this study was to learn more about the information seeking behaviors of individuals during a crisis of this nature, and to test the impact of various message types on information seeking.

Five focus groups were conducted with students at a regional university in the southeastern US. Participants were exposed to two mock television news stories that contained different levels and types of information and emotional appeals. After viewing each video, participants were asked a series of questions about the videos and the information they contained.

Results from the focus groups reveal several emergent themes. Participants showed a preference for the news story containing more information about the origin of the disease, the risk of human transmission, and the status of a vaccine/treatment. They also showed a preference for the video that made an emotional appeal by showing the personal impact to a swine farmer and his operation. When asked about trusted sources, participants reported more trust in governmental sources such as the United States Department of Agriculture (USDA) and the Centers for Disease Control and Prevention (CDC) than they did in traditional news sources. The consensus was that they would seek any additional information via internet searches and would consult three to five additional sources before feeling able to make an informed decision. Participants stated that they would only monitor the situation so long as it was covered by the media.

This research reveals more about the information seeking behaviors of audiences during a livestock contamination event and provides practical takeaways for risk and crisis communicators.

Focus Attraction, Accents, And Attachment

Alora Chesney*, Theresa Vetter*, Victoria Nash*. Dr. David Potter, Dr. Katy Carlson, mentors, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences

In a sentence like “Sammy heard that Bill had called on Monday,” the final phrase “on Monday” can attach to and modify the nearest verb (“called”) or the earlier verb (“heard”). In two experiments, we tested the Focus Attraction Hypothesis, which claims that ambiguous items in a sentence will be associated with the focused part of a sentence containing important information. Focus can be indicated by an accent or a focus particle like “only.” Specifically, when the focus particle “only” is placed before a verb (“Sammy only heard” or “Bill only called”), it marks the verb as important; we predicted that this would draw the attachment of the adverbial phrase “on Monday.” Experiment 1 marked either the first or second verb with “only,” or with “only” plus an accent. Participants were asked “What happened?” and chose between two paraphrases of the meaning: “Sammy heard something on Monday” or “Bill called on Monday.” They chose Verb 1 “heard” as the attachment site more often when “only” modified it than when it modified Verb 2 “called” (63% V1 attachment vs. 37%). No interaction was observed between the pitch accent and “only,” despite previous research where accents do draw attachment.

In Experiment 2, either Verb 1 or Verb 2 was accented in all conditions, and “only” appeared before Verb 1 in two conditions. When “only” was absent, the pitch accent drew attachment depending on its placement in the sentence. When “only” was before Verb 1 and a pitch accent was placed on Verb 2, the ambiguous clause “on Monday” was still associated with Verb 1. Thus when “only” is present, the effect of pitch accent disappears. Therefore, the Focus Attraction Hypothesis needs to be updated to state that attachment is drawn to the focus scope position, which is unambiguously marked by “only” but not pitch accents. This research was supported by NICHD 2R15HD072713-02 and NIH 5P20GM103436-13.

Elliptical Fragments, Syntactic Identity, And The Mismatch Voice Effect

Alora Chesney*, Theresa Vetter*, Victoria Nash*. Dr. David Potter, Dr. Katy Carlson, mentors, School of English, Communication, Media and Languages, Caudill College of Arts, Humanities and Social Sciences

In this project, we examined what linguistic information we use to understand elliptical fragments. For example, when correcting a statement like, “The cake was taken to Catherine by BREANNA,” a speaker could answer with a full sentence, “No, the cake was taken to Catherine by MITCHELL” or with a fragment “No, by MITCHELL.” We tested, in a sentence acceptability judgment experiment, two hypotheses about how the ellipsis site is understood. The “syntactic identity” hypothesis suggests that we are able to understand ellipsis fragments by filling in syntactic structure from the antecedent. This hypothesis predicts that participants will rate as more acceptable those ellipsis fragments that match the antecedent in voice, whether active or passive. The “semantic identity” hypothesis suggests that we are able to understand ellipsis fragments by filling in syntactic structure that matches the meaning of the preceding sentence, whether the syntax of the ellipsis site matches that of the antecedent or not. This hypothesis predicts that participants will rate elliptical fragments that match or mismatch the syntax of the antecedent as equally acceptable. In the experimental voice matched conditions, participants read sentences like “The cake was taken to Catherine by BREANNA,” and were asked to rate the given reply, either “No, by MITCHELL” (fragment) or “No, the cake was taken to Catherine by MITCHELL” (non-elliptical). In the voice mismatched conditions, they were given the sentence “BREANNA took the cake to Catherine,” and asked to rate the same replies. The results revealed that the difference between voice matched and voice mismatched conditions was greater in fragment continuations (2.83pts difference on 7pt scale) than in non-elliptical continuations (0.16pt difference). These results support the syntactic identity hypothesis, according to which we use the syntactic structure of the antecedent to understand elliptical fragments. This research was supported by NICHD 2R15HD072713-02 and NIH 5P20GM103436-13.

The Bifurcation Effect Of Education On Strength Of Religious Affiliation

Casey Coomer*. Dr. Edward Breschel, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences

This undergraduate research project relied on data from the 2008 General Social Survey (GSS). That year the GSS included a large section focusing on respondents’ religious characteristics. The focus of this project was strength of affiliation and how various factors like education, race, religious preference and gender influenced religious strength. The trend that higher education usually is associated with more religious “nones” has been noted in literature for some time. However, upon examining the GSS data, we found a trend that graduates who maintain their religious beliefs identify as having a noticeably stronger strength of affiliation after college. This project recognizes and compares the trends of gender, race, religious preference and education but also explores and outlines the divergent path of higher education related to strength of affiliation that leads to either the supporting trend of religious nones or stronger religious affiliation among the United States population.

P - 9

Technology In The Kentucky Music Classroom

***Ross Haney**. Dr. Michele Paynter Paise, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

This study seeks to tackle the issue of inequality in music technology use among music teachers throughout Kentucky. Students in different regions may have access to minimal music technology and this may affect their ability to learn rhythmic and melodic concepts, as well as their teacher's perception of their success. I surveyed music teachers throughout Kentucky to examine the technology they use in their classroom and how they use it to teach melodic and rhythmic concepts. Results will be reported based on the grade level taught, the region where the school is located, the economic backgrounds of students, and other factors.

P - 10

German Leadership And Identity: The Incessant Need To Expiate The Past

***Jason Parsons**. Dr. Ric Caric, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

"Germany has caused so many disasters for Europe, we must be the first to react", says German politician Katarina Barley, Federal Minister of Justice and Consumer Protection in Angela Merkel's fourth cabinet.

Who is Germany, what makes you 'German', and what is the moral identity of Germany? How does that relate to policy and the history of Germany since the end of the Second World War? What is Germany's role in addressing the refugee question(s) the west has faced since the 1960s and the modern European Refugee Crisis? How are the values and morals of the country following the end of the war related to policies of Europe's most powerful nation?

P - 11

Federalism And Security: Examining Pharmaceutical Issues Of Administration And Public Management Of Security Policy In The U.S. System Of Intergovernmental Relations

***Taylor Jenkins**. Dr. Michael Hail, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

An examination of pharmaceutical policy and state and local government organization and the relationship to national security will be the primary focus of this research. Exploring the operation and relationship of intergovernmental organizations in the policy process will include exploring cases and building data on inter-agency organization and policy and regulatory interactions. There will be survey and case study research conducted and these will be assessed comparatively within the U.S. system of federalism.

P - 12

Federalism And Homeland Security: Examining Privacy Issues Of Personal Devices And Management Of Security Policy

***Shelby Gevedon**. Dr. Michael Hail, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The focus of this research is an examination of privacy, federalism, and government organization for intergovernmental issues and their relationship to national security. Exploring the operation and relationship of intergovernmental organizations in the policy process includes exploring cases and building data on inter-agency organization, policy and regulatory interactions. Case studies will be regulations and privacy for personal technology devices. These will be assessed comparatively within the U.S. system of federalism.

P - 13

Federalism And American Election Security

***Sarah Fink**. Dr. Michael Hail, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

The focus of this research is an examination of the American election infrastructure with a specific look at Kentucky's election security. This research was used to determine the most secure national system, while still protecting federalism. An in-depth comparison of both a centralized electronic system and a decentralized paper system was used to determine policy recommendations to increase American election security.

P - 14

Building Successful Partnerships Between MSU And The Community For Long Term Service Learning And Engagement Opportunities

***Amethyst Muncy**. Dr. Kelly Collinsworth, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Coordinating a successful long-term engagement opportunity for MSU students requires a close relationship with a community partner. Even once the right community partner is found, there can still be obstacles for communicating needs of the partners, students, and clients. The Legal Studies program and Legal Aid of the Bluegrass have a long-term partnership serving low-income clients in Rowan, Bath, Montgomery, Menifee, Carter, Morgan, and Elliott Counties. Through the Pro Se Divorce clinic, students assist clients in preparing the documentation necessary for processing an uncontested divorce. This presentation will focus on best practices in community partnerships in engagement projects and real-life lessons learned in making a long-term project successful. This research was funded by a Regional Engagement Fellowship.

Animal Assisted Therapy With Juveniles

***Ashley Cains**, Dr. Elizabeth Perkins, mentor, School of Humanities and Social Sciences, Caudill College of Arts, Humanities and Social Sciences**

Dogs have been used since the early 1900's for jobs that have been declared to dangerous for humans to do and to comfort people in the time of need. In the early 2000's, research suggested that the presence of dogs along with petting them actually lowers blood pressure and anxiety in humans (Vormbrock, Grossberg: 1988). The bonds of humans and animals have been largely misunderstood and undervalued over the years and it has only been in recent years that animal assisted therapy, in particularly with dogs, has been used in courtrooms, schools, therapeutic facilities, jails, prisons and even psychiatric hospitals. My current job title is a therapeutic dog trainer for a juvenile justice residential treatment facility and I have seen firsthand how a therapy dog works their "magic" with juveniles that are having PTSD related issues, manic episodes, depression, a history of abuse/ trauma, or even anxiety. Animal assisted therapy uses the human/animal bond to work towards goals during treatment and therapy. They can be used to allow a person who may not have ever known a bond with anyone or anything, experience bonding with a therapy animal without experiencing the stress or pressure of having to meet and try to attach to another human, with animals they can be less reserved due to not having the stress of "being judged". Participants from one study said the dogs provided all the desirable qualities of a best friend (listening, empathetic, physical comfort) without any of the undesirable evaluative traits (Allen et al. 1991). In a similar study with juveniles, "The presence of a calm, attentive dog apparently moderates the stress responses more than the presence of an adult and even more than the presence of a supportive friend when children were reading aloud or having a routine medical exam" (Friedman et al. 2000)". Another study conducted using two juvenile males during school, showed fast improvements on eye contact, impulsive control, decrease in distractibility, and over all better manners while attending school to the therapist, faculty and staff (Geist, 2011, p. 249)". Animal Assisted Therapy can be used in a variety of settings, including courtrooms, hospitals, nursing homes, and even on campuses during stressful times or events in college students lives.

Using Drones To Map And Model Land Deterioration

***Abigail Exley**, *Brooke Cissell**, *Haylee Winters**, *Ryelle Browning**. Dr. Timothy Hare, mentor, Craft Academy for Excellence in Science and Mathematics**

We use drones and remote sensing technology to create maps and 3D models of changes in stream conditions in the Triplett Creek tributary of the Licking River that runs through Morehead, KY. Previous research indicates that the Triplett Creek watershed is impaired by excessive sedimentation from stream bank erosion. The creek was modified in the 1970s, but construction was halted before the project was complete. Unfortunately, the result was an increase in overflow and subsequent bank erosion. The city installed sediment trap rocks in hopes of slowing down the water and decreasing erosion. We have used drones carrying cameras to map and create 3D models of the stream banks in the area in the late fall of 2016, 2017, and 2018. The resulting images can be compared to determine erosion rates. This information is useful to determine the effectiveness of the sediment traps and guide future actions to protect and preserve the environment.

P - 17

The Construction And Use Of A 3D LIDAR System To Scan The Interiors Of Caves

Addi Fish*, Sydney Winters*. Dr. Timothy Hare, mentor, Craft Academy for Excellence in Science and Mathematics

The goal of this project is to use build an inexpensive 3D laser scanner to create 3D models of interior spaces both indoors and outdoors. It is difficult to map and model the complex shapes of cave walls and floors. These tasks have traditionally been accomplished using a variety of manual surveying methods that capture the general shape of cave systems but are not capable of capturing high-resolution 3D shapes of the complex surfaces found in there. Commercial terrestrial laser scanning (TLS) technologies can acquire millions of 3D points at high resolutions, but are very expensive. Light detection and ranging, or LIDAR, technology uses lasers and how long it takes for the lasers to return to the generator to create point clouds. These point clouds are sets of data points collected from the surrounding surfaces placed into a 3-dimensional space and can be used for many things including modeling and mapping. We constructed a small and inexpensive 3D LiDAR system and used it to scan and map a variety of areas including the interiors of caves. We used the resulting point clouds to create accurate maps of the scanned areas.

P - 18

MSU Farm Project

Abigail Exley*, Evan O'Neill*, Zac Bentley*. Dr. Timothy Hare, mentor, Craft Academy for Excellence in Science and Mathematics

The goal of the project is to produce functional images, maps, and 3D models of the Morehead State University farm to support a variety of activities including drainage monitoring, precision agriculture, and other environmental projects. These products could be used to support such activities as monitoring crop growth, determining optimal land-use patterns, and general field management. Traditional mapping and modeling techniques are expensive, time-consuming, and generate less accurate and extensive results. We are using unmanned aerial vehicles (UAVs/drones) to carry photographic equipment to create the imagery necessary for photogrammetric processing. This workflow simplifies and accelerates mapping, 3D modeling, and environmental reconstruction. This poster presents an outline of the technology used, the data processing workflow, and the resulting products including oblique photos, orthorectified aerial photos, digital elevation models, 3D models, and data layers for use in geographical information systems. These are the first products of these types of the area and the team is dedicated to making the products as accurate as possible to allow for a diverse range of future research opportunities.

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Word Walls: The Profound Impact On Student Achievement

***Brooklyn Carpenter**. Dr. Kimberly Nettleton, mentor, Department of Early Childhood, Elementary and Special Education, College of Education**

Is teaching related terms through the use of a word wall the best method for vocabulary instruction or is using terms during the lesson more effective? The participants for this research included students in two first grade classrooms in the same elementary school. Both classes were given the same pre and post assessments and unit lessons. The only outlying variable that altered the students' educational outcomes for this topic was the word wall. The experimental group demonstrated heightened achievement and comprehension after using the word wall compared to the control group. This Research was conducted within the Rowan County School system.

P - 20

Letter Recognition Using Different Learning Approaches

***Kirstin Humble**. Dr. Kimberly Nettleton, mentor, Department of Early Childhood, Elementary and Special Education, College of Education**

Students at different learning levels may need an accommodation in order to be successful. The teacher uses instructional strategies and methods which work best for students. Teachers need to evaluate different methods when needed in order for all students' needs to be met. In this study, both cognitive and kinesthetic instructional approaches were used with kindergarten students' letter recognition lessons. Data was collected over time to determine which instructional approach was most effective. One of the learning approaches was determined to be more successful than the other.

