SYMPOSIUM

TWENTIETH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

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TUESDAY, APRIL 18, 2023

AFTERNOON CONCURRENT SESSIONS

Poster Presentations (P)

Carl Grant Events Center	Student Presenters
12:30-2:00 p.m.	Olivia Duke (ART) Madison Gross (ART) Amy Kuhl (ART) Daniel Howe (ART) Makenna David (ART) Cayli Lambert (ART) Cassalyn Callahan (ART) Laralin Dixon (CHE) Hattie Hume (CHE) Elizabeth Smith (CHE) Philip J. Becker (EGR) David Ebrahim, Nathan Golden, and Noah Simpson (EGR) Jacob Arehart and Jacob Carbonell (EGR) Nathan Golden (EGR) Paige Bizzell (EGR) Ethan Brasher and Michael Kirk (EGR) Vishal Gaurav Karmacharya (EGR) Laralin Dixon and Laura Jin (EGR) Timothy Boccarossa (EGR) Philip J. Becker and Colby Davis (EGR) Jewelia Black and Mikaila Rogers (EGR) Daniel Lancaster and Nate Thomas (EGR) Garrison Harold and Braeden McAliser (EGR) Ian Banderchuk, Braeden McAlister, and Aldric Zeak (EGR) Ian Banderchuk and Aldric Zeak (EGR) Paige Bizzell, Vishal Gaurav Karmacharya, and Parker Rice (EGR) Philip J. Becker, Timothy Boccorosa, and Cooper Champine (EGR) Jonathan Brewer and Micah Valdivia (EGR) Timothy Boccarossa (EGR) Charles Carter, Henrry Garcia, and Shane Martien (NUR) Payton Naifeh, Cassie Moseley, and Katie Yewell (NUR) Daniel Baker, Kevin Brooks, and Jerry Nguyen (NUR) Jessica Howell, Heather Vega, and Brooke Work (NUR) Kayla Bonilla, Andrea Egbuna, and Angel Guy (NUR) Kelsea Brannon, Wright Hobgood, and Robert Smith (NUR) Shelley Brewer, Lindsey Cook, and Alicia Wilson (NUR) Laura Jarosemich and Erica Thompson (NUR) Jordan Bell, Taylor Bishop, and Collin Janke (NUR) Derel Clayton and Anthony Lowe, Jr. (NUR) Heather Moran, Kim Ward, and Jennifer Williams (NUR) Megan Burckhard, Jordan Fentress, and Andrew Sayers (NUR) Jen Dahle (NUR) Ashley Pratt (NUR) Natashia Melton (NUR) Gleyndon Kern and Jennifer Kern (NUR) Shairah Hortelano (NUR) Curtis Sutera (NUR) Amanda Cox and Amanda Terwilliger (NUR)

SCHEDULE

Poster Presentations (P)

Carl Grant Events Center	Student Presenters
12:30-2:00 p.m.	Charles Banks, III (NUR) Scott Venable (NUR) Jasmine Gonzales (NUR) Rebecca Davis (NUR) Matthew D. Johnson and Samuel L. Seaton (NUR) Codie Moszczynski and Samantha Pickarts (NUR) Joshua Lawson and Garrett Rhodes (NUR) Lauren Larsen and Kellie McGiffin (NUR) Molly Mills (NUR) Tiffani Tran (NUR) Albert Scott, Jr. and Erica Wooten (NUR) Josh Morse and Justin Woods (NUR) Cameron Chadwick, Halle Garner, and Mary Beth Propes (PSY) Faith Baker, Grace Bowerman, Isabella Flowers, and Rafael Tobler (PSY) Sarah Edgren, Karah Martin, Katelin Rainey, and Madison Webb (PSY)

Oral Presentations (O)

Dept.	Room	Student Presenters	Time
ART Session Chair: Christopher Nadaskay	PAC D-53	Sylvana Kempka Kendra Duffey Joy Robbins Cayli Lambert Anna Meadows Daniel Howe Vanessa Fillmore Joy Robbins Leah Steed	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m. 4:40 p.m.
BIO Session Chair: James R. Kerfoot, Jr.	WH 101	Katherine Askins Preston Buck Sarah Chhim Jasmine Kirchner Andrew Logsdon Jake Phelps Eden Rainey Jacob Ramgren Olivia Vermilye Sean Wheeler	1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m. 4:40 p.m.
BIO Session Chair: Andy Madison	WH 102	Abram Adkisson Elizabeth Allison Heather Baugh Savannah Garner Benjamin Murray Tyller Paniuski Sloane Sellers Elizabeth Shepherd William Smith Collette Truitt	1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m. 4:40 p.m.

BIO Session Chair: Michael Schiebout	**WH 201**	Benjamin Scott Cassandra Fish Malachi Gorga Erik Lewis Sarah J. Ruckersfeldt Sammy Bakeer Sarah C. Sparks Annelyse Valdivia Allison Winkle Jaxon Via	1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m. 4:40 p.m.
CSC/MAT/PHY Session Chair: G. Jan Wilms David Ward	**PAC A-7**	Abigail Branson (MAT) Jay Hardison (CSC) Mohammad Abuhantash (CSC) Isaac Johnson (CSC) Jessica Searl (PHY) Taylor Overcast (PHY)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.
BUS/ENG/PSC SOC/STM Session Chair: Mark Dubis	**JEN 325**	Danielle Popson (BUS) Katherine Anne Thierfelder (ENG) Caleb Starkey (ENG) Merry Ashlyn Gatewood (PSC) Katie Beth Dowling (SOC) Jessica Bogle (STM) Gabrielle Berry (STM) Nicholas Bitterling (STM)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m. 4:20 p.m.
EGR Session Chair: Georg Pingen	**PAC D-3**	Paige Bizzell, David Ebrahim, Nathan Golden, and Noah Simpson Nathan Cole, Samuel Eudy, and Parker Rice Philip J. Becker, Cooper Champine, Andrew Eschen, and Myles Gibson Ryan Keeton and Caleb Krueger	2:00 p.m. 2:30 p.m. 3:00 p.m. 3:30 p.m.
LAN (ICS/SPA/ TESOL/ALNG) Session Chair: Phillip Ryan	**Language Lab**	Laila Sue Al-Hagal (ICS) Kirbi Cochran (ICS) Hadie Sowell (ICS) Tatiana Perez (SPA) Holly Bryan (ALNG) Kailie Cromwell (TESOL)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.
NUR Session Chair: Cathy Ammerman	**WH 202**	Chad Hinton Candace Hubbert Katherine Barnes Jodie James Contesta Corey Dana Dorris and Kayla Lambert	2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m. 4:00 p.m.

ART

Cipe Pineles: Making Magazines into an Art (P)

Presenter: Olivia Duke
Faculty Project Advisor: Haelim Allen

As a twentieth-century pioneer for women in graphic design, Cipe Pineles transformed magazines and editorial works into fine art. As an art director for magazines such as *Glamour* and *Seventeen*, Pineles used handwritten type, illustrations, color, and photography as her platform to publish editorial design in a fresh new way. Since photography in the mid-twentieth century was overly used in other publications, Pineles used her fine art skills to bring a unique perspective to her magazines. Her hand-drawn type and illustrations captured the eye of readers and brought a level of intimacy to her design work. With motivation to expose her readers to modern art, she insisted as an art director that her layout designs were of the quality that would be displayed in an art gallery. Since Pineles' target audience was mainly women, she visualized in publications what roles women could pursue which differed from traditional household duties. Thanks to her editorial and design work approach, Cipe Pineles turned magazines into an art form, not just a news source.

Iconic Packaging: The Apple iPhone (P)

Presenter: Madison Gross
Faculty Project Advisor: Haelim Allen

This research aims to define how Apple has evoked a quintessential packaging experience to promote the iPhone. Inventors Stephen Wozniak and Steve Jobs constructed the company Apple in 1976. Over time, every aspect of their packaging has been tested and retested to institute a sensory experience. The iPhone first generation's packaging was the foundation of the modern-day iPhone fourteen. The evolution of the design has transformed the way that consumers perceive the company. From the sleek design to embossed images, Apple gives strict attention to detail to execute luxurious packages that are distinguishable by consumers. With all of their product's packaging, there is a polished surface that is accompanied by the most well thought out design. Apple products are among the most sought-after smart devices of 2023. Every year, Apple strives to innovate its packaging design from prior years.

Prints and Posters: The Ukiyo-e Influence on Alphonse Mucha's Aesthetic (P)

Presenter: Amy Kuhl
Faculty Project Advisor: Haelim Allen

Ukiyo-e, a popular form of Japanese woodblock prints, gained widespread recognition in Europe during the late 19th century. This was due to the forced opening of Japan that occurred in 1854. The opening allowed free trade and the influence of Japanese culture on the West. This influence is evident in the work of many graphic artists such as Eugène Grasset or Jules Chéret; even so, the influence on graphic artists is most clearly seen in the work of Alphonse Mucha. Common traits used in Ukiyo-e prints become apparent when analyzing Mucha's art: the use of flat colors, bold outlines, and asymmetrical compositions. Mucha adapted these techniques to match his own style, which resulted in a unique blend of Ukiyo-e influence

and Art Nouveau style. The popularity of Mucha's work, particularly his posters and advertisements, resonated with the public because of this unique blend. By examining the specific techniques that Alphonse Mucha developed from Ukiyo-e and the ways in which he adapted them to suit his own aesthetic, this research provides insight into the key influence on Mucha's work: Ukiyo-e prints.