P - 21

Do Tactile Activities During Good Citizenship Lessons Minimize Misbehavior More Than Activities Using Traditional Strategies?

***Andraya Flannery**, *Kelly Cornett**. Dr. Kimberly Nettleton, mentor, Department of Early Childhood, Elementary and Special Education, College of Education**

This study examined the behaviors of two 4th grade classrooms in rural Kentucky. The research was conducted over the course of 6 weeks to engage students in activities on the qualities of a good citizen. Specifically, the researchers explored two dissimilar strategies, traditional teaching strategies versus tactile/kinesthetic strategies, to determine which had the most effect on the students' occurrence of misbehaviors. Thank you to Rowan County Schools for their support for this project.

P - 22

Can Daily Focus On Historical Events Improve Students' Sense Of Historical Time Periods?

***Brianna Cottrell**, Ms. Sharon Benton, mentor, Department of Early Childhood, Elementary and Special Education, College of Education**

Students should have an understanding of when events happen and should be able to draw conclusions on what life was like in the time period that they are learning. Also, students should be able to distinguish time periods based off common threads that they learned in that time period. Being able to sequence events is an important skill for students to have, since that skill can crossover to all other content areas. The key question that was asked in the study was, “Can daily focus on historical events improve students’ sense of historical time periods?” The researcher examined if 4th grade student learning and understanding improved when exposed to daily historical event lessons.

P - 23

Analysis Of Student Map Scores In Individual And Split Grade Classrooms

***Abbey Haag**, Dr. Kim Sharp, mentor, Department of Early Childhood, Elementary and Special Education, College of Education**

This study collected research on students from an elementary school, in a rural city, in the south eastern part of the United States, in individual fourth and fifth grade classes and a fourth/fifth split class, to determine whether split classes were beneficial to students. The researcher collected data from two school years; 2016-2017 and 2017-2018. The study specifically looks at the students MAP scores in reading and math. The scores were separated between individual grade classrooms and split classrooms. Percentages were calculated based on the total number of students in the classes divided by the number of students per scoring level. The results indicated that a higher percentage of students in the split class performed proficient or distinguished in reading than the individual grade classrooms. In math, students in the split class also performed a higher percentage of distinguished than the individual grade classrooms (Rowan County Schools).

P - 24

The Effect Of Promoting Self Regulation Through Technology On Student Success

***Katie Birdwhistell**, Dr. Christopher Beckham, mentor, Department of Foundational and Graduate Studies in Education, College of Education**

This paper discusses the concept of responsibly integrating technology in the K-12 classroom to promote success through means of self-regulation. Self-regulation is the determination of students to be conscious of their actions and habits, and to use this consciousness to push themselves to be high-achievers in the classroom. Teachers can encourage high student achievement by being mindful of the technology that they incorporate in their instruction, and by showing their students to be mindful of their personal use of technology. Using different technological tools to track student progress can help the teacher enforce the self-regulation of students by giving quantifiable data that they can use to hold students accountable for their own learning. Responsibly embedding electronic components into their lessons can also help teachers promote self-regulation by transcending the confines of what they would be able to present to their students, therefore engaging students in their content and hopefully providing them with more intrinsic motivation to learn. Technology is an excellent tool for teachers to promote self-regulation in their classroom, as long as they are mindful of how they use it.

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Identification Of The Underserved And Diverse Gifted Population

***Martina Skidmore**, *Marty Mills**, *Sarah Elam Farrow**, *Dr. Michael Kessinger, mentor*, Department of Foundational and Graduate Studies in Education, College of Education**

This presentation will offer a discussion on the underserved gifted population in Kentucky and how to identify gifted students from disadvantaged populations, such as low socioeconomic status, to assist in helping students overcome barriers not in their control and push themselves academically. Teachers, guidance counselors, and administrators can learn how to serve students better to meet students' individual needs and encourage them to enroll in rigorous courses. Students' participation in rigorous coursework provides them an opportunity for college and career readiness and life after high school.

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Examining And Identifying Components Of Propaganda And Indoctrination

***Cory Rawlins**, *Dr. Sandra Riegle*, *Dr. Sara Lindsey, mentors*, Department of Middle Grades and Secondary Education, College of Education**

Indoctrination is the process where opinionated biases, methodologies, attitudes, and/or ideals are disseminated to others; it involves a disregard for proof of those claims (Nord 1995). Further, it involves unsubstantiated conviction in one's beliefs and intolerance for opposing ideas, viewpoints, thoughts, etc. (ibid, pp. 415-416). Propaganda is the purposeful promotion of certain beliefs and/or points of view and can be a political tool used rhetorically in speeches by those in positions of power, in order to sway public opinion about a certain issue. Critical thinking, which is a fundamental skill and a primary purpose of education, is needed to discern between indoctrination, propaganda, and knowledge. As such, and given the contemporary highly partisan political climate, we examined communications from current President Donald Trump and current Secretary of Education Betsy Devos.

First, we defined and identified components of propaganda. Second, we identified the types of these components as they occurred in education-centered speeches, statements, and interviews from Trump and Devos. Third, we examined the frequency of these components using a checklist that was generated using the previously mentioned components of propaganda, which included: name-calling, glittering generalities, plain folks, testimonial, bandwagon, card stacking and transfer (Fleming, 1995, p. 10).

We examined different education-related public statement by Trump and Devos including speeches, tweets, and an interview. A sample of three tweets, two speeches, and one interview were examined from both, and the frequency of the seven main propaganda techniques were highlighted. Results suggested that all elements of propaganda were evident in these, with glittering generalities being the most used and name calling being used the least amount.

Based on our research, components of propaganda are prevalent in the sample of public statements from Donald Trump and Betsy Devos that we selected. Using this small sample as groundwork, the question can be raised to where else, how frequent, and the effects of this propaganda in other mediums. When these types of propaganda are repeated, this then poses the question as to how the population internalizes and arrogates received information.

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Constructed Learning In Elementary Mathematics

***Dorian Cook**. Dr. Lesia Lennex, mentor, Department of Middle Grades and Secondary Education, College of Education**

Math manipulatives are an exciting way to interest elementary school students. Which designs are most useful? In what way(s) do manipulatives affect the learning process? In my Undergraduate Research Fellowship, I explored varying designs of math manipulatives and which could be most effective in teaching elementary school students. I then designed an affordable and easily manufactured manipulative. This poster details research with elementary school students in some of the ways the manipulatives were used to teach lessons on counting, tens places, and money skills.

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Toward Fingerprinting Kentucky Honey: Melissopalynology

***Ann Wilkinson, Annuet Soehnlen**. Dr. Jen O'Keefe, mentor, Department of Agricultural Sciences, College of Science**

Kentucky is at the forefront of a nationwide movement against honey adulteration and misbranding. This was made more urgent by March 2018 FDA guidelines for the proper labeling of honey, including statements that honey must be produced from living plants, that honey may not be adulterated with other syrups, such as light sweet sorghum or corn syrup, and that any honey labeled with a floral source must have evidence to back up this claim. Traditionally, honey is “typed” using melissopalynology, which is the identification and quantification of pollen in honey. A major goal of ongoing melissopalynological work at Morehead State University is the development of a honey fingerprint for Kentucky. Here we present an example of how honey from out-of-state compared with honey from six of Kentucky’s seven type IV ecoregions. The honey fingerprints under development can be used to identify regional honey, and also as a means of supporting sustainable urban and rural apiculture and implementation of the Kentucky Pollinator Protection Plan.

The Economic And Financial Analysis On Rainwater Harvesting Systems: A Case Study At Derrickson Agricultural Complex At Morehead State University

***Morgan Durham**, Dr. Vijay Subramaniam, mentor, Department of Agricultural Sciences, College of Science**

The current budget cuts in the state of Kentucky have led to a variety of economic analysis from universities across the state. Different methods of cutting costs and saving money are consistently being explored. From a utility perspective, aspects such as heating, lighting and water usage have been identified as major areas in which universities are monitoring much more closely in efforts to accommodate budget cuts. This study will evaluate aspects in relation to how water harvesting could economically, financially, and environmentally benefit the Derrickson Agricultural Complex (DAC) located at Morehead State University. Rainwater harvesting reduces the demand for existing water supply which will translate to a reduction in overall municipal water usage. Rainwater is free in contrast to municipal water, therefore storing harvested rainwater will decrease the demand for municipal water which will decrease the spending on municipal water at the DAC.

The DAC is implementing four water harvesting systems, which will provide water for livestock and cooling systems. Specifically, the water stored in these systems will cool the hog gestation house and greenhouse in addition to supplying water for livestock. These four water harvesting systems will be evaluated over time to analyze the long-term payoff. Essentially the researchers will seek to gather a reasonable estimate in years for how long it will take the DAC to see the full benefits of these systems. In addition to analyzing the economical aspects surrounding these systems, a conservative environmental evaluation will also provide insight towards the benefit associated with using these systems. Specifically, the researchers will evaluate the runoff control on the DAC and determine if there are any positive trends associated with implementing these water harvesting system.

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Effect Of A Hydrolyzed Yeast Product On Cow Behavior, Animal Performance, And Hair Coat Score In Cows Grazing Pastures Containing Endophyte Infected Tall Fescue

Brandi Banks*, Emory Sellinger*, Johnna Scott, Taelor McMillin. Dr. Flint Harrelson, Dr. Patricia Harrelson, mentors, Department of Agricultural Sciences, College of Science

The objective of this study was to determine if the addition of a hydrolyzed yeast product would alleviate the symptoms of fescue toxicosis in beef cattle. Thirty-eight Angus cow-calf pairs were stratified by cow age and body weight then randomly allotted to one of two treatments; control mineral (CON) or hydrolyzed yeast mineral (HYM). Cattle in both groups were allowed access to mineral for 126 days while they grazed the same eight pastures (1.21 hectares each) in a rotational pattern. Mineral was provided at a target rate of 4 ounces per head per day. Each pasture was grazed by cattle groups for 7 days. Mixed grass pastures containing tall fescue were utilized and evaluated for endophyte level prior to the start of the project. Due to pasture endophyte level variability (44% – 73% endophyte), both groups of cattle rotationally grazed each pasture at least 2 times starting on June 1st and ending on October 5th. Prior to entering a new pasture weekly, cows were weighed and assigned a body condition score (BCS) and hair coat score (HC) by two independent, trained personnel. Cow behavior was measured every 15 minutes within a 2 hour block weekly. Percentage of cows active or inactive, outside or inside was recorded. Data were analyzed using the MIXED procedure of SAS. Cow body weight change was unaffected by treatment ($P > 0.23$). Cow BCS significantly increased in HYM vs. CON cows (0.4 vs. 0.1; $P = 0.02$; SEM = 0.1) through the 126 day project. No treatment effect was observed on HC ($P > 0.19$). Cow behavior was impacted by treatment, as HYM cows spent more time outside compared to CON cows ($P < 0.01$). Results of this trial suggest that HYM cows may have experienced less heat stress as a result of fescue toxicosis as they were willing to spend more time outside and increased BCS. Research was supported in part by Gro-Tec, Inc. and by the Morehead State University Undergraduate Research Fellowship Program.

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Economic Analysis On Solar Panels At Derrickson Agriculture Complex, Morehead State University

Caitlyn Clark*. Dr. Vijay Subramaniam, mentor, Department of Agricultural Sciences, College of Science

Recent trends are showing a desire to implement sustainable practices due to a variety of factors. Not only does the implementation of these practices offer environmental benefits but can be seen as a long-term economical investment. This study will analyze whether or not the installment of solar panels will potentially help reduce electrical expenses and allow Derrickson Agriculture Complex (DAC) to become more self-sufficient. In addition, this study will seek to identify how much money could be saved with the installation of solar panels in relation to time. Compared to other states Kentucky is subpar with policies and incentives for the installation of solar panels. By this it means that Kentucky does not have incentives encouraging the use of solar.

The DAC is looking into adding a mini-grid of solar panels. Initial plans called for the installation of solar panels on the roof of the arena, but after further evaluation it was decided that the arena cannot support the weight. Therefore, the grid will be set up on the ground at the farm. The energy collected from the solar panels will be used in select buildings or discounted off of the power bill depending on how the electrical company for the DAC works. The researchers will be analyzing various solar panel purchasing options, such as leasing vs. owning, as well as determining the number of years required to pay off the capital costs. Other concerns and other things that will be considered will be what kind of electricity usage will be profitable under current policies and what kind of policies are required to make solar energy more profitable in Kentucky.

Changes In Forage Measures Through The Course Of A Grazing Season

Brandi Banks, Emory Sellinger, Johnna Scott*, Taelor McMillin. Dr. Brent Rogers, Dr. Flint Harrelson, Dr. Patricia Harrelson, mentors, Department of Agricultural Sciences, College of Science

The goal of grazing is for animals to utilize the forage for their benefit, while also controlling forage growth. Grazing systems which determine when animals will graze the pastures, should be based on several objectives: 1) meet the nutritional needs of the animals, 2) maintain forage diversity and health, and 3) distribute the consumption of forage across the pasture. The objective of our research was to evaluate forage quality measures and forage mass across a grazing season while cow-calf pairs grazed rotationally. Eight pastures (1.21 hectares each) were used in a rotational pattern for 38 cow-calf pairs during the 2018 grazing season. The grazing season started on June 1st and continued until October 5th. Two pastures were utilized every week and each pasture was grazed for 7 days and then given a 14 day rest period, allowing regrowth and recovery. Mixed grass pastures containing tall fescue were utilized. Forage mass was collected at the beginning and end of the grazing season, along with prior to cattle entering the pasture. Forage mass was collected using a quadrat (1 meter by 1 meter square) that was systematically throw 8 times in each pasture. Where the quadrat laid, the forage above the square was harvested and placed in a paper bag. Following collection, bags were dried in a 50 degree Celsius oven for 48 hours and then weighed. The average weight was determined and entered into an equation to determine mass. Following the drying of forage samples, they were ground through a Wiley Mill using a 1 millimeter screen. Subsamples of the forage were sent to Auburn University for analysis of crude protein, dry matter, in vitro total digestibility, neutral detergent fiber, acid detergent fiber, and lignin content. For all previously stated forage measures, a pasture by day interaction was observed ($P < 0.001$). Forage mass varied by day ($P < 0.01$), however no differences were observed between pastures. Pastures contained a variety of grasses and their growth varies by day and weather. Variation in quality is expected, however, based on the data, pastures should be monitored to prevent under- or over-utilization. This research was supported by the Morehead State University Undergraduate Research Fellowship Program.

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Analyzing Economic Feasibility Of Extending The Growing Season For Vegetable Production

***Kasey Young**, *Dr. Vijay Subramaniam*, *mentor*, Department of Agricultural Sciences, College of Science**

Changing consumer preferences on fresh fruits and vegetables and increasing numbers of new farmers markets along with establishing new wholesale auction markets provide ample opportunities for small and limited resource farmers to diversify their production and marketing strategies. The purpose of this study was to assess the economic and financial feasibilities of growing early seasonal fruits and vegetables using high tunnels (also known as hoop houses or unheated greenhouses). Three years of auction data from Central Kentucky was collected to analyze production and marketing opportunities for various fruits and vegetables. Major objectives of this research are to (1) identify potential technologies available for farmers, (2) determine costs and returns for various products using appropriate budgets, (3) determine break-even analysis to identify new potential markets, and assess financial feasibility of growing fruits and vegetables in high tunnels.

Return to management (economic profit) for various price and yield (per plant) combinations suggest that a grower can expect to lose on returns if price is 50 cents per pound because there is not a realistic amount of production per plant to make a positive return. A drop in revenue (by 20%) as result of diseases or other unexpected disasters will increase the required price to \$1.50 per pound. Break-even analysis of expected price and expected yield per plant show that the investment in a high tunnel will require other production and marketing strategies as wholesale auction markets alone cannot provide the required returns. Thus, farmers should focus on strategies that can increase the returns and reduced the costs. Selling the products directly to the end-users such as households, restaurants, schools, and other institutions, growing higher value products, and marketing value added products can make the high tunnel production technology profitable.

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The Synthesis Of Symmetric And Asymmetric Hydroxyfulvenes

***Clare Johnson**, *Tyler Sullivan**, *Dr. Mark Blankenbuehler*, *mentor*, Department of Biology and Chemistry, College of Science**

The synthesis of a variety of symmetric and asymmetric hydroxyfulvenes was attempted via reaction of lithium cyclopentadienide with acyl halides or esters. The purification and analysis of the products via Nuclear Magnetic Resonance (NMR) and Fourier Transform Infrared (FTIR) will be presented.

The Morehead State University Water Testing Laboratory

Elizabeth Hereford*, Sarah Lizotte*. Dr. Geoff Gearner, Mr. Justin Mason, mentors, Department of Biology and Chemistry, College of Science

The Morehead State University Water Testing Laboratory operates as the Kentucky principle drinking water microbiology lab. It provides qualitative and quantitative drinking water analyses for total coliform bacteria, a reliable indicator of potential microbial pathogens, and fecal coliform bacteria. The laboratory analyzes approximately 2,200 samples per year, and services over twenty public water districts throughout Morehead State's service region. A Kentucky Division of Water certified drinking water microbiology analyst, under the supervision of a laboratory manager, performs three primary methods for microbiology drinking water analyses, including: membrane filtration utilizing mEndo agar, Colilert-18®, and most probable number (MPN). The water testing laboratory offers opportunities for undergraduate students to become certified to participate in the operation of a certified laboratory for microbiological analysis of drinking water. A certified analyst at the laboratory is responsible for proper quality control of laboratory equipment and methods, processing water samples, and providing accurate, credible results. Thus, protecting the health and welfare of our constituents and the environment.

The Detection Of Antibiotic Resistant Bacteria In The Triplett Creek Watershed

Minh Tran*, Sydney Blanton*. Dr. Geoffrey Gearner, mentor, Department of Biology and Chemistry, College of Science

The purpose of this study was to identify the presence of antibiotic-resistant bacteria in the Triplett Creek Watershed (TCW) in Rowan County, Kentucky. We tested 12 sites in the watershed for the presence of nine antibiotic resistant genes: TetW, TetO, SulI, SulII, ereA, msrA/B, blaTEM, blaSHV, and blaCMY, as well as a marker for E. coli, uidA. We used DNA extraction, Nanodrop spectroscopy, polymerase chain reaction, and agarose gel electrophoresis to test for the presence of these genes. We found a total of 43 amplified products with 11/12 sites detected for msrA/B, 10/12 sites detected for uidA, 7/12 sites detected for sulII, 6/12 sites detected for blaTEM, 5/12 sites detected for ereA and sulI, 3/12 sites detected for blaSHV, and 2/12 sites detected for blaCMY. There were no PCR products for antibiotic-resistant genes tetO, tetW, and blaTEM detected.

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The Beginning Of The Ends: Circularizing Linear Chromosomes In Saccharomyces Cerevisiae

***Brianna Haynes**, Dr. Melissa Mefford, mentor, Department of Biology and Chemistry, College of Science**

Both circular and linear chromosomes exist in nature. Generally, prokaryotes contain a single circular chromosome while eukaryotes contain multiple linear chromosomes. However, the termini of linear chromosomes cannot be fully replicated. These ends of linear chromosomes are called telomeres, which are composed of repetitive DNA sequences that “cap” and protect DNA ends. To combat the end-replication problem at telomeres, most eukaryotes require the enzyme telomerase. Telomerase synthesizes DNA at the telomere to prevent shortening during been replication. On the other hand, the circular chromosomes of prokaryotes have no telomeres, need no telomerase, and do not shorten over time. This leads one to wonder: why did linear chromosomes evolve if they are unable to replicate their ends and require the presence of telomerase? In this project, we are genetically modifying the simple eukaryote *Saccharomyces cerevisiae* to convert each of their linear chromosomes into circular chromosomes. I will insert a DNA cassette into the ends of chromosome I and select for a recombination event that circularizes the linear DNA. Once completed, the viability and health of the modified chromosomes will be assessed. This may give us insights as to why linear chromosomes evolved.

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Taking Advantage Of Changing Conditions: Microhabitat And Movements Of The Bigeye Shiner, Notropis Boops

***Jonathan Eisenhour**, Matthew Fossett, Dr. David Eisenhour, mentor, Department of Biology and Chemistry, College of Science**

The Bigeye Shiner, *Notropis boops*, is a sensitive minnow species that occupies clear, rocky streams of the Midwest and Appalachian highlands. Unfortunately, little data on this fish has been published, which is needed to make conservation management decisions. We studied the microhabitat preferences and movement patterns of the Bigeye Shiner during the summers of 2017 and 2018 in Triplett Creek. A total of 120 Bigeye Shiners were tagged with Visible Implant Elastomer (VIE) tags at eight sites in April and June 2018. We subsequently surveyed for tagged minnows four times. Only seven Bigeye Shiners were recaptured, six of which were encountered in a different site. The average distance moved was 210 m. However, upstream and downstream movements were about equal; the average movement was 52 meters upstream. This pelagic species appears to be much more mobile than published movements of benthic darter species, suggesting a relatively high vulnerability to instream barriers. Principal component analysis of 145 microhabitat plots assessed in 2017 indicated Bigeye Shiners occupy calm or slow-moving water immediately adjacent to faster current, over heterogeneous substrates of sand and gravel, often with American Water Willow, *Justicia americana*, or woody cover. We suspect this “edge” microhabitat offers reduced swimming costs (calm water), but easy access to drifting terrestrial insect food sources (in the adjacent current). Location of this microhabitat changes with water levels; the relatively high mobility of Bigeye Shiners might allow it to exploit the transient nature of its preferred habitat.

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SOCS3 Expression In The Hindbrain Of Xenopus Laevis After Spinal Cord Injury

Mya Faris*. Dr. Kurt Gibbs, mentor, Department of Biology and Chemistry, College of Science

Unlike mammals, *Xenopus laevis* tadpoles are able to regenerate descending supraspinal axons after spinal cord injury but lose this ability during metamorphosis. Following injury in mammals, suppressor of cytokine signaling 3 (SOCS3) expression is upregulated at the mRNA level and has been shown to inhibit axon regeneration. SOCS3 mRNA increase is observed during *Xenopus laevis* optic nerve regeneration but the protein level remains the unchanged. Interestingly, the optic nerve is still able to regenerate. In collaboration with the Szaro lab, we examined the expression of SOCS3 mRNA and protein in the hindbrain of *Xenopus* tadpoles, which also regenerates axons after spinal cord injury, to determine if the same expression pattern of SOCS3 is observed. We hope that understanding the posttranscriptional regulation of this protein will help us further understand the molecular aspects of axon regeneration.

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Production And Purification Of UmuDAb Protein

Carter McIntire*. Dr. Deborah Cook, Dr. Janelle Hare, mentors, Department of Biology and Chemistry, College of Science

The umuDAb gene of *Acinetobacter baumannii* produces the UmuDAb protein which is involved in the SOS DNA repair pathway. It is unclear how UmuDAb participates in the DNA damage repair pathway. Our goal was to clone the umuDAb gene into the pET15b expression vector. The umuDAb gene was amplified by PCR with umuDAb specific primers using DNA from the ATCC 17978 strain of *A. baumannii* and successfully ligated into the pET15b plasmid using restriction enzyme cloning. This was verified through PCR and agarose gel electrophoresis, using plasmid specific primers to verify that the umuDAb insert was successfully ligated into pET15b. Cloning the gene into pET15b allowed a modified umuDAb gene to be produced with a histidine "tag". The modified gene produced a UmuDAb protein with His amino acids which will allow the protein to be purified. Once the modified plasmid was transformed into *Escherichia coli* BL21-CodonPlus(DE3)-RIL cells because of their ability to produce proteins at a high level. The cells containing the modified plasmid were selected using antibiotics. IPTG treatment was used to induce UmuDAb production from the recombinant plasmid pET15bUmuDAb. The cells were then lysed by sonication using various dial settings for five minutes. A Western blot analysis of all sonication settings yielded positive results of seeing UmuDAb produced. UmuDAb extraction was observed by SDS-PAGE gel electrophoresis. We are currently working to purify UmuDAb using TALON resin. The modified pET15b plasmid will be used to purify more UmuDAb protein for further experiments studying the properties of UmuDAb.

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Oribatid (Beetle) Mites A Potential Biodiversity Assessment Group?

***Jessica Lowe**, Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science**

Oribatid, or beetle, mites constitute an extremely diverse and numerous group of leaf-litter inhabiting arthropods. A good leaf-litter sample may include some 50 to 100 different species of mites that may number a few thousand individual specimens. Adult beetle mites range in size from a staggering 1.5 mm to 0.25 mm. This great diversity of species and abundance of specimens within most samples makes beetle mites a potentially useful group in which to assess biodiversity; however, the quite small body size and potentially thousands of individuals, makes a challenge to sort and identify all of the specimens that may occur in a single sample. The objective of this project was to develop a foundation in the collection, processing, and preparation of beetle mites in order to establish a basis from which biodiversity comparisons could be implemented. Beetle mites from Kentucky, California, Arizona, Alabama, Florida, South Carolina, and Costa Rica were used to build an initial synoptic series of oribatid mite diversity.

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Nanoformulation And Characterization Of Alginate Chitosan Nanoparticles

***Bradley Mahaffey**, Dr. Ann Macintosh¹, Dr. Torsten Stelzer², mentors, Department of Biology and Chemistry¹, College of Science, School of Pharmacy², University of Puerto Rico Rio Piedras Campus**

Synthesis of nanoparticles, using established methods, with biocompatible polymers that can be functionalized for tailored drug delivery was performed. Water-in-oil (W/O) nanoemulsions were produced from mixtures of nonionic surfactant Brij L4, decane, and aqueous solutions of 2 wt % sodium-alginate via a phase inversion temperature (PIT) method. Cross-linking gelation of the alginate-chitosan was induced by injection of CaCl₂ into an isothermal, stirring solution. Nanoparticle polydispersity index (PDI) and mean diameter were measured by dynamic light scattering (DLS), and solid-state and thermodynamic characterization were performed. We observe that loading and increased polymer complexity causes an increase in PDI and diameter. Lacking an established methodology for analysis of nanoparticles, we construct a simplified, more tangible analogue. These larger microbeads, through thermogravimetric analysis and UV-Vis studies, had their active pharmaceutical ingredient (API) loading efficiencies determined. The loaded API manifested in an amorphous form in our construct, verified by differential scanning calorimetry (DSC) and Powder X-Ray Diffraction (PXRD). Paramount of our study, we conclude that alginate chitosan and alginate folate-grafted chitosan nanoparticles were constructed and API was loaded into them. Funded under NSF grant #1757365, National Institute on Minority Health Disparities grant #8G12MD007600, and NSF support under the Major Research

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Investigating Neurotransmitter Expression In Regenerating Hindbrain Neurons In *Xenopus Laevis*

***Jessica Fulkerson**. Dr. Kurt Gibbs, mentor, Department of Biology and Chemistry, College of Science**

Previous studies have shown that regenerating hindbrain neurons in *Xenopus laevis* tadpoles use serotonin as a neurotransmitter. However, neurons are capable of expressing multiple neurotransmitters, leading us to ask whether serotonin is the only neurotransmitter expressed by these regenerating neurons. In this study, we used immunofluorescent staining to determine the type of neurotransmitters expressed in populations of hindbrain neurons that demonstrated the ability to regenerate their axons after spinal cord transection.

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Inventory Of The Bryophytes In The Eagle Lake Watershed, Rowan County, Kentucky

***Kelsey Hargett**. Dr. Allen Risk, mentor, Department of Biology and Chemistry, College of Science**

Bryophytes are non-vascular plants composed of mosses, liverworts, and hornworts. They can act as bioindicators of environmental quality, contribute to erosion control, provide a nesting substrate for birds, and create habitat for small invertebrates. Bryophytes are a very understudied group when compared to vascular plants, especially in Kentucky. The objective of this study is to inventory the bryophytes occurring in the Eagle Lake watershed in Rowan County, Kentucky. Four recent field trips to the study area yielded 73 specimens. By consulting the Consortium of North American Bryophyte Herbaria website along with recently collected specimens, a total of 29 bryophyte species (five liverworts, 24 mosses) have been documented thus far. Hornworts have yet to be collected in the Eagle Lake watershed. One moss documented was *Fissidens hyalinus*, which is an uncommonly collected species. Future work will include additional field trips to unexplored areas of the Eagle Lake watershed and further collection of specimens. This research was supported by an Undergraduate Research Fellowship from Morehead State University.

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Gene Editing In Yeast Cells Using The CRISPR/Cas9 System

***Tengyu Zhang**. Dr. Mellisa Mefford, mentor, Department of Biology and Chemistry, College of Science**

CRISPR/Cas9 is a recently developed technology to edit the genome of any organism. The CRISPR/Cas9 system was initially discovered in bacteria, where it functions as an essential defense system against viral invasion by bacteriophage. CRISPR (clustered regularly interspersed short palindromic repeat) DNA is transcribed and processed into guide RNAs that target complementary DNA sequences while the Cas9 protein cleaves the DNA. I will use CRISPR/Cas9 to edit three genes in the yeast *Saccharomyces cerevisiae*: ADE2, TLC1 and PXR1. Successful editing of ADE2, a gene involved in adenine synthesis, will cause yeast to accumulate red pigment and turn pink. Successful deletion of TLC1, the RNA component of the telomerase enzyme, will cause yeast to senesce. Successful editing of PXR1, a gene involved in rRNA and snoRNA processing, should result in slow growth. Overall, these experiments will allow us to assess the relative efficiency of using the CRISPR/Cas9 technology as a means to genetically engineer the important model organism *Saccharomyces cerevisiae*.