What's the Point: An Analysis of Dots (P)

Presenter: Daniel Howe
Faculty Project Advisor: Haelim Allen

In printing, nothing has quite the same power and influence as the dot. In the same way that pixels make up all modern digital images, thousands of tiny circles, or dots, make up most modern printed images. These dots often go unnoticed and easily confused, but when magnified, it is clear to see that there are many different styles of dots. The main four misconstrued dot styles are: Ben Day dots, halftone screens, Roy Lichtenstein dots, and Kirby dots. Benjamin Day was a printer and inventor who created his Ben Day dots for the purpose of shading printed drawings in newspapers, which went on to have their own life in comic book art. Roy Lichtenstein, an American Pop Art painter, used an altered version of Ben Day dots in his paintings to great effect as a graphic element in his work. Jack Kirby was a comic artist who used his dots to convey energy. While Ben Day dots were made for the printing process, halftone screens were created for the photo taking process. Halftone screens aimed to break images up into less expensive versions for lower quality printers. Lichtenstein dots were used to emulate the comic style of shading, while Kirby dots were used to show energy on the comic page. Just as they did in *Spider-Man: Into the Spider-verse*, these dots will start to show up in more popular films and culture, so it is important to know about them now. This research will analyze each dot to find its origins and what makes each one different from other kinds of dots in order to be able to identify them as they become more prevalent in popular culture.

Our Footprint: A Study on Sustainable Packaging (P)

Presenter: Makenna David
Faculty Project Advisor: Haelim Allen

The packaging industry has made progressive efforts to engineer and design structures and materials that have a cleaner impact on the environment, from paper-based shipping materials to reusable food containers. Modern packaging was introduced in the early nineteenth century and evolved to recognizable packaging such as the iconic Coca-Cola bottle. This research will analyze the history of package design and wherein the ideas toward sustainability were introduced, as well as current efforts. Brands in all areas of consumer life such as Puma, Pangea, and Alter Eco have drastically decreased the amount of single use packaging or have transitioned to utilizing only recyclable packaging. Consequently, global recycling efforts have increased with the improvements made in packaging. With the efforts on behalf of producers and designers, environmental progress towards waste reduction can continue expeditiously because of the developments of sustainable packaging within both materials and design.

Okay Google, How is Brand Identity Created? (P)

Presenter: Cayli Lambert
Faculty Project Advisor: Haelim Allen

Brand identity is what a business portrays to the world to be recognized by consumers. For a business to become more prominent against competitors, brand identity must be approached with attention to its personality, physical features, and value. Google is a highly recognizable brand across the globe, with its youthful personality and its value in making information accessible.. This research will delve into the details of Google's brand identity, including how the company chose to respond to technological advancements. Google is able to achieve these ideals by remaining a single brand house and adding brand extensions, which are marketing strategies that allow a company to produce multiple products under one identity. As of February 2023, Google holds 93.37% of market shares over other search engine companies. Yahoo is one such company that lacks in its attention for brand identity. Thus, this paper will contrast Google's success with Yahoo's failure. Even as Google exists as artificial intelligence, consumer electronics, and an Internet search engine, Google's brand identity remains one of the strongest.

The Evolution of Christmas Cards (P)

Presenter: Cassalyn Callahan
Faculty Project Advisor: Haelim Allen

This research project examines the history of the Christmas card from its origins in the mid-19th Century to the variety of types and features of Christmas cards present in today's industry. The predominant types of Christmas cards specified in this paper are the commercial card, the homemade card, the official card, the E-card, and the artisan card. Each classification of the Christmas card is determined by the distinct design features, the purpose, and the production process of the card. These types of cards formed over the span of three eras: the Victorian era, the American era, and the Smart Technology era. The origins of the popular types of cards will be discussed in order of when they emerged throughout the three eras. Following the origins of each type of Christmas card, the evolution in the popularity, the physical features, and the usage of the type of card will be examined. The research found from studying these evolving trends will inform the possible future of the Christmas card, including prospective trends and whether the tradition of sending physical Christmas cards will survive the progression of smart technology.

ART

Red Bull Gives You Wings: How Red Bull's Marketing Strategy Helped Them Fly High (O)

Presenter: Sylvana Kempka
Faculty Project Advisor: Haelim Allen

Red Bull is an internationally recognized brand that has taken the energy drink industry by storm. The brand's success in the energy drink market can be attributed to its consistent branding, targeted marketing strategies, and effective use of graphic design to create a unique and memorable brand identity. What makes Red Bull's targeted marketing strategy so unique is that instead of focusing on advertising their products, they create events and experiences for their customers. Red Bull's design is strongly recognizable by the two red bulls charging towards one another in front of a yellow sun. The Red Bull logo is a perfect representation of the brand's name, and it communicates the values of the brand such as energy, strength, dynamic, and rebellion. Red Bull is known for the use of a red and blue color scheme and for their slogan, "Red Bull Gives You Wings." They create unique animated TV commercials in which they advertise that slogan. Red Bull uses social media platforms and popular streaming services to reach and engage their target audience. The company markets its products to athletes and extreme sports enthusiasts, young people, and adrenaline junkies who best fit Red Bull's characteristics and values. This research paper analyzes the company's logo design, packaging design, color choices, and unique marketing strategies, including a comparison with its closest competitor in the energy drink market. Red Bull's success as an energy drink company is a good example of how strong branding and marketing can lead to significant company growth and market dominance.

Seeking an Audience Outside the Gallery (O)

Presenter: Kendra Duffey
Faculty Project Advisor: Christopher Nadaskay

When I was a kid, I had this dream to paint for a living. When elementary schools would ask me to draw what I wanted to be when I grew up, I typically drew myself painting in front of an easel. As I practice painting in school, I find myself drawn to painting, but not for galleries. Instead, I have been seeking an audience outside of the galleries. Mural painting and illustration have been my focus in painting during my senior year. My past work, that I thought would lead me to gallery work, only sharpened my skills for a new focus and direction for my art. The colors, brushwork, art principles, and strengthening my creativity learned through my last works help me in my current mural and illustration jobs.

Speed of Love (O)

Presenter: Joy Robbins
Faculty Project Advisor: Christopher Nadaskay

Faster than can ever be fathomed, light speeds throughout the universe and graces every corner with the love of God at 299,792,458 m/s. God in his divine kindness has gifted the ability to enjoy these powerful and awe-inspiring hues to humanity for our enjoyment. This project is a celebration of the sensory experience of color, as well as the God who lovingly created us.

Living in the Unreal Illustrations (O)

Presenter: Cayli Lambert
Faculty Project Advisor: Christopher Nadaskay

Living in the Unreal is a body of illustrative work that utilizes pen and ink wash on drawing paper. Creative imagination is the foundation of each illustration to summon landscapes and architecture. They are created for specific spaces and with an individual visual vocabulary. The first illustration, *Floating Islands*, was the first illustration that set the tone for what I wanted to do with this series. The act of simply creating, embracing the medium I most enjoy, and tearing down boundaries that keep me from expressing my imagination are the main implications that I learned while drawing.

Incorporating Autism Acceptance into Children's Literature (O)

Presenter: Anna Meadows
Faculty Project Advisor: Christopher Nadaskay

Consultation and collaboration with a Pre-K special education teacher encouraged the production of a children's book created specifically to introduce special needs students to other children. The book, *Xander's Zoo*, is based on a nonverbal autistic child named Xander who communicates acceptance and inclusiveness through the love of his animals. As a focus for my ART 218 class, I was

tasked to research and create twelve illustrations. I used my own illustration style for each character and decided on stylistic choices throughout the entire book. Autism acceptance plays a significant role in the book hoping to teach children to be accepting of others despite their differences.

Guess Who: Designing Characters (O)

Presenter: Daniel Howe
Faculty Project Advisor: Christopher Nadaskay

Character design is a very important facet of game design and is based on simplifying shapes, creating icons, and developing a personality through image alone. Successful character design must communicate on a functional, aesthetic and visually communicative level. The aesthetic qualities of a character must be pleasing to the viewer while maintaining visual cohesion with the overall work. The functional characteristics of a character must also work in concert with its design and communicate to the player the abilities and actions that are available to them. This presentation is a survey of character design, examining those aspects and researching the use of shape, icon and personality

The Role of Interactive Ads in the Evolution of Advertising (O)

Presenter: Vanessa Fillmore
Faculty Project Advisor: Haelim Allen

Advertisement has evolved from printed ads and television commercials to a new marketing approach. Interactive marketing has infiltrated business and product advertising. Daily internet and social media usage is rapidly increasing; thus, advertising is difficult for consumers to avoid. Instead of changing the television channel or turning the newspaper page to avoid ads, the interactive elements such as the "skip ad" or "buy now" buttons, QR codes, or advertisements where consumers can physically see themselves using a product, have made it nearly impossible for consumers to avoid ads. Traditional advertising relies on physical media to reach its target audience and utilizes a passive approach, whereas the interaction now needed to escape an ad causes the consumer engagement. Interactive advertising relies on the consumers' constant interaction with advertisements to drive sales. This research will examine two modern methods to consumer interaction and marketing through the advertising approaches taken by companies like Reebok, Spotify, and Volkswagen, and the social media platform, Instagram, as a streamlined marketing tool from businesses to consumers

A Woman of Virtue: Sofonisba Anguissola's *The Game of Chess* (O)

Presenter: Joy Robbins
Faculty Project Advisor: Haelim Allen

Giorgio Vasari, in his book *The Lives of the Most Excellent Painters, Sculptors, and Architects*, details great artists such as Leonardo da Vinci and Michelangelo. Included is a small section presenting Sofonisba Anguissola at the end of Properzia de' Rossi's vita. Anguissola's work was praised not only by Vasari, but many others including Philip II, Michelangelo, and Queen Elizabeth of Valois. Vasari was so impressed after meeting Anguissola and her family, that he included her in his second edition of "*Lives*". What was it that Vasari found so fascinating about Anguissola, particularly in a time when women artists were not celebrated? Vasari, while doubtless amazed by her talent, must have been equally impressed by her virtue. Anguissola's humanist father sent her for schooling as a painter, not so that she would have a career in painting, but that she would be seen as a woman of great virtue through her educational achievement. Many of her paintings, which were self-portraits and portraits of other women, emphasize this focus on virtue, a core theme in her work. Anguissola chose to sign her name, "Sophonisba Angusola virgo seipsam fecit 1554" (translated "The virgin Sofonisba Anguissola made this herself in 1554") on her painting to emphasize this commitment to virtue.1 Arguably, Anguissola's most well-known work, *The Game of Chess*, features her sisters as the subject matter. This painting presents her sisters as intelligent and highly skilled strategists in the game of chess. Anguissola also clearly possessed great intelligence and strategical skills to have succeeded in her career as a woman in this time period. Anguissola's life and work presents herself and her sisters as intelligent women of virtue.