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Flight Of The Winter Moths (Order Lepidoptera) In Rowan County, Kentucky

***Madelynn Kiefer**, Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science**

Moths (order Lepidoptera) are a commonly overlooked group of insects that could perhaps become good biotic indicators for the environment. Moths are exclusively herbivorous insects, most species feed and deposit eggs on a limited number of host plants. They are also an important source of food for local wildlife including bats, birds, and other arthropods. Moths tend to take flight for specific months of the year based on the temperature. The flight period of most moths is from early spring through late summer, with very few flying during the winter. In this study moths were collected during the fall and early winter season, and identified to species. A comparison of the recorded flight seasons of these moths was done to identify any outliers and to analyze if these outliers correlated with the changing temperature of that season. Approximately 57 species were caught during this study representing nine different families of the order Lepidoptera. Of those collected, about six of the 113 individuals were seen to be out past their typical flight season infringing into the later months.

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Evolving A More Active Telomerase Enzyme In Saccharomyces Cerevisiae

***Abigail Whaley**, Brice Smith*, Dr. Melissa Mefford, mentor, Department of Biology and Chemistry, College of Science**

Telomeres are repetitive DNA sequences found at the ends of linear chromosomes in eukaryotic organisms ranging from yeast to humans. Though telomeres act to protect the end, they cannot be fully copied by the DNA replication machinery. This "end replication problem" is overcome by a telomere-lengthening enzyme called telomerase. Telomerase is minimally composed of a non-coding telomerase RNA and a reverse transcriptase protein. Without telomerase, telomeres shorten over time, eventually causing cells to senesce and contributing to cellular aging. On the other hand, more than 85% of human cancers overexpress telomerase to support the uncontrolled cell division characteristic of this disease. In order to better understand how the telomerase enzyme works, we are screening a library of telomerase RNA mutations for gain-of-function alleles that increase the activity of telomerase. This screen utilizes a counter-selectable marker located in the telomeric region that exhibits the telomere position effect (TPE). With TPE, longer telomeres increase silencing of genes near telomeres allowing us to select yeast that have more active telomerase. Our results will shed light on how the structure of telomerase RNA contributes to enzyme function. Ultimately, being able to create more active telomerase that lengthens telomeres could be used to slow aging or treat diseases of pre-mature aging.

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Epigenetic Changes In The Hindbrain Of *Xenopus Laevis* Following Spinal Cord Injury

***Abbigail Dorn**, Dr. Kurt Gibbs, mentor, Department of Biology and Chemistry, College of Science**

Several studies, including our own, have examined changes in gene expression following spinal cord injury. However, few studies have examined the epigenetic changes that accompany these changes in gene expression. In this study, we used immunofluorescent staining to examine changes in methylation and acetylation status of hindbrain neurons following spinal cord injury in *Xenopus laevis*. We can identify clear differences in level of expression and subcellular distribution of various epigenetic markers, verifying changes in chromatin structure. This study is a smaller component of a larger study in which we are using Methyl-Seq to examine epigenetic changes across the entire genome following optic nerve and spinal cord injury.

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Creating A Circular Chromosome In The Budding Yeast *Saccharomyces Cerevisiae*

***Ethan Chandler**, Dr. Melissa Mefford, mentor, Department of Biology and Chemistry, College of Science**

At the ends of linear chromosomes there are regions of repeated nucleotide sequences called telomeres that do not encode for any genes. During eukaryotic DNA replication, the ends of telomeres cannot be copied and thus shorten with each round of replication. To maintain telomere length, an enzyme called telomerase adds nucleotides to the end of the chromosome after DNA replication. The function of telomerase in telomere maintenance has important implications for human health. Lack of telomerase function and telomere shortening plays a role in the aging while unregulated increased telomerase activity occurs in most human cancers. Given these significant effects on organisms, we will experimentally explore how linear chromosomes, telomeres and telomerase evolved in the simple model organism *Saccharomyces cerevisiae*. To accomplish this, I will convert the linear chromosome XI of *Saccharomyces cerevisiae* into a circularized version that lacks telomeres. Chromosome XI was specifically chosen due to its moderate length and short telomeric regions. To circularize Chromosome XI, a DNA cassette will be inserted into the sub-telomeric region on each end of Chromosome XI. These cassettes each contain a complimentary half of the selectable marker URA3, a gene that codes for the production of uracil. Growth of yeast on media lacking uracil will select for cells that underwent recombination to create an intact URA3 gene in a now circular chromosome. Once circularized, the viability and fitness of the *S. cerevisiae* strain will be characterized. Eventually, a long-term goal of this research is to engineer a strain in which all of its individual chromosomes are circularized, creating a eukaryotic organism that lacks telomeres as a tool to explore how telomeres evolved.

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Characterization Of Deiodinase Expression In Hindbrain Neurons Of Xenopus Laevis

***Abby Isaacs**, Dr. Kurt Gibbs, mentor, Department of Biology and Chemistry, College of Science**

Following metamorphosis, *Xenopus laevis* adults lose the ability to regenerate central nervous system (CNS) axons. This phenomenon is attributed to the increased expression of thyroid hormone that occurs with advancing development and peaks during metamorphosis. Thyroid hormone activity in vertebrates is largely regulated by the deiodinase enzymes, which are capable of converting between inactive and active forms of thyroid hormone via the selective removal of iodine atoms. Thus, an understanding of the expression of these enzymes is vital to understanding developmentally-sensitive CNS regenerative ability in *Xenopus*. We sought to characterize the expression of deiodinase mRNA in the hindbrain of regenerating tadpoles and non-regenerating frogs using in-situ hybridization and quantitative polymerase chain reaction. The goal of this work is to understand how the expression of deiodinase enzymes may contribute to the loss of supraspinal regenerative ability after spinal cord injury in the vertebrate CNS.

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Changes In The Fish Community Of Triplett Creek Following Restoration Of A Channelized Reach

***Austin Spradlin**, Jonathan Eisenhour, Dr. David Eisenhour, mentor, Department of Biology and Chemistry, College of Science**

In the early 1970s, Triplett Creek in Morehead, Kentucky, was straightened, deepened, and widened, resulting in a rather homogenous aquatic habitat, varying little in depth, flow, and substrate. In summer of 2018, a section of the stream was “restored” in order to alleviate the bank instability and flooding problems created by the 1970s channelization, restore the health of its aquatic community, and improve recreational opportunities, including fishing. Our goal was to examine changes in the fish population resulting from the extensive modifications to the channel and substrate during the restoration. We studied the fish populations at four sites (two sites in the restored area and two unaltered reference sites) in June and October of 2018, just before and just after, respectively, the restoration work occurred. Fishes were qualitatively sampled using backpack electrofishing and seining. Encountered fishes were identified and counted, which allowed us to assess the fish community health using the Kentucky Index of Biotic Integrity (KIBI). In June 2018, prior to restoration work, the four sites had KIBI scores between 59 and 70, all of which rated as “good”. However, the two sites in the to-be restored area had a higher proportion of nonnative fishes, and fewer darter species compared to the reference sites, indicative of an impaired fish community. In October 2018, one restored site and one reference site scored as good (KIBI = 59-70). One restored site and one reference site scored as fair (KIBI = 39-58). The drop in KIBI scores in all four sites probably reflects high water and poor collecting conditions during the October sampling. The total number of species in the restored sites decreased after restoration from 25 to 21 in the upper site and from 24 to 18 in the lower site, while the number of total species remained close to the same in the reference sites. In addition, the number of darter species dropped in the upper restored site (from 6 to 2), while remaining about the same in the other sites. This is likely due to the habitat modification during the restoration efforts, which was most pronounced in the upper restored site. In the future we expect the fish communities of the restored section to improve, as riparian vegetation becomes established, the substrate stabilizes, and invertebrate communities (i.e., food for fishes) colonize the new habitat. We plan to continue monitoring the fish fauna changes of the restored areas of Triplett Creek.

Biodiversity Of Ants Across And Ecotone Vs Woods

Cody Evans*, Josh Griffith*. Dr. Sean O'Keefe, mentor, Department of Biology and Chemistry, College of Science

Biodiversity is the measure of taxonomic diversity and disparity within an area. Biodiversity is important for conservation evaluation as well as ecological assessments. Several groups of organisms have been used to assess biodiversity, such as plants, mammals, birds, butterflies, beetles, etc. Ants represent another potential surrogate taxon for biodiversity. They occur in many types of habitats, fulfill a variety of ecological roles, can be diverse and numerous, and there are several very good references for identification. Over 9,000 species are known worldwide, and ants are among the most numerous individuals in many habitats. For this study, ants were collected from leaf litter in an ecotone as well as from leaf litter in the woods near Eagle Lake. The ecotone represents the disturbed transition area between woods and a field; the woods represent a less-disturbed area of continuous habitat. Ants were collected by sifting leaf litter and other debris on the forest floor. Specimens were labeled, organized, and identified in order to analyze the diversity of ants between these two habitat types. Some species of ants were more numerous in the ecotone, but a greater diversity of ants occurred in the woods.

Beetle Biodiversity: Comparing Ecotone Vs Woods

Bryana Shumate, Kathryn Branham*. Dr. Charles Lydeard, Dr. Sean O'Keefe, mentors, Department of Biology and Chemistry, College of Science

Biodiversity is an important indicator of health of an ecosystem. Beetles (order Coleoptera), which comprise twenty percent of known, described species, inhabit a wide variety of habitats and occupy many ecological niches; making them excellent study organisms to address biodiversity-related questions. To study this phenomenon, we sampled the biodiversity of Coleoptera at a site near Morehead State University's Eagle Lake. We collected beetles using yellow pan traps, Lindgren funnels, and leaf-litter extraction. Pan traps catch the larger, crawling beetles, as well as those attracted to yellow flowers. The Lindgren funnels attract beetles that are flying and prefer to land on trees. Leaf-litter extraction collects the small beetles found only within the leaf-litter. For our analysis here, we only concentrated on the leaf-litter inhabiting beetles. We collected leaf-litter samples from a less-disturbed wooded habitat and its associated ecotone between the wooded habitat and the more disturbed, open field habitat to assess whether there were any differences in the richness and/or abundance of beetle species between these two sampled areas. Through our data we discovered that the leaf litter from the wooded habitat featured a greater diversity of beetles, compared to the ecotone only a few meters away.

Bed Bug Behavior In Response To Odors

Hunter Dockery*, *Dr. Sean O'Keefe, mentor*, Department of Biology and Chemistry, College of Science

The common bed bug, *Cimex lectularius* has long claimed a pestering domain in the homes, beds, furniture and luggage of humans. With recent spikes in bed bug populations, especially in areas with poor demographics, and few effective ways to prevent infestation, it is an opportune time to study these prolific pests. Bed bugs utilize multiple receptors to detect heat, gas emission, and scent. With special focus on olfaction, trials are being conducted which test the efficacy of various essential oils and pheromones to repel bed bugs. A special focus on the behavior of the bugs was observed and recorded for these purposes. Experimentation consisted of six types of trials. Each trial utilized an absorbant applicator soaked in a test solution and an absorbant applicator soaked in a control solution. Trials varied in time conducted (from minutes to 24 hours or more) as well as in many other factors, such as the container in which the trials were conducted, number of bugs used, and scent solution and control used. Manipulations of variations of treatment allowed for the collection of a variety of types of data, and results obtained in earlier trials helped to set parameters for subsequent ones. Applications of this experimentation are numerous; refinement of concentrations which tend to repel the bugs could be applied to a variety of locations to form a sort of barrier to bed bug entry, an application especially useful in the prevention of unwanted pests in luggage.

Bacterial Two Hybrid System Used To Determine Physical Interaction Between UmuDAb And DdrR

Jordan Carrington*, *Dr. Deborah Cook, Dr. Janelle Hare, mentors*, Department of Biology and Chemistry, College of Science

UmuDAb and DdrR are both proteins that are involved in the SOS mutagenesis response in the opportunistic pathogen *Acinetobacter baumannii*. We hypothesize that UmuDAb and DdrR work together to repress gene expression in the SOS mutagenesis response. This might require UmuDAb and DdrR to physically bind one another to accomplish this response. The bacterial two hybrid system is used to determine if two proteins physically interact. The BACTH kit uses separate plasmid vectors which each encoded either the 18 kD or 25 kD portion of the catalytic domain of adenylate cyclase. This allows the genes encoding the proteins of interest, UmuDAb and DdrR, to be fused to either the N- or C-terminus of either the portions of the enzyme. If the proteins of interest interact, then the enzymatic function would be restored, which will cause cAMP to be produced. This induces the lactose and maltose biochemical pathways, and this can be observed in several assays as an indication of UmuDAb-DdrR interaction. First, I designed specific primers to produce PCR products that coded for the proteins of interest. These PCR products which contained the two genes of interest were then cloned into the BACTH system's provided vectors using restriction cloning. This produced two separate plasmids, each containing a portion of the catalytic domain and a protein of interest (either DdrR or UmuDAb), now coding for a novel hybrid protein. These plasmids were then transformed into reporter *E. coli* cell strains DHM1 and BTH101. Following this, qualitative testing was done using MacConkey maltose and X-gal/IPTG plates. A positive test, indicating an interaction, would show darker bacterial growth on both of the qualitative media. Additionally, quantitative testing with a beta-galactosidase colorimetric test is currently being used to evaluate the amount of hydrolysis of ONPG into O-nitrophenol, a yellow product which provides measureable results via spectrophotometry. Negative controls were the vectors provided by the system with no umuDAb or ddrR cloned into them and positive controls were the vectors provided by the system which had leucine zippers ensuring a physical interaction. Initially, the results have showed little to no signs of interaction. The selective media tests showed little differentiation between the tests and negative results. The beta-galactosidase test showed a significant gap between positive controls and tests, initially signaling no interaction.

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Are Telomeres Required? Genetically Engineering A Eukaryote With Circular Chromosomes

***Nadia Richardson**, Dr. Melissa Mefford, mentor, Department of Biology and Chemistry, College of Science**

Telomeres are regions of repetitive DNA at the ends of eukaryotic linear chromosomes. Telomeres cannot be fully copied during DNA replication. To overcome this problem, an enzyme called telomerase adds repetitive sequences to the 3' end of the chromosome. Telomere length and telomerase activity are implicated in aging and cancer in humans. Prokaryotes have circular chromosomes that lack telomeres and telomerase. So, why did linear chromosomes, telomeres and telomerase evolve? To begin to address this broad question, I am genetically engineering a circularized version of chromosome XVI in the yeast *Saccharomyces cerevisiae*. The method involves inserting DNA cassettes at both ends of chromosome XVI and selecting for a recombination event between the cassettes that cause circularization. Once yeast with a circular chromosome XVI are confirmed, we will assess their relative fitness. This experimental approach will shed light on the evolution of linear chromosomes in eukaryotes.