A Celebration of Joy in Portraiture (O)

Presenter: Leah Steed
Faculty Project Advisor: Haelim Allen

Historically in the hierarchy of painting, portraiture was considered the second highest subject matter after historical painting. This is largely because of the understanding of the complexity of human anatomy and the desire for remembrance. As Christians we affirm this importance, understanding that every human being is an image-bearer of God, made in His likeness and created with purpose. Portraits capture this significance. This semester, through color and gestural expression, I have sought to celebrate the lives of individuals who are significant to me. This series seeks to capture the beauty and individualism of these people, investigating how their physical appearance conveys who they are. I wanted to capture the joy these people have brought to my life as well as call attention to their worth as image-bearers of God. ■

BIOLOGY

A Snapshot of Flower-Visiting Insects at Cypress Grove Nature Park (O)

Presenter: Allison Winkler
Faculty Project Advisor: Jeremy Blaschke

Pollinating insects are a vital component of healthy ecosystems, yet pollinator abundance and diversity are declining worldwide. To assess the diversity and flower color preferences of local pollinators within the unique ecosystem of Cypress Grove Nature Park, insects were collected using colored pan traps (yellow, white, blue, red) in two different habitats (forest and meadow). In just 12 days, 1,614 insects were collected, representing at least 14 orders and 25 families. Overall, yellow pan traps captured the most insects (n=736), followed by white (n=360), blue (n=334), and red (n=191). Yellow also attracted the greatest diversity of insects (109 morphospecies), followed by white (n=48), red (n=38), and blue (n=29). Insect abundance was higher in the meadow (n=1,122) while insect diversity was higher in the forest (n=102). These results demonstrate that using a variety of colors in a variety of habitats can increase the abundance and diversity of pollinators captured.

Effects of *Pseudomonas fluorescens* Culture Supernatant on Biofilm Formation of *Staphylococcus epidermidis* Strains (O)

Presenter: Cassandra Fish
Faculty Project Advisor: Esther Choi

Staphylococcus epidermidis is a human skin commensal, but it is also one of the leading causes of nosocomial infections due to its ability to form biofilms. Biofilms are complex bacterial communities encased in exopolysaccharide matrix. Bacteria in them are hard to eradicate since they are protected from host defenses and show increased antibiotic resistance. Previously, *Pseudomonas fluorescens* culture supernatant (CS) was shown to effectively disturb biofilm formation *S. epidermidis* 1457. In this study, the CS was tested for another clinically isolated *S. epidermidis* strain, RP62A. Biofilm assays and quantitative PCR revealed a significant inhibitory effect of the CS on RP62A biofilm formation by downregulating *icaA*, which encodes for polysaccharides of the biofilm matrix. Identifying the mechanism through which *P. fluorescens* CS inhibits biofilm formation of clinical strains of *S. epidermidis* could contribute to the development of an anti-biofilm treatment for reducing *S. epidermidis*-mediated infections in hospitals.

Citrobacter rodentium 4280 as a Model for Pathogenic *Escherichia* coli Biofilm-mediated Infections in Humans (O)

Presenter: Elizabeth Shepherd
Faculty Project Advisor: Esther Choi

Enteropathogenic Escherichia coli (EPEC) and enterohemorrhagic *E. coli* (EHEC) are well known human pathogens responsible for causing traveler's diarrhea. They create attaching and effacing lesions and efface the brush border microvilli of their hosts. Their propensity to form biofilms also increases their pathogenicity, as biofilms are highly antibiotic resistant. To study EPEC and EHEC safely, model organisms are used. This study used *Citrobacter rodentium*, a murine pathogen that shares many characteristics with *E. coli*. Biofilm assays were performed to discover the optimal concentrations for biofilm formation, as well as to challenge C. *rodentium* with other bacterial supernatants. No obvious difference was seen between trials incubated with supernatant and those without, although the biofilm that was formed was not very strong in either case. *Citrobacter rodentium* was also challenged by a low pH environment and results indicated that low pH was effective at reducing C. *rodentium* numbers.

Fish Species Survey of the Rossville Farm Mitigation Site (O)

Presenter: Andrew Logsdon
Faculty Project Advisor: James R. Kerfoot, Jr.

Ecosystem restoration is a cornerstone for biodiversity conservation. Wetland degradation reduces ecological effectiveness by influencing water quality, water movement, and the ability to support many organisms. For these reasons, wetland mitigation is tracked to ensure the restoration process is appropriately supporting its end goal. The goal of this study was to establish a baseline condition of the fish and site physio-chemical composition within the Rossville, Tennessee mitigation site. From this initial survey 14 fish native fish species, 118 total, were found in the site by seining. *Notropis texanus* (Weed Shiner) 32%, *Lepomis macrochius* (Bluegill) 26%, and *Lepomis gulosus* (Warmouth) 15% were the most abundant species captured. Principal component analysis of the physio-chemical data revealed potential relationships between increased temperature and depth with higher species densities. This research will be beneficial in the future by the tracking of baseline fish and physio-chemical composition changes in relation to different seasons.

BIOLOGY

The Effects of Environmental Enrichment Removal on Wheel Running Behavior in Caged Mice (O)

Presenter: Sarah J. Ruckersfeldt
Faculty Project Advisor: Robert S. Bowen

Physical inactivity is a leading cause of death in the human population, while physical activity guards against premature mortality. Previous studies have investigated the motivational drivers of physical activity using rodent wheel running as a model of human behavior. This study evaluated the validity of such research by experimentally analyzing whether wheel running might be a purposeful behavior or a stereotypy induced by stress. C57BL/6j male and female mice were housed with running wheels for two phases of study. The experimental subjects were given environmental enrichment (EE) during Phase I, which was removed for Phase II to introduce stress. EE removal had no significant effect on wheel running distance, duration, or speed in caged mice, demonstrating that wheel running is a purposeful behavior rather than a response to stressful stimuli. We conclude that wheel running appears to be an appropriate model for assessing the motivational drivers of voluntary physical activity.

Effects of Prolonged Estrogen Exposure on *BRCA2* Expression in Zebrafish (O)

Presenter: Savannah Garner
Faculty Project Advisor: Faith Zamamiri-Davis

Triple Negative Breast Cancer (TNBC) is an aggressive form of breast cancer that is difficult to diagnose. In this experiment, 9 zebrafish (*Danio rerio*) were divided into 3 groups with varying exposure periods of estrogen to monitor the effects on BRCA2 gene expression and morphological features. The goal of this research is to analyze the effects that estrogen has on *BRCA2* expression, when using the zebrafish as a model for Triple Negative Breast Cancer. After estrogen exposure, the zebrafish were harvested and there was a significant difference in expression between the 48- and 96-hour exposure times. Future research should be done focusing more intently on the 96-hour period, to see if there are any additional differences involved with this exposure time.

The Influence of Atmospheric Disturbances on Seagrass Meadows in Charlotte Harbor Aquatic Preserve in Punta Gorda, Florida (O)

Presenter: Sarah Chhim
Faculty Project Advisors: James R. Kerfoot, Jr.

Seagrass communities provide marine ecosystems with many resources such as food, shelter, carbon storage, and nursing habitats. Seagrasses are in decline worldwide due to pollution, weather disturbances, and human activities. The research performed in Charlotte Harbor Aquatic Preserve in Punta Gorda, Florida provides insight on how to combat these disturbances. This study compared water variables to the seagrass bed community by using data collected from December 2021 and December 2022, before and after a hurricane. The results indicated that the average density of seagrass after the hurricane was significantly less than before the hurricane. Temperature and salinity decreased on average after the hurricane. Higher salinity can cause slower development in seagrasses while lower temperature can hinder germination rates. While over a short temporal scale seagrass population can decrease after a hurricane, long-term, seagrasses communities can adapt to local environmental fluctuations and stochastic events like hurricanes depending on the severity.

Examining the Retention of Intraspecies Phenotypic Variation of Chinese Elm During Regeneration (O)

Presenter: William Smith
Faculty Project Advisors: Mark Bolyard

Plant regeneration is a process where a new plant can be grown from cultured tissue of plants through use of phytohormones. Retention of intraspecies phenotypic variation through regeneration is not well studied in plant tissue culture. In this research project we examined the impacts of regeneration on the phenotype of the wildtype and Seiju variant of Chinese elm (*Ulmus parvifolia*). These 2 trees are the same species with extreme variation in phenotype, and we hypothesized that each would retain its phenotype through the regeneration process. We followed a procedure for regeneration developed previously, making necessary modifications. Once shoots were developed, we observed shoots for leaf development. While we saw some leaf formation of the Chinese elm, we are working to develop a proper sterilization technique for the Seiju elm. Because of this, we were unable to compare leaf phenotypes and draw definitive conclusions about retention of phenotypic variation through regeneration.

Effect of PAR-1 Activation on Collagen Formation in Fibroblast Cell Lines (O)

Presenter: Eden Rainey
Faculty Project Advisors: Marc Lockett

Collagen is a key structural component in healing wounds requiring vitamin C for proper synthesis. Fibroblasts, the cell type responsible for formation of collagen, along with the expression of protease-activated receptor – 1 (PAR-1), the primary receptor for thrombin. Thrombin, a procoagulant that plays a critical role in wound healing by generating fibrin, an essential first step. Thrombin activation of PAR-1 elicits downstream effects including regulation of collagen production. By activating PAR-1 within fibroblast cell lines, this research clarifies thrombin's role in promoting synthesis of collagen in the presence of vitamin C within

injured tissue. 3T3-L1 cells were grown under standard conditions and cell lysates sample were examined for pro-collagen production via ELISA. 3T3-L1 (enriched with vitamin C) were also observed using a scratch test to observe cellular migration influences. Both ELISA and scratch test, demonstrated vitamin C influences on collagen formation via ELISA and cellular migration via scratch test.

Factors Affecting *Candida albicans* Biofilm Formation (O)

Presenter: Sloane Sellers
Faculty Project Advisor: Esther Choi

Candida albicans is a leading opportunistic pathogen in medical settings that causes serious infections through forming aggregates called biofilms. In biofilms, *C. albicans* evades immune detection and develops antibiotic resistance. This research aimed to determine factors that promote its biofilm formation. Different temperatures, media, and pH levels on biofilm formation were tested. When comparing biofilms at 30°C (a preferred setting) versus 37°C (a stressful setting) in complex- and chemically defined media, no significant differences were observed. However, the biofilms at 37°C were significantly higher at pH 4.2 in both media. This indicates that the yeast was stressed when exposed to two combined environmental factors (high temperature and low pH) and changed their morphology to its pseudo-hyphae form, a preferred morphology for forming thicker biofilms. By providing important biofilm promoting factors, this research may contribute to future prevention of *C. albicans* biofilm-mediated infection.

Production of Anti-Iodothyronine Deiodinase-1 Antibodies from Mouse Hybridomas (O)

Presenter: Abram Adkisson
Faculty Project Advisor: William Thierfelder

Deiodinase enzymes assist in mediating the activation and inactivation of thyroid hormone. Iodothyronine deiodinase-1 (D1) produces triiodothyronine, a hormone that regulates energy usage. Commercial antibodies that currently exist for this deiodinase are of low quality, but high-quality deiodinase antibodies could be efficiently used for many laboratory techniques, like assays, and increase their overall accuracy and reproducibility. To create these antibodies, 5 laboratory mice were injected with D1 peptide every 2 weeks. After several months, the mice were sacrificed. The B cells extracted from these mice were fused with a myeloma cell, creating a hybridoma to produce monoclonal antibodies. 2 mice died. All surviving mice gave a positive immunological response and produced a polyclonal serum that recognized the antigen in an ELISA assay. The monoclonal fusion produced colonies, demonstrating the success of hybridoma production.

BIOLOGY

Zebrafish as a Pancreatic Cancer Model (O)

Presenter: Heather Baugh
Faculty Project Advisor: Faith Zamamiri-Davis

Pancreatic cancer is the third leading cause of cancer death in the United States. Being able to research and study oncogenesis is a valuable tool in cancer diagnosis and treatment. It is possible to induce experimental pancreatic cancer with estrogen, therefore this research examined the impact of synthetic estrogen exposure on *KRAS* gene expression in a zebrafish model. Adult zebrafish (*Danio rerio*) were exposed to 500 ng/L of estrogen for varying lengths of time. After exposure, zebrafish were harvested, and RNA quantified. RT-qPCR was used to measure the *KRAS* gene expression in pancreatic tissue samples. Results showed no significant difference in *KRAS* expression values in raw data or when standardized to a common housekeeping gene. In the future, it would be beneficial for students studying estrogen exposure on the *KRAS* gene to experiment with longer exposure times.

Comparing Shrinkage of Tissue Types in Room Temperature and Cold Temperature Plastination (O)

Presenter: Olivia Vermilye
Faculty Project Advisor: Micah Fern

Plastination has been used to create anatomical models that serve instrumentally in educating various health care professionals. In this study, room temperature plastination and cold temperature plastination were compared to determine if there is an ideal method for preserving different tissues. This research compared the shrinkage rates of 15 different sub-tissue types using ImageJ software for measurements before and after plastination. The data was put through an analysis of variance test to determine whether the results between the two methods were significant for any of the 15 sub-tissue types by rejecting or accepting the null hypothesis. Results pending.

Investigating Intrafamilial Relationships of Wasp Family Rhopalosomatidae (O)

Presenter: Collette Truitt
Faculty Project Advisor: Jeremy Blaschke

Rhopalosomatidae is a family of wasps whose larvae parasitize crickets. Specimens from around the world were assembled to create the first molecular phylogeny of the taxon. A total of 30 species were included from all four extant genera (*Rhopalosoma*, *Paniscomima*, *Liosphex*, and *Olixon*), a total of 45 wasps. Genomic DNA was extracted and two genes (*EF-1α* and COI) were amplified and sequenced. Phylogenies were constructed using maximum likelihood and Bayesian analyses for each gene independently and on a concatenated dataset, all using two vespids as outgroups. The composite phylogeny supported several hypotheses from morphological literature: including *Olixon* as most genetically as well as morphologically distinct, the relationship of *Rhopalosoma* and *Paniscomima* as sister taxa, and the monophyly of all four genera. The *EF-1α* phylogeny was confused by intron inclusion but matched the composite phylogeny with exons only. COI required removal of the homoplasious third codon position for a strong signal.

Ichneumonid Biodiversity in Cypress Grove Nature Park (O)

Presenter: Preston Buck
Faculty Project Advisor: Jeremy Blaschke

Ichneumonidae (Hymenoptera) are incredibly diverse parasitoid wasps which are crucial components of healthy ecosystems. Their tri-trophic interactions through pollination, host regulation, and host plant management connect food webs and help maintain healthy biodiversity. To assess ichneumonid biodiversity at Cypress Grove Nature Park, insects were collected using a Gressett-style Malaise trap and colored pan traps (yellow, white, blue, and red). Insects were stored in ethanol, identified to morphospecies, and pinned. In total, 475 ichneumonids were collected, representing 133 different morphospecies. New morphospecies records for the park included additional 12 unique morphospecies from the Malaise trap and 31 total pan specimens. Ichneumonids were most commonly captured in yellow and white pan traps (67%), but blue traps also captured unique species not found in other colors. These results suggest increasing the diversity of collecting methods will increase the number and diversity of collected ichneumonids, thus providing a more accurate estimate of true biodiversity.

Comparing Growth Sites and the Effect of Seasons on *Thalassia testudinum* (O)

Presenter: Annelyse Valdivia
Faculty Project Advisor: Michael Schiebout

Thalassia testudinum (turtle grass), a seagrass of the Caribbean basin, has experienced decline in portions of its range over the last 40 years. Reasons for this decline have been difficult to pinpoint because the die-off is site-specific and variable. This field study compared percent coverage, density, and shoot height of *T. testudinum* from two sites off the Southern coast of Puerto Rico with two sites off the Western coast of Florida to determine which population of *T. testudinum* was healthier. Four transects with 20 m^2 quadrats were set up at each of the sites and environmental factors, community structure, and growth data were collected from them biannually in 2021-2022. An AVOVA test showed significant differences between the sites and seasons. One of the Puerto Rico sites showed higher averages in percent cover and height for *T. testudinum* for these years indicating a possible preference for this habitat.

Production of Antibodies Against Type 2 Deiodinase in Mice (O)

Presenter: Elizabeth Allison
Faculty Project Advisor: William Thierfelder

Deiodinases are important in the activation and inactivation of thyroid hormones. They assist thyroid hormones in signaling to regulate homeostasis. There are 3 types of deiodinases, and this research focuses on type 2 deiodinase. Commercially produced antibodies to deiodinases are used to detect the presence of deiodinase proteins. However, the commercially produced ones exhibit poor quality, and many are not specific. To address these issues, we generated specific antibodies to type 2 deiodinase. This involved injecting mice with a peptide fragment of type 2 deiodinase, harvesting the mice's spleen cells, and fusing to create hybridomas. The hybridomas were cloned, selected, and grown out. They were then tested to through Eliza assay to show antibody production. Results from testing are still pending. Working antibodies will be useful for future detection of type 2 deiodinase protein in a variety of experiments.

The Effects of Artificial Grazing on *Thalassia testudinum* (Turtle Grass) (O)

Presenter: Malachi Gorga
Faculty Project Advisor: Michael Schiebout

Turtle grass (*Thalassia testudinum*) is a vital part of offshore marine ecosystems. It serves as a food source for a variety of animals and helps hold substrate in place with its rhizomes. Turtle grass is currently seeing a large decrease over much of its range and causes of these declines appear to be multifaceted with certain locations responding more intensely to stressors. A factor that impacts turtle grass is herbivory. This experiment studied the effects of 2 levels of grazing on turtle grass. Heavy grazing was simulated by toping the blade and light grazing was simulated by 2 holes punched through the blade with a hole puncher. The plants that were in the control group had an average mass increase of 10.55%, the light grazing gained 9.59% and the heavy grazing gained 42.51%. The results seem to indicate that heavy grazing can be helpful to Turtle grass for gaining mass.

Loss of Testosterone Adversely Affects Physical Activity and Blood Glucose Levels in Mice (O)

Presenter: Erik Lewis
Faculty Project Advisor: Robert S. Bowen

A sedentary lifestyle increases all-causes of mortality including some types of cancers, heart and vascular diseases, and metabolic disease in humans. Avoiding a sedentary lifestyle through routine participation in physical activity appears to be regulated by several biological factors including the sex steroids. This experiment assessed blood glucose levels and wheel-running activity in mice under physiologically-normal conditions (pre-orchidectomy), following surgically induced testosterone deficiency (post-orchidectomy), and following re-exposure to testosterone (post-testosterone-replacement). Blood glucose levels increased and remained elevated post-orchidectomy and post-testosterone-replacement, indicating a long-term effect of testosterone removal on blood glucose regulation. Daily wheel running distance (km) and duration (min) decreased significantly post-orchidectomy and returned to baseline following testosterone re-exposure, demonstrating a direct link between sex steroid levels and physical activity levels. These results indicate that low testosterone levels promote physical inactivity and might dysregulate glucose homeostasis both of which will promote the prevalence and progression of chronic diseases.