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Analysis Of Frequency Distributions Of Parmotrema (Ruffle Lichens) And Quercus (Oaks) To Identify Species Of Conservation Concern In Kentucky

***Kay Rothermund**, Dr. Allen Risk, mentor, Department of Biology and Chemistry, College of Science**

Parmotrema (ruffle lichens) and Quercus (oaks) were studied for number of species and specimens collected in Kentucky in order to compare abundance patterns of the species in the two genera with the objective of identifying species for conservation consideration. Number of specimens collected was determined by using SERNEC and CNALH, online databases for vascular plants and lichens, respectively. Morehead State University's herbarium (MDKY) was also searched for additional specimens not documented online. Both genera are species rich and commonly found in Kentucky. Parmotrema has 26 species found in Kentucky while Quercus has 21. Frequency distributions by species for each genus were created. The Quercus frequency distribution had a linear trend whereas the Parmotrema frequency distribution had a negative exponential trend, suggesting there are significant differences in the proportion of rare species for each genus. Twelve species (46.2%) for Parmotrema and three species (14.3%) for Quercus were identified for conservation consideration. A possible explanation for this significant difference in percentage is that vascular plants, in general, are collected more often than lichens. If Parmotrema was collected more, the frequency distribution might become more linear like that of Quercus. Additional possible explanations are that there are differences in the speciation history of the genera or that Parmotrema species have narrower niche requirements than Quercus species. This research was supported by an Undergraduate Research Fellowship from Morehead State University.

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**Age Of The Forest And Disturbance Pattern History At Eagle Lake,
Rowan County, Kentucky**

***Katherine DeBurger**, *Lindsay Wetzel**, *Dr. Allen Risk*, *mentor*,
Department of Biology and Chemistry, College of Science**

Dendrochronology is the dating and study of annual rings in trees. It can be used to determine the history of a stand, better recognize past and current environmental processes and conditions, and to improve the understanding of possible future environmental issues. Thus, tree ring dating can help determine when forests were established and what environmental stresses have occurred since their establishment. Five 20x20 meter plots were randomly located and assessed within the Eagle Lake watershed. With an increment borer, two samples were taken from each tree measuring 10 cm or more in diameter at breast height (DBH). Each core was dried, glued to a mount, and sanded to expose the annual rings. The cores were examined and cross dated by at least two researchers. After cross dating, the ring widths of various species were measured using a Velmex measuring system. COFECHA, quality control software, was used to confirm ring dates. Inner ring dates and ring width values will be used to determine establishment pulses and disturbance patterns. Release events will be determined with a percent release calculation using the formula $[(m_2 - m_1)/m_1] \times 100$, where m = median ring width. This research was supported by the Department of Biology and Chemistry.

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**Spatially Resolved X Ray Spectroscopy Of The Galactic Supernova
Remnant G344.7-0.1**

***Savanna Booten**, *Dr. Thomas Pannuti*, *mentor*, Department of Earth and
Space Science, College of Science**

We present a spatially-resolved X-ray spectroscopic study of the Galactic supernova remnant (SNR) G344.7-0.1 using an archival observation made with the Chandra X-ray Observatory. The radio morphology of G344.7-0.1 is shell-like (which is typical of Galactic SNRs) but unlike the majority of Galactic SNRs the X-ray morphology is center-filled. Previous X-ray studies of this SNR have revealed that the X-ray emission is thermal in origin but a detailed spectroscopic analysis of the SNR that covers the entire angular extent of the X-ray emission has yet to be conducted. In the present work, we have extracted X-ray spectra across the entire angular extent of G344.7-0.1 to search for variations in the spectral properties of the X-ray emission, such as in temperature and in elemental abundances. This search takes advantage of the superior angular resolution capabilities of the Chandra X-ray Observatory (with an on-axis angular resolution of 1 arcsecond) and will help investigate the suitability of various models that have been advanced to explore the center-filled thermal X-ray morphologies exhibited by several Galactic SNRs including G344.7-0.1. Initial results of this work will be presented and discussed.

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Preliminary Palynology Of MoSu Ridge, A Complete Exposure Of A Coal And Associated Sediments In The Hooper Formation, Wilcox Group, Texas

***Alexander Newman*^{*1}, *Dr. Jen O'Keefe* (mentor)¹, *Dr. Christopher Denison*²(mentor), and *Nicholas Cowey*³(mentor), ¹Department of Earth and Space Science, College of Science, Morehead State University, Morehead, KY, ²Astra Stratigraphics, Bastrop, TX, ³McKinney Roughs Nature Park, Cedar Creek, TX**

Exposures of the poorly-documented Hooper Formation, lowermost Wilcox Group of Texas, have been under study by MSU students, faculty, and collaborators since 2017. During winter intersession 2018, a new exposure, dubbed 'MoSU Ridge' by MSU students enrolled in ESS 399, was located, described, and sampled. This new exposure represents the first complete exposure of the coal in the uppermost Hooper formation and its seat-earth and capping deposits. Here we provide a brief summary of the preliminary palynology of this exposure. Samples are somewhat less weathered than in other localities in McKinney Roughs Nature Park, but had variable palynomorph recovery, possibly due to past and current pedogenesis, which can destroy pollen, plant spores, and algae. This work confirms the preliminary hypothesis that deposition occurred in freshwater topogenous mires, much like coastal wetlands present in Texas today. This project was completed as part of ESS 476 during spring 2019.

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Pollen Fingerprinting In Fayette County: Preliminary Work In Hills Of The Bluegrass And Inner Bluegrass Level IV Ecoregions Of Kentucky

***Ann Wilkinson*^{*}, *Dr. Jen O'Keefe*, mentor, Department of Earth and Space Science, College of Science**

A statewide-effort to produce regional pollen fingerprints for each Level IV Ecoregion of Kentucky was launched in January 2019 as a means of 1) fingerprinting Kentucky honeys and 2) supporting on-going Holocene paleoecological and anthropological research. The preliminary fingerprint for the 711 (Inner Bluegrass) region is based on samples from northern Fayette County and does not account well for the biodiversity of the region, especially the southernmost part, along the border with the 71k (Hills of the Bluegrass) region, which includes many unique and rare taxa, especially in and near forested dissected uplands and side-slopes the Kentucky River palisades. This poster presents the preliminary results from the initial flowering period for one portion of the 711 and 71k boundary, with emphasis on plants visited by bees. Data are being used to refine the 711 pollen fingerprint for Fayette County and to improve honey typing in that region.

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Organic Petrography Of Everglades Type Coal Deposits (Paleocene Eocene Boundary) At Manawianui Drive, Bastrop County, Texas

***W. Luke Grayson*^{*1}, *Dr. Jen O'Keefe* (mentor)¹, *Dr. Thomas Demchuk*², and *Dr. Christopher Denison*³ ¹Department of Earth and Space Science, College of Science, Morehead State University, Morehead, KY, ²RPS Group, Houston, TX, ³Astra Stratigraphics, Bastrop, TX**

Paleocene-Eocene age rocks exposed at Manawianui Drive near Bastrop, TX, are primarily dark-gray, tidally-laminated, bioturbated, silty mudstones, collectively referred to as the 'Dark Band.' This unit, in several places, is cut out by coal-filled tidal channels. The coals contain scattered silicified logs and branches near their bases and range from woody to herbaceous in aspect. The logs appear to have been highly weathered and/or degraded by fungi and bacteria prior to silicification. In the upper portions, laminated mats of herbaceous materials occur, including compressed rushes and ferns. The top of the coal is cut out by erosion and Ophiomorpha-type burrows extend down into the coal from the overlying Carrizo Formation sands. The coals, as shown by palynological study, likely accumulated in Everglades-type freshwater to brackish water wetland settings. This organic petrographic study seeks to compliment the palynology and further define the coal's depositional history. This study was completed as part of ESS 476: Directed Research, in Spring 2019.

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Organic Matter Preservation In Paleocene Rocks At MoSu Ridge In Mc Kinney Roughs Nature Park: New Insights Into Ancient Wetland Ecosystems

****Russel C. Rogers*¹, *Jen O'Keefe*¹ (mentor), *Thomas Demchuk*² (mentor), *Chris Denison*³ (mentor), *Nicholas Cowey*⁴ (mentor), ¹Department of Earth and Space Sciences, College of Science, ²RPS Group, Houston, TX, ³Astra Stratigraphics, Bastrop, TX, ⁴McKinney Roughs Nature Park, Cedar Creek, TX**

Though Earth is currently experiencing significant climate change, it is not the first time in Earth's history that climatic aberrations have occurred. Hyperthermal events are well known from the Paleocene and Eocene (66-33.9 MA), and tend to be associated with deposition of low-rank coals. The little-studied coal in the upper Hooper formation at McKinney Roughs is an example of this type of coal. Preliminary biostratigraphic work has indicated that it may be associated with the Early Latest Paleocene Climate Event (ELPE), also referred to as the Middle Paleocene Biotic Event (MPBE), which took place 58.9 MA; a radiometric age date for the ash in the lower portion of the coal is pending. The coal at McKinney Roughs is exposed in multiple locations; this poster contains results from a new exposure dubbed 'MoSU ridge.' This is the most complete exposure of the coal, seat-earth, and overlying sediment found to date. Organic petrography of the sediments shows that the seat-earth and overlying sediment are organic-matter poor, while the coal is generally detrital woody-matter (huminite)-dominated, with significant quantities of charcoal (inertinite). This is consistent with a flooded, flowing water mire, similar to freshwater swamps and marshes along the modern Gulf Coast.

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Long Term Swift Monitoring Of The Narrow Line Seyfert 1 Galaxy Pg 1211 + 143

***Dylan Grupe**, Dr. Dirk Grupe, mentor, Department of Earth and Space Science, College of Science**

I will report on over a decade of x-ray and UV data observed by NASA's Swift observatory of the Narrow Line Seyfert 1 galaxy PG 1211 + 143. Observations of this source began in March 2007, during which the galaxy was going through a low x-ray flux period, and over the past decade it has returned to a fairly regular state. Light curves for both x-ray and UV will be presented, along with a discussion on how the spectral energy distribution has changed. I will also give an overview of possible reasons for the flux change in 2007, including partial covering absorption and changes in accretion rate.

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Long Term Monitoring Of Active Galactic Nuclei With Swift

***Alexander Hubbart**, *Keaghan Knight**, Dr. Dirk Grupe, mentor, Department of Earth and Space Science, College of Science**

We will present long-term X-ray and Ultra-violet/Optical light curves of four Active Galactic Nuclei (AGN) observed with the NASA Neil Gehrels Swift Observatory. These four AGN (QSO 0056-36, Fairall 1116, CBS 126, Mkn 876) represent different classes of AGN with different black hole masses and accretion rates. We will discuss the variability of the X-ray and UV light curves of these AGN and how they correlate to the black hole mass and accretion rates.

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Ground And Mission Operations For The NASA JPL Asteria Space Mission

***Alex Roberts**, *Emily Mattle*, *Toby Gedenk*, Dr. Benjamin Malphrus, mentor, Department of Earth and Space Science, College of Science**

ASTERIA (Arcsecond Space Telescope Enabling Research in Astrophysics) was deployed from the ISS on November 20, 2017. The primary mission is to achieve arcsecond-level line-of-sight pointing error and highly stable focal plane temperature control. The spacecraft was developed by a collaboration between MIT and JPL's Phaeton Program. Morehead State University's Space Science Center has been contracted to provide spacecraft tracking, telemetry, and control services to the Mission Operations team at JPL. The Space Science Center's Ground Operations team, which consists of Toby Gedenk, Chloe Hart, Alex Roberts, Emily Mattle, and Sarah Wilczewski, uses advanced technology consisting of highly sensitive RF front ends, fiber optics, SDR software, an Amegint transceiver, and MSU's own 21-Meter Space Tracking Antenna to perform these services. The MSU ground station team has provided support for over a year and at least 700 passes since spacecraft deployment with a reliability rate of greater than 97%. ASTERIA's original 90-day prime mission was successful. The spacecraft continues to operate nominally and ASTERIA has now entered their final extended mission and will be funded throughout the spacecraft's lifetime. In this presentation the team will provide an overview of the ASTERIA mission, the mission operation processes, and the ground station Architecture.

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A Chandra X Ray Observation Of The Composite Galactic Supernova Remnant 3C 396

***Charles Bebout**. Dr. Thomas Pannuti, mentor, Department of Earth and Space Science, College of Science**

We present an analysis of an archival observation made of the composite Galactic supernova remnant (SNR) 3C 396 (G39.2-0.3) with the Chandra X-ray Observatory. Prior X-ray studies of this SNR have revealed several remarkable features of this source, including the presence of an extended pulsar wind nebulae and the enhanced elemental abundance of calcium relative to solar in the diffuse X-ray-emitting plasma. The high angular resolution capabilities of Chandra (with an angular resolution of 1 arcsecond at 1 keV) are well-suited for searching for spatial variations in the spectral properties of extended diffuse X-ray sources such as Galactic SNRs like 3C 396. We have divided the SNR into eight different regions (excluding the pulsar wind nebula) and attempted spectral fitting with several different thermal models and with variable elemental abundances of calcium, silicon and sulfur. One of the thermal models that we have applied includes an over-ionized recombining plasma model: this model has recently been applied successfully to extracted X-ray spectra of other Galactic SNRs and may indicate a new evolutionary path for these sources. Our initial results will be presented and discussed.

P - 68

The Forces Applied In Football

***Dalton Lewis**. Dr. Ignacio Birriel, mentor, Department of Mathematics and Physics, College of Science**

This project will investigate the use of wireless accelerometers to measure the magnitudes of the accelerations behind the "hits" at the line of scrimmage.

P - 69

The Calibration Of Nuclear Radiation Detectors

***Eddie Henderson**. Dr. Ignacio Birriel, mentor, Department of Mathematics and Physics, College of Science**

This project involves calibrating GAMMA-SCOUT radioactive detector. The detectors are halogen filled Geiger-Müller counter tube and will be used to measure radiation in local outcrops of black organic shale.

P - 70

Probability Of Winning The Game Of Tetris

***John Michael Visperas**. Dr. Rus May, mentor, Department of Mathematics and Physics, College of Science**

Tetris is a game whose objective is to arrange pieces that fall from above and fill up a grid. Once a row is filled, it is cleared and the game awards points. We explore a special case of this game where the player can only score by clearing four rows at a time. We use a model for discrete probability in order to determine the probability of winning the game of Tetris at any given level, and then we can determine the average game score through a series of generating functions. This allows us to create a new definition of winning at Tetris through a more conventional means.

P - 71

Increasing Student Engagement In Introductory Online Physics

***Breanna Epperson**. Dr. Kent Price, mentor, Department of Mathematics and Physics, College of Science**

Today, the demand for online instruction is on the rise. While online classes may have their advantages, they have many disadvantages. In a classroom setting, research shows that student interactions are important for overcoming common misconceptions, but it is challenging to achieve the same level of engagement in an online setting. To try to improve online interactions in an introductory online physics class at Morehead State University, we required the students in the fall 2018 online class to post a total of three times about a conceptual physics question in a series of assignments. They had to state their answer, explain why they chose that answer, and respond to a classmate's answer to receive full credit. Doing so increased the percentage of students who responded to another student's answer and changed their final answer. This led to an increase in the percentage of students who answered the discussion questions correctly when compared to previous classes. The previous classes were only required to state their answer and explanation. Surveyed online students stated that they thought the new method of answering discussion questions was helpful in preparing them for future exams and was beneficial for their group communication.