Effects of *Pseudomonas fluorescens* Culture Supernatant on Pre-Formed *Staphylococcus epidermidis* 1457 Biofilm (O)

Presenter: Benjamin Murray
Faculty Project Advisor: Esther Choi

Staphylococcus epidermidis is a significant source of infections on indwelling medical devices. Its pathogenicity stems from its ability to form biofilms, which offer protection against host immunity and antibiotics. Thus, effective treatments to disrupt biofilms will reduce the clinical and economic burden of these infections. Our lab has previously shown that *P. fluorescens* culture supernatant (CS) inhibits *S. epidermidis* biofilm formation. The current study aimed to determine if the supernatant can disrupt existing biofilms. We treated *S. epidermidis* biofilms with CS at several stages of biofilm development, observing significant differences in optical density at the 12- and 16-hour time points. These disruptions were accompanied by changes in the culture's growth kinetics, but no changes in antibiotic susceptibility. Taken together, the *P. fluorescens* CS is promising as an alternative and complementary measure to reduce and destabilize staphylococcal biofilm within medical devices, enabling better control against *S. epidermidis*-mediated nosocomial infection.

Researching the Development of Deiodinase-3 Antibody in Mice (O)

Presenter: Sarah C. Sparks
Faculty Project Advisor: William Thierfelder

The conversion of thyroid hormone (TH) into its various forms is vital for survival. Deiodinase enzymes (DIO) assist in each step of this conversion, converting TH into its most biologically needed form. Without DIO, TH would remain in a low activation state and have decreased usability in tissue. To examine the effects of DIO, laboratory techniques, such as an ELISA assay or Western Blot, require antibodies specific to the protein. Commercial antibodies that recognize deiodinases have often proved unreliable. Here, monoclonal antibodies are created to specifically recognize and bind to the DIO type 3 (DIO-3) enzyme. These antibodies will be further used in various experiments relating to the effects of the DIO-3 enzyme.

BIOLOGY

Wetland Restoration Comparison of New Channels in Rossville Mitigation Site Versus Wolf River (O)

Presenter: Katherine Askins
Faculty Project Advisor: James R. Kerfoot, Jr.

Wetlands in the United States have been decreasing since the 16th century. Most wetland degradation is caused by agricultural practices that drain the land. In Rossville, TN previous agricultural land has been set aside for wetland mitigation. The mitigation site was engineered with tributaries off of the Wolf River that are structurally and functionally different and include different flora and fauna. The goal of this study was to form a baseline condition of the mitigation site describing the physio-chemical composition, vegetation, and presence of aquatic macroinvertebrate communities. Prominent macroinvertebrate families found within the survey were *Oligochaeta* 47%, *Chironomidae* 23%, and *Cladocera* 12% and vegetation included *Panicum virgatum* 31% and *Andropogon virginicus* 14%. Physio-chemical analyses between sites showed differences between flow rate, temperature, and turbidity which can affect macroinvertebrate diversity. These results will be used as a baseline of current conditions with the ability to evaluate succession at the site.

Comparing the Noose and the Lasso as Techniques of Alligator Capture (O)

Presenter: Jacob Ramgren
Faculty Project Advisor: Micah Fern

Methods for capturing crocodilians each have disadvantages. One method of capturing crocodilians involves casting a weighted 3-pronged treble hook. The alligator is brought into the boat using a snare, a wire noose attached to a pole. While crocodilians are usually not severely harmed by this method, stress and injury to crocodilians remain significant risks to the animals. This study compares the snare to a novel lasso method in the capture of American alligators (Alligator mississippiensis). The lasso is a rope that is looped and tightened around the alligator's body. Researchers used both the snare and a lasso to pull alligators into the boat and compared the efficiency and safety of both methods. The number of attempts, success rate, and injury potential were significantly different between the two methods. The data (n=20) suggest that the snare is more efficient, but the lasso reduces injury to the alligators.

Examining between-clade incongruence within Vespoidea using *Cytochrome oxidase* I (O)

Presenter: Sean Wheeler
Faculty Project Advisor: Jeremy Blaschke

The insect superfamily Vespoidea (Hymenoptera) includes two distinct wasp families: Vespidae, including hornets and their relatives; and Rhopalosomatidae, the cricket-assassin wasps. To assess the phylogenetic utility of the "barcoding gene" (*COI*) to accurately reconstruct relationships within Vespoidea, 133 COI sequences were downloaded from the Barcode of Life Database, representing all extant subfamilies of Vespidae, all extant genera of Rhopalosomatidae, and two outgroup taxa. Within R, the TN93+γnucleotide substitution model was used to correct genetic distances and hierarchical clustering of the distance matrices was performed. Despite the strong evidence for the monophyly of these families, several unusual vespid subfamilies clustered with Rhopalosomatidae rather than Vespidae. To resolve this between-clade incongruence, ancestral state reconstruction (ASR) using maximum likelihood was used to estimate the ancestral sequences for clades within Rhopalosomatidae and Vespidae. Subsequent cluster analyses recovered the families as distinct groups, thus providing novel evidence for the benefit of *COI* for hymenopteran systematics when coupled with ASR.

Sphingosine-1-Phosphate (S1P) Effects on Gene Expression of PAR-1 and Fcγ Receptors in ARPE-19 Cells (O)

Presenter: Tyller Paniuski
Faculty Project Advisor: Marc Lockett

Sphingosine-1-phosphate (S1P) is a member of the sphingolipid family involved in the upregulation of vascular endothelial growth factor (VEGF) and Interleukin-8 (IL-8) in retinal pigmented epithelium (RPE). This upregulation of VEGF and IL-8 in RPE aids in the development of wet age-related macular degeneration (Wet AMD) by encouraging choroidal neovascularization (CNV). The fragment crystallizable gamma receptor (FcγR) upregulates VEGF and IL-8 in RPE, whereas protease-activated receptor-1 (PAR-1) is a G-protein coupled receptor that aids in hemostasis and wound healing and is also involved in inflammatory processes. The goal of this research is to determine a potential link between the expression of Fcγ and PAR-1 in ARPE-19, a RPE cell line, in response to changes in concentration of added S1P. The RNA of the ARPE-19 cell samples have been collected, and each sample's concentrations have been quantified. The RT-qPCR results are still pending.

Habitat Suitability Model for Seagrass (*Thalassia testudinum*) Off the Southwest Coast of Florida (O)

Presenter: Jasmine Kirchner
Faculty Project Advisor: James R. Kerfoot, Jr.

Seagrass beds are important ecosystems that provide goods and services and have been rapidly declining due to various anthropogenic pressures. Geographic Information System technology has been used to document the decline in seagrass habitat and aid in developing habitat suitability models for restoration. Models can be used to predict the presence or absence of seagrass and maximize conservation efforts by identifying areas to protect. Using water quality data collected from study sites in Punta Gorda and Naples, Florida,

and species preference data collected from other studies, a habitat suitability model for *Thalassia testudinum* was created. Important drivers of population growth were determined to be increased light penetration/reduced depth along with reduced turbidity. Over a larger spatial scale, flow dynamics also related to the presence or absence of *T. testudinum*. Regionally the model was precise on the variability of *T. testudinum* density levels, which can aid in future restoration efforts.

Creation of a GFP-based Model to Test Gene Editing in Eukaryotic Cells (O)

Presenter: Jaxon Via
Faculty Project Advisor: William Thierfelder

Gene editing is a revolutionary tool that can be used for a myriad of purposes. Clustered regularly interspaced palindromic repeats (CRISPR) is a form of gene editing that many researchers and lab workers have been utilizing for genetic experiments. It is a tool that researchers at Union have been attempting to use with limited success. Green fluorescent protein (GFP) is a protein that fluoresces when exposed to ultraviolet light. We incorporated GFP into a breast cancer cell line and applied CRISPR to delete it. A stable clone of the human breast cancer cell line MCF7 was created which expresses eGFP constitutively. This cell line is being subjected to CRISPR gene editing to test whether GFP expression can be successfully suppressed.

Developing a Fully Validated Edna Assay for the Detection of *Alligator mississippiensis* Presence in West Tennessee (O)

Presenter: Jake Phelps
Faculty Project Advisor: Micah Fern

The Tennessee Wildlife Resource Agency has confirmed several sightings of the American Alligator (*Alligator mississippiensis*) in West Tennessee. Previous research has developed a primer that is species specific to *A. mississippiensis* and allows for the detection of *A. mississippiensis* DNA in high concentrations from synthetic DNA or DNA extracted directly from an alligator. This research will test this primer's sensitivity to ultimately allow for *A. mississippiensis* DNA detection in minute quantities from environmental DNA samples. Samples were collected from a laboratory holding tank that houses *A. mississippiensis* as well as in the field from the Rockefeller Wildlife Refuge in Louisianna where alligators are known to be present. The Assay has been able to detect minute quantities of DNA from environmental samples, however, definitive results are pending. Ultimately this assay will be used to study the presence and range expansion of *A. mississippiensis* to West Tennessee from its established southern range.

Immune Response Variance Induced by Planktonic Versus Biofilm Forming *Staphylococcus epidermidis* (O)

Presenter: Sammy Bakeer
Faculty Project Advisor: Esther Choi

Biofilm formation is the main mode of pathogenicity of *Staphylococcus epidermidis*, human skin bacteria. In biofilms they stick to each other and attenuate the host defense system. This study aimed to determine the different cytokines produced by the host in response to two types of *S. epidermis*, the wild type (wt) biofilm forming and the *Δica* mutant non-biofilm forming *S. epidermidis*. The quantitative PCR was used to measure the pro- and anti- inflammatory cytokine levels produced by A431 cells, the human skin epithelial cells. A431 challenged with *Δica* mutants showed greater levels of pro-inflammatory cytokines than the cells challenged with wt. This indicates that host cells do not detect biofilm forming *S. epidermidis* effectively and fail to communicate with other cells to remove pathogens. Elucidating the mechanism by which biofilms avoid host detection will give greater insight on how to eliminate biofilm-mediated infections.