P - 72

Galois Theory And Polynomials

***Gloria Corona-Luna**. Dr. Vivian Cyrus, mentor, Department of Mathematics and Physics, College of Science**

At a young age French mathematician, Evariste Galois made a dent in the abstract algebra field. Coined in the 1800's, Galois theory has served as a bridge between group theory and field theory. A topic mathematicians have explored is determining solvability methods for polynomials and the form of its solutions. Subsequently, the existence of polynomials that are not solvable by radicals serve as a motivation to study Galois' work. The present study examined polynomials of varying degrees up to the quintic polynomial, which serves as a primal demonstration of the importance of Galois theory .

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Factors Associated With Students Leaving Quantitative STEM Majors. A Case Study

***Hannah Brewer**. Dr. Robert Boram, Dr. Wilson Gonzalez-Espada, mentor, Department of Mathematics and Physics, College of Science**

Although STEM graduates are essential for a large number of professions and for strong national and local economies, researchers warn that more than half of college freshmen who declare STEM majors switch out of them, especially in quantitative disciplines, such as mathematics, physics, chemistry, and engineering (Q-STEM). The process of selecting and changing any college major is a deeply personal process that is influenced by family, friends, mentors, and discipline related experiences. The study used a case study approach and mixed-methods methodologies, including a demographic survey by participants and a control group (graduating seniors in Q-STEM majors) and semi-structured interviews. Data was used to identify "push" and "pull" factors that influenced the participants' decision to select a Q-STEM major and, later on, switch out of STEM altogether. Preliminary results and implications will be discussed.

P - 74

Detection Of Radioactivity In Black Organic Shale

***Eddie Henderson**, Dr. Ignacio Birriel , Dr. Kevin Adkins, mentors,
Department of Mathematics and Physics, College of Science**

This project concerns measuring the amount of naturally occurring radioactivity found within the black organic shale family. This type of shale is common in Eastern Kentucky, so it is important to measure the amount of radiation as a first step towards understanding the impact it could have on the surrounding environment. To detect this radiation, we are using a group of Gamma-Scout detectors. The Gamma-Scout detects alpha, beta and gamma radiation in fixed time intervals and stores the results in memory for later analysis. Two local sites will be used in this project, the Ohio Shale Outcrop and the Sunbury Shale Outcrop, both located within a few miles of Morehead State University. This poster will focus on the use of the Gamma-Scout and the upcoming data collection and analysis.

P - 75

Use Of A Strategy List To Decrease Interruptions During Medication Administration

***Ashley Bowling**, Emily Ashley*, Haley Back*, Helyna Bissell*, Sydney Chadwell*. Ms. Mary White, mentor, Department of Nursing, College of Science**

It is estimated by the Food and Drug Administration that 1.3 million people in the United States are injured as a result of medication errors annually. Of these injuries, 250,000 resulted in death of the patient according to Johns Hopkins patient safety experts. A literature review of 25 research studies identified that a significant amount of medication errors occurred from interruptions during the medication administration process. The purpose of this quality improvement project was to create a strategy list to present to nursing staff at a large rural teaching hospital that outlined ways to decrease distractions during medication administration. The strategy list included methods of decreasing distractions such as retiring personal staff phones and wearing brightly colored sashes during the medication administration process.

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Strategies To Improve Nurse To Patient Ratios And Its Effects On Patient Outcomes

***Alex Meador**, Holly Haskins*, Jonna Watkins*, Olivia Ritchie*, Sara Setser*. Ms. Mary White, mentor, Department of Nursing, College of Science**

A current nursing practice issue is an increase in mortality, medication errors, and patient falls related to nurse staffing shortages. A literature review that included 25 research studies identified an association between staffing ratios and adverse patient outcomes. Research suggests each additional patient per nurse may be associated with an increase in the likelihood of negative patient outcomes within 30 days of admission. The purpose of this quality improvement project was to develop a strategic teaching plan that outline the use of staff meetings, encouraging verbalization of concern, incorporating regular reflection times, and surveys as ways to address nursing staffing shortages.

P - 77

Reducing Errors Associated With Intravenous Medication Administration

Andrea Howard*, Blake Smith*, Chanel Wilder*, Susie Chaney*. Ms. Suzi White, mentor, Department of Nursing, College of Science

In 2014, the World Health Organization (WHO) found that nearly 85 percent of medication error fatalities come from intravenous medication errors. Intravenous (IV) medication errors occur due to the wrong drug, wrong dose, wrong rate, wrong concentration, incorrect aseptic technique, known allergies, omitted medications, wrong time of administration, incorrect labeling, patient identification, and no order for the infusion. A literature review of 32 research articles identified that nurses' perceptions of why medication errors occur included physicians' medication orders are not clear, the names of many medications are similar, pharmacy did not label the medication correctly, poor communication, lack of staff to patient ratio, fatigue from hard work, nurses' heavy workload, and working night shift. This quality improvement project emphasizes a step-by-step protocol of setting up, administering IV medications, and monitoring the patient after. A combination of standardized practice, technology improvements, and targeted education is required to reduce errors.

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Increasing The Use Of Patient Hand Hygiene In The Hospital Setting

Ariana Jackson*, Gage Grimes*, Haley Mills*, Katlin Moore*, Michaela Oaks*. Ms. Mary Suzanne White, mentor, Department of Nursing, College of Science

Every year approximately 1.7 million hospitalized individuals contract a healthcare associated infection (HAI) resulting in 99,000 deaths. This number could be drastically decreased through implementation of simple patient hand washing protocols. As nursing students in a large urban teaching hospital, it has been noted that actions in support of patient hand hygiene are minimal. This includes, but is not limited to, patient hand hygiene after toileting, before meals, and pre/post wound care. A literature review of 25 research studies targeting patient hand hygiene indicates that this issue can be attributed to the assumption that hand hygiene is a commonly used practice by everyone including patients. The purpose of this QI project is to develop a patient hand-washing protocol that will decrease the incidence of nosocomial infection in patients. This protocol would include patient education regarding hand-washing and would feature handouts and wall posters, as well as nursing staff education on the importance of having patients perform hand hygiene to improve patient outcomes.

P - 79

Exploring The Effects Of CAM Therapies Compared To Opioid Administration In A Hospital Setting

Aaron Hutchison*, Brian Witt*, Emily Rogers*, Sidney Logan*. Ms. Suzy White, mentor, Department of Nursing, College of Science

The opioid overdose crisis has become one of the leading causes of death in the United States. Opioids are a powerful analgesic that act as a depressant to the central nervous system resulting in euphoria and addiction. A literature review of fill in the number research studies was conducted that explored CAM (Complementary Alternative Medicine) therapies to help reduce the use of prescribed opioids in the hospital setting. The purpose of this quality improvement project was to develop a meta-synthesis analysis describing how the use of CAM therapies in the hospital is an alternative to prescribing opioids.

Evidence Based Standardized Report Tool

Karrie Holloway*, Scarlet Strong*, Trey Swartz*, Whitney Strange*. Ms. Suzi White, mentor, Department of Nursing, College of Science

The Joint Commission recommends that standardized reporting tools are the most effective method to communicate critical information during patient transfer of care. Baccalaureate Nursing Program students receiving clinical instruction at a large urban teaching hospital observed reporting communication during transfers of care between nurses on a medical surgical unit and identified multiple methods being utilized. A literature review of 32 research studies overwhelmingly supported the use of a standardized reporting tool so that both sender and receiver were operating on the same communication system. Mnemonics were found to organize the that information about patient care was given and received. A popular mnemonic was the Situation, Background, Assessment, and Recommendation (SBAR) method and was used to organize effective handoff reporting communication. The purpose of this quality improvement project was to develop an evidence-based standardized report sheet using the mnemonic SBAR in order to ensure the continuity of patient care and safety.

Evidence Based (EB) Solutions To Positively Improve Patient Outcomes In Emergency Department (ED) Boarding

Abigail Timm*, Anna Rucker, Brent Pierce, Tessa McCord. Mr. Suzi White, mentor, Department of Nursing, College of Science

Emergency department boarding has been shown to increase mortality and morbidity rates and decrease patient outcomes and satisfaction. Annually, there are 136.3 million hospital visits with 16.2 million of those visits resulting in hospital admission. Thus, 91.6% of people who visit the emergency department (ED) are sent home without admission. Patients spend an average 24 minutes waiting in the emergency department before seeing a health care provider. Patients who are admitted to the unit from the emergency department spend an average of 96 minutes waiting for room placement. Overcrowding in the ED attributes to a 3.6% increase in mortality rates compared to emergency departments that have adequate triage systems and enough bed spacing for all patients.

A literature review of 32 research articles identified several solutions that could mediate the issue of ED crowding and boarding. These solutions include; pivot triage, reverse triage, better communication from and with other healthcare workers and bed spacing.

The purpose of this quality improvement project was to review previously implemented approaches used to reduce emergency department wait times, improve morbidity and mortality rates, and to reduce hospital spending on patients in the emergency department.

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Effectiveness Of Using Disposable Chlorhexidine Wipes Compared To Traditional Bed Baths

Benjamin Hill*, Cheyenne Wells*, Madeline Wilson*, Olivia Moore*. Ms. Mary White, mentor, Department of Nursing, College of Science

A current practice issue in nursing is whether to use disposable chlorhexidine wipes to bathe patients or the traditional method of a basin, soap, water, and washcloths. Based on a literature review of 20 research studies, a reduction in infectious organisms was found when using disposable wipes rather than the traditional method. Using disposable chlorhexidine wipes could be cost-effective in that less money will be spent treating infections that are associated with traditional methods. It was also identified that both nurses and patients prefer the disposable wipes compared to the traditional bed bath. Chlorhexidine wipes were also shown to be more time effective allowing nurses more time to provide other nursing interventions. The purpose of this quality improvement project was to educate nurses and patients of the benefits of bathing with chlorhexidine compared to traditional bathing with soap and water. A teaching sheet was developed and distributed to staff nurses outlining cost effectiveness, time saving, decreased infection, and cleanliness of disposable chlorhexidine wipes.

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Development Of An Evidence Based Protocol For Improving Quality Of Care By Increasing Certified Nursing Assistants

Kacey Cox, Katelyn Rogers, McKenzie Cooper*, Regan Bohrer*. Ms. Suzi White, mentor, Department of Nursing, College of Science

Throughout clinical rotations at a large urban teaching hospital MSU students noted fewer Certified Nursing Assistants (CNAs) in various hospital settings. Staff nurses cited high CNA turnover rate as a factor resulting in decreased quality of patient care. A literature review of 32 research articles identified CNA perception of being ill prepared for patient assignments and overall low job satisfaction as reasons for leaving their positions. The purpose of our quality improvement project was to develop a document that outlines the importance of quality CNA education, improved delegation between nurses and CNAs, and opportunities for upward mobility thus resulting in increased numbers in CNAs in the workforce. This protocol is expected to result in a decrease in CNA-patient ratios, improved communication between CNAs and hospital staff, enhanced education on skill performance, and further education for the CNA. Implementation of this protocol would improve the quality of care that each patient is receiving by providing education and appropriate delegation to CNAs. This will improve patient and CNA satisfaction and lead to improved patient outcomes. Improved delegation from the nurses to the CNA can help them feel better prepared in providing care to high acuity patients.

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Cardiovascular Risk Reduction Of College Students Via Social Media

***Amanda Mapes**, Ms. Suzanne White, mentor, Department of Nursing, College of Science**

More than 50% of young adults aged 18-24 have at least one identifiable risk factor for coronary heart disease (CHD) and almost 25% have atherosclerotic lesions. It is estimated that cardiovascular (CV) risk in young adults is likely underestimated despite the presence of multiple CV risk factors including hypertension, elevated cholesterol levels, smoking, obesity, physical inactivity, poor diet, and excessive alcohol intake. The purpose of this pilot study was to deliver an educational intervention aimed at increasing consumption of fruits and vegetables and reduction of BMI among college students. The intervention was delivered via social media, specifically Facebook.

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The Influence Of Personality Characteristics On Trust Of Autonomous Vehicles

***Abigail Mohr, Emily Lush, Jorden Crowe, Sydney Young**, Vanessa Jones. Dr. Gregory Corso, mentor, Department of Psychology, College of Science**

As autonomous vehicles become more common, manufacturers should be interested in customer personality characteristics that might determine whether people will accept these types of vehicles. The purpose for this study was to determine whether there are correlations between personality characteristics and user acceptance of autonomous vehicles. To assess acceptance of autonomous (self-driving) vehicles, we used a short 24-item questionnaire from another research project (by permission). A demographic survey was also distributed to participants along with a Big Five questionnaire to assess personality characteristics. Participants (N=105) were recruited online via Amazon Mechanical Turk; data from 83 participants were analyzed. The autonomous vehicle questionnaire contained eight subcategories of questions related to Perceived reliability/trust, Cost, Appropriateness of automation/compatibility, Enjoyment of to-be-automated task, Perceived usefulness of automation, Perceived ease of use of automation, Experience with automation, and Intention to use automation. The mean individual participant responses for the questions in each subcategory were subjected to a correlational analysis with scores from the Big Five questionnaire. The trait with the greatest number of significant correlations was Openness, suggesting that individuals who score high in Openness may be more willing to trust and purchase an automated vehicle. Our research investigating trust of automation is ongoing.

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The Effect Of Morphine Dose On The Elicitation Of Acute Withdrawal

***Cameron Goble**, *Edward Stump*. *Dr. Wesley White, mentor*, Department of Psychology, College of Science**

In prior research, most rats, when given a dose of 5.0 mg/kg morphine, showed a reduction in activity 12 to 24 hours after administration, a sign of acute withdrawal. However, a smaller number of rats showed no reduction in activity. The latter animals do not appear to experience a major cost of drug receipt, “hangover”, and may have a different risk of developing drug abuse than the former animals. In the present study, the subjects were eight adult male Wistar rats. Every five days, the rats were given counterbalanced doses of morphine, and after each administration the activity of the animals was monitored for 24 hours. Patterns of activity produced by morphine were compared to patterns produced by saline. The research provided an additional estimate of the proportion of animals showing acute-withdrawal resistance, and it indicated how elicitation of morphine acute withdrawal was related to dose. The study also produced individual difference scores that could be related to established predictors of drug abuse risk, and that could be used to study the genetic basis of acute withdrawal resistance.

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Sensory Motor Integration In Children With Autism Spectrum Disorder

***Brianne Davis**. *Dr. Ilsun White, mentor*, Department of Psychology, College of Science**

Autism spectrum disorder (ASD) is a neurological disorder characterized by a significant decrease in attention to voices or faces. In children with ASD such lack of attention to caregiver’s voices reflects deficits in reciprocal social interaction. Recent studies emphasize importance of a distributed view of behavior, involving areas of perception, attention, and motor development in ASD children. Using sensory motor tasks, this study examines sensory motor integration in pediatric autism and compares two groups of ASD children: hyposensitive and hypersensitive to sensory stimuli. In addition, changes of children’s responses to auditory, visual, or tactile stimuli are measured repeatedly over a period of time. Our preliminary observations indicate that hyposensitive children tend to seek and pursue the stimulation, while the hypersensitive children resist and avoid the stimulation. Assessing each child’s sensitivity to a range of different stimuli is an important step in providing the aids to help them. Improving sensory-motor integration with continued implementation in therapy may retrain a child’s brain to process sensory stimuli efficiently.

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Relations Among Tasks Used To Predict Drug Abuse Risk In Rats

Cameron Goble, Camille Felts*, Edward Stump, William Little. Dr. Wesley White, mentor, Department of Psychology, College of Science

A variety of tasks have been developed that tap into processes thought to have relevance for increased risk of drug abuse. These tasks produce a wide range of scores in individual subjects, with higher scores predicting drug abuse risk. The current research examines rats on several of these tasks, and also on some novel tasks that may have the potential to predict drug abuse risk. The subjects were sixteen male Wistar rats. The animals were run on a battery of tasks. The tasks included an assessment of anxiety, as assessed by preference for an enclosed space as opposed to an open one; an assessment of sensation seeking, as assessed by preference for exploring a novel context rather than a familiar one; an assessment of sensitivity to drug, as assessed by the increase in activity produced by acute administration of drug (amphetamine or morphine); acute withdrawal from drug, as assessed by the reduction in activity produced 12 to 24 hours after administration; and sensitization following repeated administration of drug. Scores on these tasks can be correlated and combined to produce better predictors of vulnerability to drug abuse.

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Parental Reflective Functioning: Associations With Adolescent Internalizing Symptoms

Brooke Thomas, Hannah Rice*, Jodi Perkins, Katelyn Ginn, Rachel Mayhaus, Sarah Huffman. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Parental reflective functioning (RF) is the ability to understand children's behavior in terms of underlying mental states (Slade et al., 2005). RF has a demonstrated relationship with young children's attachment, but less is known about RF pertaining to older children or about its import outside of the parent-child relationship. This study assessed RF in the parents of 21 families when the children were on average 16 years old (range 15 to 18 years, 9 female). Specifically, a 7-point scale was used to rate RF in an interview in which parents discussed times they and their teen experienced the emotions of sadness and anger. Children's internalizing symptoms (i.e., depression and anxiety) were assessed by both teen self-report and parent-report using the Child Behavior Checklist (CBCL: Achenbach & Rescorla, 2001). Data coding is still being finalized; however, we predict lower reflective functioning ratings will coincide with higher adolescent internalizing symptoms. That is, we expect that parents who demonstrate lower understanding of their children's thoughts and feelings will tend to have adolescents who show greater levels of depression and anxiety. This study could have significant implications for interventions aimed at improving parental reflective functioning among parents of adolescents. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

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Learning And Memory During Withdrawal From Psychostimulants

Georgia Clark*, Nicole Roberts. Dr. Ilsun White, mentor, Department of Psychology, College of Science

Repeated use of psychostimulants having addictive properties leads to loss of neurons in the brain, resulting in behavioral changes. Most recent reports suggest that abstinence from drug may increase neurogenesis in brain regions involved in memory. This study examined withdrawal from repeated use of psychostimulants, such as methamphetamine (METH) and cocaine, and subsequent effects on learning and memory. Rats were shaped to press a lever for each food pellet, and they were treated with METH (5mg/kg), cocaine (100mg/kg), or saline for 5 consecutive days. Beginning from the 3rd day of injection, rats were trained on a simple learning task, fixed-ratio 5 (FR5), which required 5 lever-presses for each food pellet. For each trial, lever-press latency and time to complete 5 lever-presses (run-time) were measured. During withdrawal, METH decreased response latency and run-time, reflecting impulsivity. However, cocaine increased response latency and run-time, reflecting differential effects on motivation. The present findings suggest that behavioral deficits during withdrawal depend on type of psychostimulant. Currently, we are examining possible blockade of behavioral deficits produced by repeated psychostimulant treatment.

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Is Reward Effective In Improving Visuospatial Memory Among The Elderly With Alzheimer's Disease?

Terra Riggs*. Dr. Ilsun White, mentor, Department of Psychology, College of Science

Early signs of Alzheimer's disease (AD) are characterized by spatial memory loss and amyloid- β accumulation in the brain. Such memory deficits and pathological changes develop, partly due to a progressive loss of neurons. This study examined the effects of reward on improvement of visuospatial working memory in the elderly with AD, using a delayed spatial task. A spatial cue was presented for 2 sec, followed by a 5-sec delay, then subjects selected a cue location. Correct responses during rewarded trials yielded a token reward, but correct responses during non-rewarded trials yielded no reward. Response latency was also measured. Two trial types were presented in a counterbalanced manner. Both AD subjects (n=4) and controls (n=4) made a greater number of correct responses during rewarded trials. AD subjects took longer to respond, compared to controls. However, AD subjects showed a markedly improved spatial memory during rewarded trials, within session. The present findings suggest that reward condition was effective in improving spatial working memory in AD and that continuous training in a visuospatial task with reward contingencies will lead to a significant delay in progression of memory loss and possible improvement in memory function in AD patients.

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Emotion Related Processes Amongst Rural, At Risk Adolescents

Ashley Hamm, Cameron Blanton*, Kristy Nine, Rebecca Ashley, Shelby Wright*. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Mindfulness is a state of openness, acceptance, and awareness in which aversive thoughts and feelings are experienced. Cognitive-behavioral therapies, including Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 2012) utilize mindfulness techniques for changing awareness and attitudes towards such experiences. The current study examines the association of adolescent's awareness and acceptance of sadness and anger, relative to their general tendencies towards accepting vs. avoiding feelings or becoming dysregulated. As part of a larger longitudinal study, 21 adolescents ranging from 16 to 18-years (9 female), were assessed for mindfulness-related concepts using two questionnaires. They also were interviewed intensively about their experiences with sadness and anger. This interview is being coded for indicators of accepting and adaptive attitudes towards these emotions, using a series of 5-point scales. We predict that teens observed to have high awareness, acceptance, and adaptive regulation of sadness and anger will self-report higher levels of mindfulness and lower levels of emotion dysregulation. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

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Does Wealth = Sensitivity?: Connections Between Financial Stress And Parenting Behavior

Angela Lentz, Madison Turner*. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Parental sensitivity is an extremely important aspect of healthy parent-child relationships, but research suggests it may be decreased when families experience chronic financial stress. We examined this question amongst 21 families returning for the last phase of a longitudinal project. The average age of the children was 16 and 9 were female. Parents completed a comprehensive demographic questionnaire, including rating how frequently and intensely they worried about their financial situation. In order to examine the influence of low SES and environmental stress, eight variables were composited into an index of socioeconomic risk according to theoretical and psychometric guidelines (Rushton, Brainert, & Pressley, 1983) Parents and teens also watched and discussed a video made of themselves playing together 12 years prior. We rated these interactions for parenting sensitivity and hostility, using scales adapted from Biringen (et al. 2000) and Kobak (2017). Our results supported the hypothesis in that both aspects of parenting quality were associated in the expected direction with socioeconomic risk. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

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Associations Of Childhood Trauma On Adolescent Acceptance Of Negative Emotions

Abigail McDevitt*, Ashley Hamm*, Cameron Blanton, Shelby Wright. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

In recent years, greater attention has been paid towards aversive childhood experiences and their impact on later functioning. Not only does exposure to such experiences appear to be fairly commonplace, but repeated exposure to traumatic life events has been associated with increased risk in both mental and physical health domains (KyBRFS, 2015). The present study explores connections between Adverse Childhood Experiences (ACEs) and adolescent's acceptance of negative emotions such as sadness and anger. As part of a larger longitudinal study, 11 teens (mean age 16 years) from Eastern Kentucky were administered the Transition to Adulthood Attachment Interview (TAAI: Crittenden, 2006) and an emotions interview based on the work of Katz & Gottman (1996). These were coded for ACEs and acceptance of negative emotions, respectively. Although coding is still underway, the authors hypothesize that adolescents with higher exposure to adverse life events will be less accepting of their negative emotions. In contrast, we expect teens exposed to greater levels of adverse events will tend to avoid experiencing negative affect, be uncomfortable experiencing it, and will describe non-accepting methods of coping. This work was supported by MSU Graduate Assistantships and Undergraduate Research Fellowships, and was funded by MSU RCPC and NSF EPSCOR grants.

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Association Of Child Emotion Understanding And Emotion Related Behavior During A Delay Of Gratification Task

Rachael Foster*, Shanea Capps*. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Emotion understanding is an integral first step in the process of regulating emotions adaptively. We examined the association between children's emotion understanding and their behavior during a frustrating task. We hypothesized that higher levels of emotion understanding would be associated with better-regulated behavior during the task. Thirty-five families participated when children were approximately 6 years of age. Child behaviors during the delay task were rated for presence/absence every 15 seconds of the 7-minute task. We rated noncompliance, false positive affect, hyperactivity, and physical avoidance of parent. Previous coders rated child affective displays during the task. Emotion understanding was rated separately in a task that focused on children's experience of six emotions. Results indicate that our hypothesis was generally supported. Children with higher understanding showed less anger, sadness, avoidance, and noncompliance. Children who showed both anger and sadness were more likely to display greater noncompliance during the delay. These results have important implications for understanding children's disruptive behavior. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

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Adverse Life Events And Parenting Behavior

***Angela Lentz**, Madison Turner. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science**

Parental sensitivity is an indicator of the quality of a parent-child relationship, which some research has shown to be associated with trauma history. However, most research has focused on young children and surprisingly little utilizes observational methods. In this study, the association of trauma and observed parenting was examined among parents of adolescents. Twenty-one dyads watched and discussed a video made during their participation 12 years prior. Children averaged 16 years of age at this latter time, and 9 were female. Their interactions while watching the video were coded for sensitivity and hostility, using scales adapted from Biringen (et al. 2000) and Kobak (2017). Parents also completed a checklist of their own and their child's stressful experiences, yielding a total for parent and child. No relationship was found between observed parenting and parents' total adverse events; however, children with greater adverse events had parents who showed greater hostility. This study adds to the scant literature on the relationship between trauma exposure and observed parenting, particularly amongst parent-teen dyads. This research was supported by an MSU Undergraduate Research Fellowship and by MSU RCPC and KY NSF grants.

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A Novel Procedure For Assessing Individual Differences In Anxiety In Rats

***William Little**. Dr. Wesley White, mentor, Department of Psychology, College of Science**

The elevated plus maze has commonly been used to assess individual differences in anxiety in rats. In the present research, individual differences in anxiety were assessed using an alternative, simpler apparatus. The subjects were 20 adult male Wistar rats. The apparatus was a runway that was elevated 1 meter above the floor, that was 10 cm wide and 1 meter long, and that was divided into three adjacent regions: a center region with a floor 10 cm long, and two side regions with floors that were 45 cm long. One side region had walls that were 18 cm high and covered (closed arm), and the other side region had only "curbs" that were 1 cm high (open arm). Each rat was initially placed in the center compartment and was video recorded from above for five minutes as it moved between the regions. Several measures were quantified from video recordings, including total time in closed and open arms. Anxious rats are considered those that spend a higher proportion of time in closed arms. The elevated runway appeared to produce results that were qualitatively similar to those produced with the elevated plus maze, with considerable individual differences seen in the proportion of time spent in the closed arms.

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A Blast From The Past: Parent's Insightfulness And Sensitivity About Their Teenager's Experience Of A Dyadic Reminiscing Task

Angela Lentz, Kaitlyn Osborn, Kimberly Meade*, Madison Turner, Morgan Brown. Dr. Shari Kidwell, mentor, Department of Psychology, College of Science

Parental reflective functioning (RF) assesses the capacity to understand mental states in one's child (Slade et al., 2005). While researchers have found RF to be associated with observed parenting behavior, few have examined these constructs beyond early childhood. This study evaluates parent's RF and sensitivity amongst 21 families of 16-year olds. Sensitivity was measured using a nine-point scale applied to a dyadic reminiscing task based upon coding schemes by Kobak (2017) and Biringen (2014). Specifically, sensitivity ratings were made of parents and teens discussing a video of themselves playing in the lab 12 years prior. Parents were subsequently asked to describe their child's thoughts and feelings during the discussion, based on Koren-Korie and Oppenheim's Insightfulness Assessment interview procedure (2001). RF was rated from these interviews on a 7-point scale. Though ratings are being finalized, we hypothesize that parents with higher RF will tend to engage in more sensitive behavior in the dyadic task. This research was supported by MSU Undergraduate Research Fellowships and by MSU RCPC and KY NSF grants.

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Inhibition Efficiency Of Lactobacillus Acidophilus Bacteria On Candida Albicans Growth

Sydney Gordon*. Dr. Michael Fultz, mentor, Craft Academy for Excellence in Science and Mathematics

Lactobacillus acidophilus is an abundant gram-positive bacterium commonly found in the gastrointestinal tract and in female reproductive tract. It is used as a probiotic and it is suggested that L. acidophilus may affect the ability of Candida albicans to adhere to vaginal cells and therefore decrease the chance of a yeast infection. Our project examined the effect of microgravity on of cultures of L. acidophilus and C. albicans. In our experiment, we utilized a dual-culture plating method to investigate the potential of L. acidophilus to impede the growth of C. albicans. Our experiment was flown to the International Space Station and incubated for 30 days. Our results indicate that L. acidophilus grown in microgravity produce larger colonies and had an increased growth compared to cultures at normal gravity. It also appeared that L. acidophilus may have an enhanced ability to prevent growth of C. albicans in a microgravity environment.

A Introduction To Quantum Computing

***Johnathan Baird**, Dr. Joshua Qualls, mentor, Craft Academy for Excellence in Science and Mathematics**

Quantum computing is a fundamentally new approach to the fields of computation. Classical computing is based on the ideas of bits: strings of 1's and 0's (with nothing in-between) on which we perform arithmetic operations. Quantum computing, however, is a radically new way of doing computation based on qubits (quantum bits) and new physical operations. The situation is analogous to that of a candle and an LED flashlight—both are sources of light, but the principles by which they operate are fundamentally physically different. It does not matter how many candles you put together, they will NEVER produce light in the same way that an LED does (quantum mechanically). Until quantum computers are ubiquitous, however, we will have to learn to make models and write algorithms for this powerful new technology.

Our project is a meditation on an introductory-level quantum computing exercise. The setup in question involves flipping a coin in secret. In the event of “Tails”, I give you a qubit prepared in some way. In the event of “Heads”, I give you a qubit prepared another way that depends on a parameter “x”. You are allowed to measure the qubit along some axis, and depending on the outcome of the measurement you have to guess whether the coin was “Heads” or “Tails”. This project consists of writing a Python computer program to model/simulate precisely this setup.

When the coin is modelled classically, there is an expected behavior as a function of “x”. We are restricted to only measuring the qubit along a vertical axis, up-and-down. Quantum computing predicts, however, that quantum phenomena such as superposition and interference will lead to a generically IMPROVED guess success rate as function of “x”. We will also be modeling the qubit in Python program (with the caveat that we are describing a quantum object using classical bits). Finally, we used the publicly-available quantum computing resources (IBM Q Experience) to compare our predictions/results with an actual quantum computer calculation created by IBM.