Phylogeny of the Cricket-assassin Wasps (Hymenoptera: Rhopalosomatidae) Using POL2 and VSP4B (O)

Presenter: Benjamin Scott
Faculty Project Advisor: Jeremy Blaschke

The understudied cricket-assassin wasp family Rhopalosomatidae includes four extant genera: *Rhopalosoma*, *Paniscomima*, *Liosphex*, and *Olixon*. To generate the first genetically-informed phylogeny of this understudied family, 45 specimens representing 30 species and all four genera were gathered from collaborators and collections around the world. Two wasps from Vespidae were included as outgroup taxa. The two nuclear coding genes *POL2* and *VSP4B* were extracted, amplified, and sequenced. Maximum Likelihood and Bayesian phylogenies were constructed and confirmed several longstanding morphological hypotheses, including 1) the monophyly of all four rhopalosomatid genera, 2) the close affinity of *Rhopalosoma* and *Paniscomima*, and 3) the basal position of the unique brachypterous taxon *Olixon*. Additionally, *VSP4B* was used here for the first time in rhopalosomatid phylogenetics and was effective at accurately resolving deep nodes in the phylogeny, indicating broad phylogenetic utility of this gene among the Hymenoptera. ■

BUSINESS

An Investigation Into Microfinance in Developing Countries (O)

Presenter: Danielle Popson
Faculty Project Advisor: Colene Trent

Opportunity-based entrepreneurism has shown to be a significant contributor to economic development. In developing countries without access or qualification for more traditional capital sourcing, accessible credit options like microfinance or saving group programs have seen success. Which cultural measures influence entrepreneurial activity and outcomes of these microfinance networks? This paper will look at relationships between cultural factors and corresponding impacts on economic indicators of entrepreneurial outcomes. Cultural measures like individual attitudes, social cohesiveness, religious beliefs, collectivism, political environments, and economic factors such as natural resource endowment, education levels, economic openness, and freedom indexes will be considered in the analysis. Results can be used to determine factors that serve as facilitating or constraining forces on entrepreneurship and suggest policy responses to different economic environments. ■

CHEMISTRY

Developing Green High School Laboratory Experiments for Gas Laws and Intermolecular Forces to Fulfill Science Standards (P)

Presenter: Laralin Dixon
Faculty Project Advisor: Sally Henrie

Science standards set high school curriculum requirements to promote the comprehension and organization of core scientific concepts. Green chemistry is an effective way of educating students on these concepts with a minimal effect on the environment as well as a lower risk to the students. After connecting the Tennessee Science Standards and the Next Generation Science Standards with the laboratory experiments already included in *The Green Chemistry Laboratory Manual* for High School, it was found that experiments for intermolecular forces and gas laws also needed to be included in the manual to satisfy the standards. This research focused on developing these two experiments while using green methods and materials.

Development of a Synthetic Method of the Oxidation of [Cr(TMP)C6O6H2Cr(TMP)]2 (P)

Presenter: Hattie Hume
Faculty Project Advisor: Randy Johnston

The oxidation of alcohols is a procedure that has been used in many different fields of chemistry for many uses, including both manufacturing processes and laboratory-scale experiments.1 Chromium (III) benzoquinone complexes can oxidize alcohols to aldehydes or ketones, and these complexes may be able to catalytically carry out the oxidation.2 The complexes may be made by preparing Cr(ClO4)2 and reacting it with a substituted benzoquinone and nitrogen donor ligands. Those ligands could be in this specific case, tetradentate ligands, meaning they will bind four donor atoms to a central atom in order to form a reduced coordination complex. Once the reduced form is produced, a reduction-oxidation reaction can be used to form the oxidized form. Many different methods were attempted to accomplish this, and the results will be reported.

Chromatographic Analysis of Common Analgesic Compounds Using TLC, LC, and HPLC (P)

Presenter: Elizabeth Smith
Faculty Project Advisor: Jimmy Davis

The purpose of this research project was to analyze commonly used over-the-counter analgesic drugs using thin layer chromatography, column chromatography, and high-pressure liquid chromatography. The goal was to create a useful Organic Chemistry lab for students to perform in an effort to learn how to use these techniques. In addition to learning how to use these chromatography techniques, students will be able to identify similarities and differences between the techniques, as well as the molecular reasoning that explains the results of each run. ■

COMPUTER SCIENCE

Ecosystem Relationship Manager (O)

Presenter: Jay Hardison
Faculty Project Advisor: G. Jan Wilms

Customer Relationship Management (CRM) is an important tool that businesses use to manage the relationships with their customers. However, this can also be a useful tool to implement within the ecosystem of an organization. MI2, or Metals Innovation Initiative, is a startup organization that promotes the research and development of metals in Kentucky and the surrounding states. They use an ecosystem business model, so this application was perfect for them to replace the Excel spreadsheet they were using to keep up with their data. The goal of this application is to be able to collect data of the interactions within the ecosystem and to show MI2 analytics and graphs based on this data in order to make well-informed business decisions. This application can also filter the data and display these graphs, tables, analytics, and other data in Microsoft Teams.

Creating a Website for a Local Business (O)

Presenter: Mohammad Abuhantash
Faculty Project Advisor: G. Jan Wilms

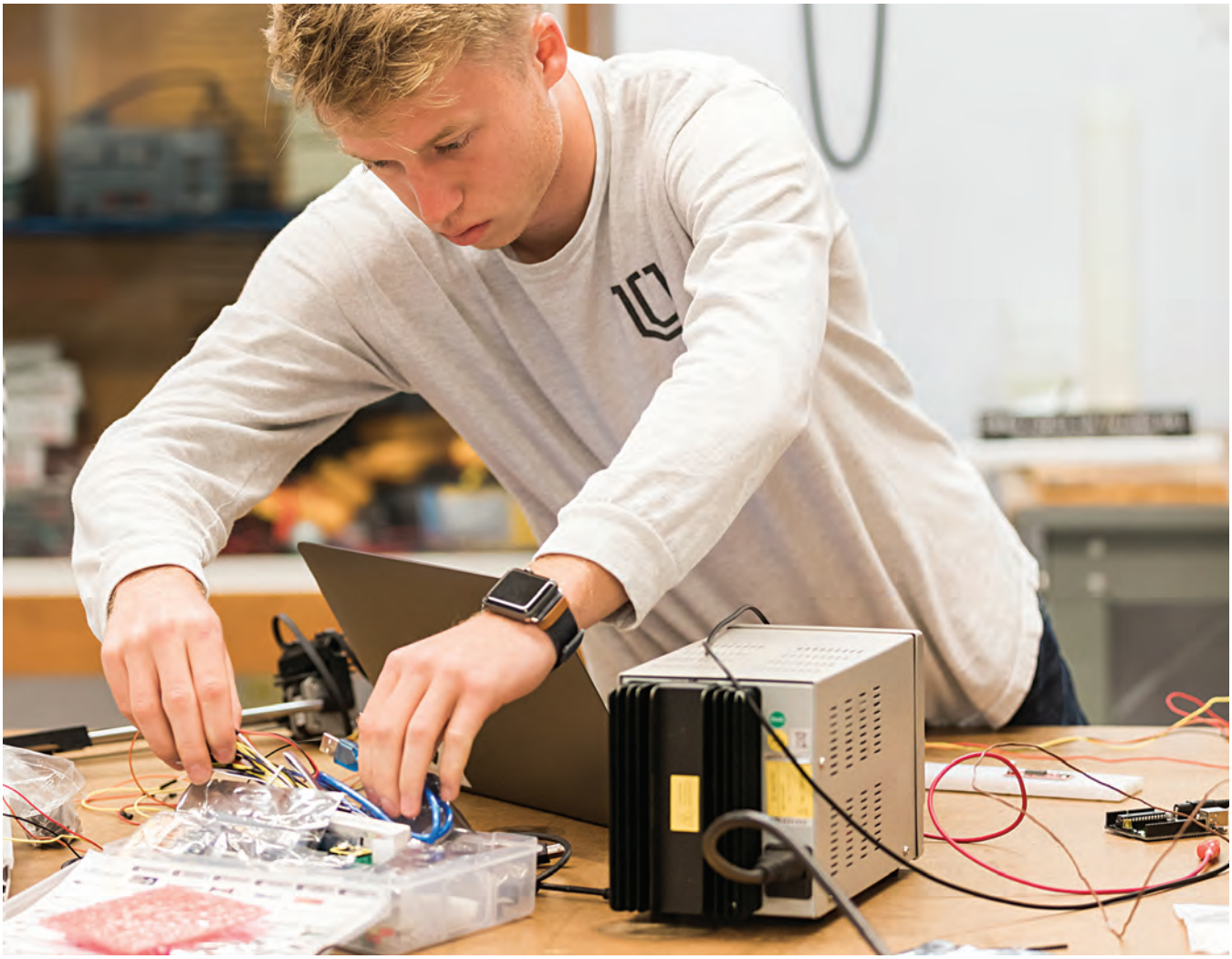
This project involved the creation of a website for a local salon business here in Jackson that doesn't have much online presence other than a Facebook page. The website will display the services offered by the salon, as well as the ability to make an appointment with a licensed aesthetician. This website will be constructed using HTML and CSS and incorporate elements of JavaScript for server-side scripting.

App for Poplar Heights Baptist Church (O)

Presenter: Isaac Johnson
Faculty Project Advisor: G. Jan Wilms

The Poplar Heights Baptist Church staff has been looking for a more efficient way to communicate with their members and guests. They currently have to send mass emails to their members and guests and give announcements during their services. In order to fix this need, I have created an app that will allow members and guests alike to download it through the Apple app store to not only find any information that they are looking for, but also give them push notifications about new events/ministries or changes to other events. ■

ENGINEERING



Maximizing Basketball Shooting Accuracy (P)

Presenter: Philip J. Becker
Faculty Project Advisor: Don Van

Basketball is a universal sport that is played and enjoyed by people all around the world. However, everyone has varying techniques for how they play the game, which in turn greatly affects and impacts their performance. The aim of this experiment was to maximize the accuracy of successfully shooting a basketball and analyzing various factors that contribute to shooting accuracy: shoe type, number of steps taken before the shot, shooting stance, shooting form, the type of basketball being used, clothing being worn, and whether an audience is present. The Design of Experiment (DOE) statistical method is used to measure the effects of these variables by completing three trials of eight runs with all shots being taken from the free throw line. This experiment will conclude the ideal and most important factors for basketball shooting accuracy by using the 16th fractional factorial design method.

Developing a Portable Hydroelectric Generator for Sustainable Power Generation (P)

Presenters: David Ebrahim, Nathan Golden, and Noah Simpson
Faculty Project Advisor: Don Van

Hydroelectric generators have been a reliable source of renewable energy for years. However, large hydroelectric plants can be expensive to build and maintain, making them unsuitable for small-scale power production. In this project, we aim to create a small hydroelectric generator that can be used in rivers for small-scale power production. Our generator will be designed to harness the kinetic energy of flowing water and convert it into electrical energy. We will focus on creating a cost-effective and efficient design that utilizes 3D printing. Our goal is to provide a sustainable and reliable source of electricity for rural communities that lack access to traditional power grids.

ENGINEERING

Creating A Tunable Astable Multivibrator (P)

Presenters: Jacob Arehart and Jacob Carbonell
Faculty Project Advisor: Jeannette Russ

This project explores the creation of square waves utilizing the classic astable multivibrator circuit. Transistors are implemented to generate oscillating square waves that can be sent to a speaker. Potentiometers are used to vary the frequency of the waves which will in turn vary the speaker output. A second method is also implemented for comparison. Five hundred and fifty-five (555) Timer chips are used to generate the square waves, again using potentiometers to vary the output frequency. The two circuits multivibrators are then combined to investigate the creation of intervals with differing input frequencies.

Recreating a Tone Generator with a Simple Circuit (P)

Presenters: Ethan Brasher and Michael Kirk
Faculty Project Advisor: Jeannette Russ

This project will explore the use of capacitors and potentiometers to develop a simple tone generator. Our goal is to see how accurately we can achieve different notes with this simple circuit. Tone generators are used in many common applications such as alarm systems, children's toys, and emergency sirens. They work by converting an electric signal into sound. We replicate this common device by creating a simple circuit that varies the pitch by changing the resistance with a potentiometer. Capacitors filter out the signal to reduce noise and create a smooth note. Finally, a simple speaker outputs this signal into discernable noise.

Factor Affecting Growth Rate of Fish (P)

Presenter: Vishal Gaurav Karmacharya
Faculty Project Advisor: Don Van

There are many factors that affect the growth rate of fish. The most widely affected parameters are water quality, temperature, food, water volume and population. This experiment aims to determine which one of those factors is the most determining one. The factors are tank size, water changes, temperature, food and population. The proposed fish for use in this experiment is the common convict cichlid (*Amatitlania Nigrofasciata*) since they are readily available. The temperature high and low proposed are 74°F and 82°F for a high. These are the chosen temperatures because even though 74°F is on the lower end of the scale, it is not inhumane to keep this particular species at that temperature long term since they experience similar conditions in their natural habitat. Eighty-two °F is the higher end of temperature that they experience in the wild. Water quality is to be monitored using an API water tester that measures ammonia, nitrite and nitrate. The high factor for water changes will be doing weekly water changes at fifty percent at each time and on the low end would be doing a water change of the same volume every other week. As for food, some of the most popular brands commonly used in the hobby at two price ranges with an option as inexpensive as Aqueon brand to something as high end as Fluval insect-based flakes will be utilized. The next criteria to be experimented with is tank space with high being ten gallons of water volume and low being five gallons. Population would be the other factor. The high would be six in one aquarium and low would be three. This experiment is a fourth fractional factorial design on an experiment that has five factors.

Sound Frequency Manipulation (P)

Presenters: Laralin Dixon and Laura Jin
Faculty Project Advisor: Jeannette Russ

This project creates a basic three-band audio equalizer using three filters: a high pass for treble, a low pass for bass, and a band pass for mid-range. These filters manipulate the frequencies of sound, thereby varying the prominence of bass and treble that can be heard. An RC circuit is used to create the equalizer, which is visually represented by LED lights and audibly represented by a speaker. Three potentiometers are used to control the intensity of the frequencies passed through each of the filters which allows a user to manually change audio broadcasting from the speaker.

Applying the DOE Method to Study Hand Washing Techniques (P)

Presenter: Timothy Boccarossa
Faculty Project Advisor: Don Van

All of us remember the COVID-19 posters placed on just about any wall with free space: "WASH YOUR HANDS FOR AT LEAST 20 SECONDS." This poses the question: What is the optimal method for washing your hands? This project seeks to answer this question by using the power of the Engineering Design of Experiment (DOE) method while integrating the disciplines of Biology and Engineering. The DOE will use eight fractional factorials to determine which factors most affect how clean your hands are after washing them. The factors that will change are time, temperature, drying, touch, number of soap pumps, the use of water, and the type of soap.

Potentiometer-controlled LED Cube (P)

Presenters: Philip Becker and Colby Davis
Faculty Project Advisor: Jeannette Russ

The purpose of this project is to construct a functional and visually appealing LED cube, which is a 3D display made up of a matrix of LEDs arranged in a cube shape. LED cubes can find practical application in diverse settings such as businesses, schools, museums, and by individuals to cater their visual, educational, and entertainment needs. This LED cube was constructed by soldering LEDs in the Engineering Lab on a circuit board and then utilizing an Arduino, resistors, and a potentiometer to program the cube to display various patterns, shapes, and colors. This project demonstrates the successful integration of hardware and software to create a complex and visually appealing electronic device.

The Use of Potentiometers with DC Motors (P)

Presenters: Jewelia Black and Mikaila Rogers
Faculty Project Advisor: Jeannette Russ

This project explored the usefulness of potentiometers by analyzing their effect on the speed of DC motors. The potentiometers change the resistance that the voltage must pass through to get to the motors in the circuit which, as a result, changes the speed at which the motors run. To accomplish this, we designed a circuit in which two potentiometers are connected to two separate motors positioned on the left and right side. The motors themselves are used to turn two wheels on the left and right side to replicate a car. In order to visually show the effect of the potentiometers there are LED lights connected throughout the circuit that vary in brightness depending on the potentiometers resistance.

Creating a Wave Simulator with a Simple Circuit (P)

Presenters: Daniel Lancaster and Nate Thomas
Faculty Project Advisor: Jeannette Russ

This project explores circuits, but more specifically potentiometers. Potentiometers are manually adjustable variable resistors with three terminals. Adjusting the potentiometer allows the user to change and regulate the current of a circuit. For our project, we will use a motor and gears attached to a wall to create small waves in a thin and long tank of water. The goal of this project is to simulate waves crashing into the shore at variable frequencies. Adjusting the potentiometer in circuit with the motor will allow us to have frequency variations and change the wave amplitude.

Audio Filtering with Op Amps and Potentiometers (P)

Presenters: Garrison Harold and Braeden McAlister
Faculty Project Advisor: Jeannette Russ

This project explores the behavior of potentiometers and op amps in different audio filtering applications. The design demonstrates how potentiometers can be used to isolate different bands of frequencies in analog audio signals. The intensity of these bands can be adjusted independently of each other using potentiometers. This project also demonstrates how op amps can be used to combine multiple audio sources. The design encapsulates all of these ideas and allows for the filtering of audio using op amps, while also demonstrating how their intensity, and combining audio sources.

Diesel Engine Cycle and Applications (P)

Presenters: Ian Banderchuk, Braeden McAlister, and Aldric Zeak
Faculty Project Advisor: Georg Pingen

This project highlights important aspects of a diesel engine. The evolution of diesel engines is outlined followed by details involved in specific applications of diesel engines. Common applications include, but are not limited to, the common automobile, tractors/agricultural equipment, generators, eighteen wheelers, military/emergency vehicles, boats, and railroad locomotives. Further, comparison with the basic textbook diesel engine process is made for chosen applications and adaptations that make these engines possible. When possible, efficiency, power output, and work loss are also noted. Finally, models of renowned diesel engines have been constructed to illustrate their respective aesthetic, structural and size differences, along with their different applications.

LED Potentiometer Color Wheel (P)

Presenters: Ian Banderchuk and Aldric Zeak
Faculty Project Advisor: Jeannette Russ

The goal of this project is to display an arrangement of twenty-four red, green, and blue LED lights in a circuit controlled by three potentiometers. Each potentiometer controls one of the colors, allowing each color to be individually adjusted for intensity by changing the amount of current flowing into each color. The result will be a visual display of a range of changing colors, which essentially creates a simple "color wheel." Varying levels of current achieved by adjusting the potentiometers will emit colors such as orange, yellow, purple, pink, and many more.

ENGINEERING

Maximizing Solar Energy Production through Dual-Axis Sun Tracking Systems (P)

Presenters: Paige Bizzell, Vishal Gaurav Karmacharya, and Parker Rice
Faculty Project Advisor: Don Van

Today, solar energy is one of the leading sources for renewable energy. Maximizing the power collected from the sun enables more power to be generated. This power can be maximized through the angles in which solar panels receive light from the sun. This project seeks to maximize the power produced from a solar panel through tracking the sun through the sky. There will be two dual-axis solar tracking devices in which the solar panel will be mounted. One system will track the sun with photoresistors sensing and subsequently positioning the solar panel in the best path of light. The second system will track the sun every hour through predetermined angles which have been theoretically calculated. These two systems will be compared to see which has the greatest output of power. betwe

Using Renewable Energy to Construct a Solar Charging Station (P)

Presenters: Philip Becker, Timothy Boccorosa, and Cooper Champine
Faculty Project Advisor: Don Van

For this project, we used the principles of renewable energy to design and implement a solar powered phone charging station on Union University's campus. Our goal is to provide a sustainable and convenient solution for students to charge their phones in a semi-remote location on campus. We constructed a custom size solar panel using solar cells and a weatherproof frame. We conducted various tests to determine the efficiency and reliability of the solar panel, including measuring the power output and monitoring the battery storage capacity. We also designed a user-friendly charging station that includes USB ports for students to plug in their phones. The station is equipped with safety features to protect against overcharging and short circuits. The completed project will be installed in a high-traffic area on campus without access to power. This project demonstrates the power of renewable energy through solar cells in small-scale applications.