Exo Lab: The Growth Of Arabidopsis Thaliana Under Different Light Conditions

***Kaitlyn Palumbo**, *Kimberly Bosh**, Ms. Jennifer Carter, Ms. Rachel Rogers-Blackwell, Mr. Ted Tegami, Mr. Tony So, mentors, Space Science Center**

Magnitude.io launched the original ExoLab on SpaceX-14 to the ISS in the Spring of 2018. The experiment performed had a goal of growing Arabidopsis thaliana in a microgravity environment. On Earth, in the Craft Academy laboratory within the Exomedicine Cleanroom in Morehead State University's Space Science Center, the ground experiment was grown. The ground experiment plants were grown in two tubes with one set to match the light conditions of those of the chamber on the ISS as a control and the other with light conditions that varied over the course of the experiment from blue to red to white. The specimens on the ISS expired after 15 days due to high temperatures and CO2 levels. We found that the control light specimen grew at a faster, but less consistent, rate during the rosette growth and flower production periods, but the experimental specimen lived longer when exposed to the white light. Since it was theorized that high temperatures were the cause of the expiration of the experimental plants on the ISS, a new experiment was designed with high heat tolerant plants.

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Reclamation Of Unused Coal Fields Through Solar Gardens

Cassie Davis**, *Garrett Flynn**, *Haylee Winters**, *Hunter Dockery**, *Sydney Winters**, *Dr. Ahmad Hassan*, *Dr. Fatma Mohamed*, *mentors*, **Craft Academy for Excellence in Science and Mathematics*

With depleting oil reserves, constraints on coal usage, and the negative influence of fossil fuels on the planet, there is growing public support for renewable energy alternatives. Solar farms play an important role in addressing the challenges facing the generation of reliable, efficient, affordable, and environmentally friendly electricity. Our project details the business plan for the installation of a highly efficient photovoltaic solar farm to meet some of the electricity needs of the Leslie County community. Our business plan outlines finances, marketing, organization and everything needed to start this business. Our hopes are to bring a new energy source to the state while improving the community and protecting the environment. Kentucky Solar Garden Cooperative aspires to generate affordable, environmentally friendly, and reliable low-carbon, renewable electricity.

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Collegiate Athletic Fans Perception Of The Use Of Social Media In Marketing

Anna Gdovka**, *Dr. Steve Chen*, *mentor*, **School of Business Administration, Elmer R. Smith College of Business and Technology*

Over the last five years, social media has become the dominant tool for people to receive news and messages. Nowadays, sports fans also turn to the four main platforms of social media, Facebook, Twitter, Instagram and Snapchat, to receive marketing information, highlights, updates, and statistics while consuming sports content. Numerous studies indicated the greatest advantages for all levels of sports organizations using social media to promote the events and engage their fans. To fully understand the utilization of social media and its effectiveness for marketing intercollegiate athletic events, this study examined 149 event spectators' (62% males and 38% females) preferable methods for obtaining athletic information and promotional messages of a regional collegiate athletic program in Appalachia. The results showed the respondents relied on social media as much as the official athletic website to obtain information and game content. They relied far less on the traditional means such as word of mouth, radio, and printed media. The use of Facebook (72%) was still more prevalent than the use of Twitter (43%) perhaps because a greater number of respondents (60%) were 45 years of age or older. Nevertheless, 56% of respondents were satisfied with the content received through social media. Practical strategies for increasing certain types of video content and messages to enhance student event attendance and engagement were addressed based on the analyses of this data. It is logical for athletic programs to create employment or internship positions to further generate and monitor promotional and informational content in social media platforms.

An Exploration Of Tourism Variables' Influence On Direct And Indirect Expenditures Related To Tourism In Kentucky

***Sydney Bennett**. Dr. Janet Ratliff, mentor, School of Business Administration, Elmer R. Smith College of Business and Technology**

This exploratory research study examines variables of tourism that could potentially influence tourists' decisions to visit a location. The review of literature addresses the economic impact of tourism, SOAR initiative in Kentucky, attractions and destination tourism, branding, regional assets and economic development.

Tourism, both locally and nationally, has become a dominant economic driver for development within any community. Literature in this area addresses the importance of both physical characteristics of a location, as well as cultural attributes. Using Aksoz and Arikian (2008), as the framework for this study, the following are the five components of tourism specifically identified: attractions, accessibility, accommodations, activities, and amenities. The researchers further determined that a sixth component emerged from the research, referencing it as the sixth "A", awareness.

The way consumers research and plan travel has been significantly influenced by the digital revolution. Information and communication technology (ICT) as well as social media and mobile marketing (digital marketing) in consumers' research and decisions have become a key component in travel.

Based upon the review of literature, data was collected from a sample of 54 Appalachian counties in Kentucky. Variables identified in the literature were collected and analyzed for each county or city promoted on the state of Kentucky website (kentuckytourism.com) and through census information provided for each county in Kentucky at census.gov.

The findings of this study are reported along with a discussion of how tourism throughout the counties of Kentucky can greatly affect the economy within each of these counties. Additionally, information was collected on how counties are choosing to market and promote the tourism taking place within each county.

Systems Simulation Software: Anylogic Vs Vensim

***Patrick Good, Patrick Perkins**. Dr. Khouroush Jenab, mentor, School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

Evaluation and comparison of the Anylogic and Vensim simulation software packages, using their free educational versions. Including the applicability and effectiveness of the tutorials provided by the maker of the software, prices found for both products, and ease of use for beginners. Comparison of the features found in both programs.

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A Multi Variable Sensing Platform For Water Quality Monitoring In The Distribution Network

***Allie Skaggs**, Dr. Cheng Cheng, mentor, School of Engineering and Information Systems, Elmer R. Smith College of Business and Technology**

It is critically important to public health and homeland security that water utilities have the potential to detect contaminants (either natural or artificial, and accidental or deliberate) in a distribution water system in near to real time. In order to be able to safeguard the public, there is a clear need to be able to rapidly detect (and respond) to instances of accidental (or deliberate) contamination, due to the potentially severe consequences to public health and safety. Despite recent advances in biological monitors and microsensor technologies, there is no universal monitor for water quality monitoring and contaminant detection.

In this work, a multi-variable sensing platform is presented to monitor the quality of water in the distribution network. More reliable quality monitoring is achieved due to the large spatially distributed deployment and the possibility of correlating the quality measurements from various locations. This platform is controlled by Arduino ATmega2560 development board. Multiple sensors measuring the water temperature, pH, dielectric constant and electrical conductivity are integrated into the board. Water temperature and pH are evaluated by commercially available sensors, and dielectric constant and electrical conductivity are measured by a newly developed sensor. This innovative sensor utilizes integrated circuit (IC) ADuCM355 to add an AC signal on an interdigitated electrodes (IDE) that are immersed into water. Based on the measured impedance of water, dielectric constant and electrical conductivity can be extracted and measured. Therefore, by recording and documenting the measured data continuously, the spatiotemporal multi-parametric data collected can be fused and analyzed to reach complex decisions concerning the quality of drinking water.

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Investigating The Synthesis Of LMA-P2

***Samantha Bradley**, Sarah Little*, Dr. Brandon VanNess, mentor, Department of Biology and Chemistry, College of Science**

The ongoing objective of this project is to develop research techniques and organic synthesis strategies while progressively completing the synthesis of LMA-P2. The overall project is divided into three separate phases of synthesis in which each phase individually focuses on reactions necessary to synthesize precursors for LMA-P2. Each phase revolves around a key synthetic transformation. In order, the phases are as follows: a MacMillan cross-aldol reaction, a Takai olefination reaction, and a Nozaki-Hiyama-Kishi nickel(II) catalyzed coupling reaction. Phase one has been completed with the synthesis of the allylic alcohol from the MacMillan cross-aldol reaction being successful, while phase two and three remain as ongoing endeavors of this research project. This project continues to allow undergraduate researchers to gain valuable experience in chemical transformations, purification techniques, and characterization that is vital for careers that involve synthetic chemistry.

2018-2019

Recipients of Undergraduate Research Fellowships

Morehead State University supports the initiative for students to engage in research, scholarship, performance activities and creative works. Listed below are the 2018-2019 awardees and their mentors.

ELMER R. SMITH COLLEGE OF BUSINESS AND TECHNOLOGY

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Brenton Anderson*	SR	SEIS	Jorge Ortega-Moody
Nicole Bennett*	SR	SBA	Janet Ratliff
Criagory Coppola	SR	SEIS	Heba Elgazzar
Anna Gdovka*	JR	SBA	Steve Chen
Patrick Good*	SR	SEIS	Kouroush Jenab
Amanda Hansford	SO	SEIS	Heba Elgazzar
Christian Hensley	SR	SBA	Steve Chen
Levi Howell	SO	SEIS	Jorge Ortega-Moody
Tristen Jordan	JR	SEIS	Heba Elgazzar
Alexander LeMaster	SO	SEIS	Jorge Ortega-Moody
Patrick Perkins III	SR	SEIS	Kouroush Jenab
Karly Potts*	SR	SBA	S. Ali Ahmadi
Allie Skaggs*	JR	SEIS	Cheng Cheng
Justin VanHoose	FR	SEIS	Jorge Ortega-Moody
Rachel Wallace*	SR	SBA	Ahmad Hassan
Joshua Webb*	SR	SEIS	Sherif Rashad

CAUDILL COLLEGE OF HUMANITIES

Student URF	Class	Department	Mentor (s)
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Alyssia Bunts*	SR	SCA	Ellen Mosley
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Matthew Cooper	SR	SHSS	James Masterson
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James Davidson*	JR	SCA	Elizabeth Mesa-Gaido
Hannah Day	SR	SECML	Donell Murray
Daria Denysenko*	SO	SCA	Glenn Ginn
Nicole Duff*	SR	SCA	Jennifer Reis
Braydon Dungan	SO	SECML	Alison Hruby
Eliza Eaches*	SR	SCA	Michele Paynter Paise
Sarah Fink*	SR	SHSS	Michael Hail
Maggie Flanagan	SR	SCA	Robyn Moore
Shelby Gevedon*	JR	SHSS	Michael Hail

Caitlin Haggard*	SR	SHSS	Bernadette Barton
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Michala Jones*	SR	SHSS	Dianna Murphy
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Melissa Keyser	SR	KCTM	Nathan Kiser
Brandon Lindsey	SR	KCTM	Jesse Wells
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Jason Parsons*	SO	SHSS	Ric Caric
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Elizabeth VonMann*	SR	SHSS	Kristina DuRocher
Madison Wallace*	SR	SHSS	Morgan Getchell
Austin Wood*	SR	SCA	Michele Paynter Paise

College of Education

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Kaylee Grace Ann Johnson	JR	ECESE	Kim Nettleton
Caitlyn Mullins	SR	ECESE	Daniel Grace
Lauren Myre	SR	FGSE	John Curry
Victoria Nash*	JR	FGSE	Timothy Simpson
Kelsey Purdum	SR	MGSE	Kimberlee Sharp
Cory Rawlins*	JR	MGSE	Sara Lindsey
Chloe Spencer	JR	FGSE	Lola Aagaard
Jordan Turley*	SR	FGSE	Lola Aagaard

College of Science

Student URF	Class	Department	Mentor (s)
Bethany Allen	JR	AGS	Patricia Harrelson
Brandi Banks*	JR	AGS	Patricia Harrelson
Sydney Blanton	JR	BIOL/CHEM	Geoffrey Gerner
Kathryn Branham*	SR	BIOL/CHEM	Sean O'Keefe
Hannah Brewer*	SR	MATH/PHYS	Robert Boram

Shanea Capps*	SR	PSY	Shari Kidwell
Jared Castle	JR	MATH/PHYS	Jennifer Birriel
Ethan Caudill*	SR	MATH/PHYS	Jennifer Birriel
Casey Christian*	SR	MATH/PHYS	Josh Qualls
Caitlyn Clark*	JR	AGR	Vijay Subramaniam
Jorden Crowe*	SR	PSY	Gregory Corso
Jesseca Dale*	SR	BIOL/CHEM	Allen Risk
Brandon Dizney	JR	BIOL/CHEM	Janelle Hare
Morgan Durham*	SR	AGR	Vijay Subramaniam
Anna Grace Ehr	SO	BIOL/CHEM	Geoffrey Gerner
Breanna Epperson*	SO	MATH/PHYS	Kent Price
Cody Evans	SO	BIOL/CHEM	Sean O'Keefe
Jessica Fulkerson*	SR	BIOL/CHEM	Kurt Gibbs
Danielle Gibson	SR	BIOL/CHEM	Michael Fultz
Josh Griffith	SR	BIOL/CHEM	Sean O'Keefe
Kelsey Hargett*	JR	BIOL/CHEM	Allen Risk
Eddie Henderson*	SR	MATH/PHYS	Ignacio Birriel
Madison Howard*	JR	MATH/PHYS	Jennifer Birriel
Abby Jones*	SR	BIOL/CHEM	Kurt Gibbs
Brooke Jones	SO	MATH/PHYS	Robert Boram
Nathan Jones*	JR	MATH/PHYS	Jennifer Birriel
Vanessa Leigh Jones*	SR	PSY	Gregory Corso
Madelynn Kiefer	SR	BIOL/CHEM	Sean O'Keefe
Ashton Killen*	JR	EASS	Jen O'Keefe
Cassidy Lacey	SR	BIOL/CHEM	Kurt Gibbs
Dalton Lewis*	FR	MATH/PHYS	Ignacio Birriel
Sarah Little*	SR	BIOL/CHEM	Brandon VanNess
Donald Matthews*	SR	MATH/PHYS	Kevin Adkins
Taelor McMillin	SR	AGR	Patricia Harrelson
Kimberly Meade*	SR	PSY	Shari Kidwell
Rebecca Mikula*	JR	EASS	Dirk Grupe
Mitchell Nichols*	SR	EASS	Thomas Pannuti
Logan Pennington	SO	SSC	Benjamin Malphrus
Hannah Rice*	JR	PSY	Shari Kidwell
Nathan Rickman	SO	SSC	Benjamin Malphrus
Alexander Roberts	SR	EASS	Benjamin Malphrus
Kay Rothermund*	JR	BIOL/CHEM	Allen Risk
Jacob Schabert*	SR	EASS	Benjamin Malphrus
Johnna Scott*	SR	AGR	Patricia Harrelson
Emory Sellinger	SR	AGR	Patricia Harrelson
Bryana Shumate*	SR	BIOL/CHEM	Sean O'Keefe
Kristian Sills	SR	BIOL/CHEM	Sean O'Keefe
Jenna Slone	SR	BIOL/CHEM	Allen Risk
Brice Smith*	JR	BIOL/CHEM	Melissa Mefford
Austin Spradlin*	JR	BIOL/CHEM	David Eisenhour
Johannah Stegemann*	JR	BIOL/CHEM	Allen Risk
Maggie Stephenson*	SO	EASS	Jen O'Keefe
Minh Tran*	SO	BIOL/CHEM	Geoffrey Gerner
Madison Turner*	JR	PSY	Shari Kidwell
Isaiah Vanderwater	FR	MATH/PHYS	Doug Chatham
Abigail Whaley*	JR	BIOL/CHEM	Melissa Mefford

Shelby Wright*	JR	PSY	Shari Kidwell
Sydney Young*	SR	PSY	Gregory Corso

Office of the Provost

Student URF	Class	Department	Mentor (s)
Katerina Winters*	SR	SSC	Benjamin Malphrus

*presenting at the 2019 Celebration of Student Scholarship

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