Constructing a Battery Charger with Basic Circuitry (P)

Presenters: Jonathan Brewer and Micah Valdivia
Faculty Project Advisor: Jeannette Russ

In this project, we explore the concepts behind constructing a battery charger using basic circuit components. The building block of the project will be a timer which will serve the dual purposes of both charging and monitoring the voltage level of the charging capacitor. The goal of the project will be to create a homeostatic mechanism for the charging capacitor where the timer will regulate the amount of current going into the charging capacitor until it is fully charged at which point it will cut the current being supplied to it until it has been discharged into a supplied battery at which point the timer will resupply current to the charging capacitor. The charging of a battery is also controlled by a transistor to prevent excess charging current from damaging the battery.

Using COMSOL to Model Particle Flow Through a Digital Twin Design (P)

Presenter: Timothy Boccarossa
Faculty Project Advisor: Georg Pingen

Diseases caused by irregular bone marrow such as leukemia affect thousands of people each year. While there have been great strides in medicine, bone marrow diseases, and specifically what causes them, are still greatly unknown. This research project seeks to marry engineering and medicine using COMSOL, a computational fluid simulation program, to model a 3D designed counterpart blood growth plate that is being designed and tested at Vanderbilt University by the Department of Chemical and Biomolecular Engineering

Engineering a Solid Solution: The Process of Developing and Optimizing a Torque Arm Bracket (O)

Presenters: Paige Bizzell, David Ebrahim, Nathan Golden, and Noah Simpson
Faculty Project Advisor: Georg Pingen

Diversified Conveyors International (DCI) LLC is a conveyor system designing and fabricating company based out of Memphis, TN. The company typically works with large logistic and supply chain companies that need a network of conveyor systems to sort and deliver goods in various elevations of a warehouse. Due to the aerial nature of the company's conveyor systems, motors mount directly onto the shaft of the drive assembly. These shaft-mounted gear reducers require a torque arm to secure the equipment to the drive and prevent free rotation of the motor. The team from Union University is assigned the task of designing, fabricating, testing, and implementing a torque arm bracket applicable to a myriad of motors and drive assemblies utilized by DCI.

Designing a Prolink Quality Testing Device (O)

Presenters: Nathan Cole, Samuel Eudy, and Parker Rice
Faculty Project Advisors: Jay Bernheisel and Georg Pingen

Hitachi Energy manufactures fuses for high-voltage circuits in distribution transformers. Our team sought to improve the testing process for these devices, primarily known as Prolinks. We crafted a specification detailing how a machine would automatically test each device for six key parameters. Specifically, our machine is designed to decrease cycle time, reduce operator dependence, and decrease quality issues There were three phases in the project: first, we researched and selected the best testing method for each of the six parameters; second, we evaluated the financial feasibility of the project; finally, we wrote the specification that Hitachi pitched to machine builders. Our presentation will highlight the documents we created, overview one of our specific designs, and explain the reasoning behind our design decisions.

Filling the Freezer: Maximizing Growth in Feeder Rabbits (O)

Presenter: Paige Bizzell
Faculty Project Advisor: Don Van

Raising meat rabbits are a staple for farmers and homesteaders attempting to lead a self-sustainable life. With the low start-up cost, fast maturity, and high return of investment, raising rabbits can be a fruitful endeavor leading to a freezer full of high-quality meat. Optimal living conditions and quality feed greatly contribute to the final weight of juvenile butcher rabbits. To optimize the growth of rabbits, this experiment will focus on the following factors: Living Space, Type of Food, Amount of Food, and Competition. Over the course of two weeks, this study will attempt to find which factor will cause the highest effect on growth rate by conducting an experiment of a half-fractional factorial design.

Automated Pressure Decay System (O)

Presenters: Philip Becker, Cooper Champine, Andrew Eschen, Myles Gibson
Faculty Project Advisors: Georg Pingen and Jay Bernheisel

Pressure testing is a method used in manufacturing to locate leaks or cracks in piping within radiators. This process is extremely tedious for workers and requires a significant amount of time and resources. The aim of this project is to replace this method of pressure testing with an automated system that would remove the need for a worker to manually perform the test. This solution would improve efficiency and effectiveness in manufacturing plants that perform pressure testing by creating an Arduino-based prototype with select parameters that can be tailored to meet certain criteria and specifications to determine whether a pressure test has passed or failed.

Potentiometer Project (O)

Presenters: Ryan Keeton and Caleb Krueger
Faculty Project Advisor: Jeannette Russ

This project explores how potentiometers are implemented in a video game joystick. Our project will demonstrate how the joystick can be used to control several outputs. The joystick acts as a potentiometer by adjusting the resistance felt to multiple outputs. Therefore, depending on the direction of the joystick, one or even multiple outputs can be affected and tuned to a wide variety of user defined settings and reset very easily. In this project, LEDs are used as the outputs so that the brightness changes based on where the joystick is moved to. In addition to LEDs, we also use a DC motor to demonstrate the usefulness of the joystick in controlling different types of outputs. ■

ENGLISH

Whatever You Do, Don't Forget (O)

Presenter: Katherine Anne Thierfelder
Faculty Project Advisor: Christine Bailey

Inspired by a letter that she received from her own elementary school Gifted Program, Katherine Anne's short story "Whatever You Do, Don't Forget" follows Lucas Druthers, a psychology Ph.D. student, as he conducts an interview for his dissertation with convicted death row inmate Archie Saxton. Lucas must battle the clock and the inmate's unwillingness to open up in order to get the information he needs for his dissertation director and answer questions that have been plaguing Lucas ever since he was a kid. The key to Lucas's case seems to lie in the contents of a letter of rejection that Saxton received from his elementary school Gifted Program. "Whatever You Do, Don't Forget" combines the feeling created by Richard Connell in "The Most Dangerous Game" that something isn't quite right with a Sci-Fi twist to explore the lengths to which a person will go in order to find answers and reveal truth.

Secrets of the Paper Prince: Chapter 1 (O)

Presenter: Caleb Starkey
Faculty Project Advisor: Christine Bailey

Secrets are rough when you're fourteen—especially magical ones. *Secrets of the Paper Prince* by Caleb Starkey follows Ezra Hale as he struggles to navigate the worlds of foster care, adoption, and eventually a new home in a magical town called New Seelie, all the while hiding powerful magic that has proven its potential to be as dangerous as it is useful. Chapter 1 begins as Ezra's eighth-grade year wraps up and as he prepares to begin the adoption process for the third time since his uncle disappeared. The chapter brings mystery and complication as Ezra tries striking a desperate and unsteady balance between relationships, secrets, and a growing sense that there might be other secrets bigger and darker than his own. ■

INTERCULTURAL STUDIES

Healthy Assimilation Strategies for the Potential Trauma Associated with Immigration (O)

Presenter: Laila Sue Al-Hagal
Faculty Project Advisor: Jean Marie Walls

Immigrants are faced with many challenges when adjusting to a new country. Perceptions of identity, purpose, and home may change during the cultural transition of people who have been separated from the place of their childhood. When these internal perceptions are challenged, the result can lead to trauma, isolation, and an unhealthy cultural adaptation to the host society. The research conducted in this project specifically examines the types of trauma that can occur with immigration and the attempt to assimilate into a new culture. Further, the research also explores the work of the International Leadership Coalition, an organization that attempts to aid internationals with strategies for healthy cultural adaptation.

Cultivating Effective Community Development Through International Nonprofits and Local Partner Collaboration (O)

Presenter: Kirbi Cochran
Faculty Project Advisor: Jean Marie Walls

International aid to a community requires a holistic understanding of the community and its needs. Every international nonprofit has unique ways of approaching the needs of the communities they serve. However, all methods are not equally effective. Through my personal experience working alongside Education Equals Hope, an international non-profit working in Quito, Ecuador, I observed the benefits of an international nonprofit organization partnering with local leaders to determine and implement effective community development. In light of this experience, my research examines different methods of international aid and narrows the focus to the effects of both the international organization and the local community working in partnership to assess needs, plan aid strategies, and implement community development. These strategies lead to long-term solutions that take into account the culture and history of the community partner.

The Importance of Building Multicultural Teams in Short-Term Missions to Cultivate Mutually Beneficial Community Outreach (O)

Presenter: Hadie Sowell
Faculty Project Advisor: Jean Marie Walls

In the last few decades in the United States, it has become increasingly popular for high school and college aged students from middle class families to travel internationally to participate in short-term missions or aid. Oftentimes, these trips take place in impoverished communities of post-colonial nations. Because visiting teams often do not include local community members, other than in the role of translators, the projects or service the teams provide can often lead to unintended negative consequences. This research project is an examination of how healthy multicultural teams can provide an environment for mutually beneficial short-term missions and identify ways in which students can be better equipped for cultural sensitivity and awareness. This study specifically draws from student experiences with short-term missions in Brazil who have worked on a multicultural team. ■

LANGUAGE

Las obras creativas como expresión de los movimientos políticos y sociales mexicano-americanos: Creative Works as an Expression of Mexican American Sociopolitical Movements (O)

Presenter: Tatiana Perez
Faculty Project Advisor: Karen Martin

Mexican Americans first became a defined group in the early 1800s and they have often struggled with being heard and respected. Initially, Mexican people were made American citizens through the Treaty of Guadalupe Hidalgo, but their rights and value as people have long been disregarded. This presentation brings awareness to some of the political issues this group has faced from its inception to today and analyzes literary and artistic works created to speak against these injustices. This research traces the trajectory of the Mexican American socio-political movement from its creation to the present, including the ideological frameworks that shape its actions. It also highlights the lives of prominent Mexican American activists. In times of sociopolitical strife, there are many ways to have one's voice heard, and this paper explores how these authors and artists speak out against racial, economic, and societal issues through the arts.

Over- and Under-Diagnosis of Speech and Language Disorders: A Case Study on English Language Learners (O)

Presenter: Holly Bryan
Faculty Project Advisor: Phillip Ryan

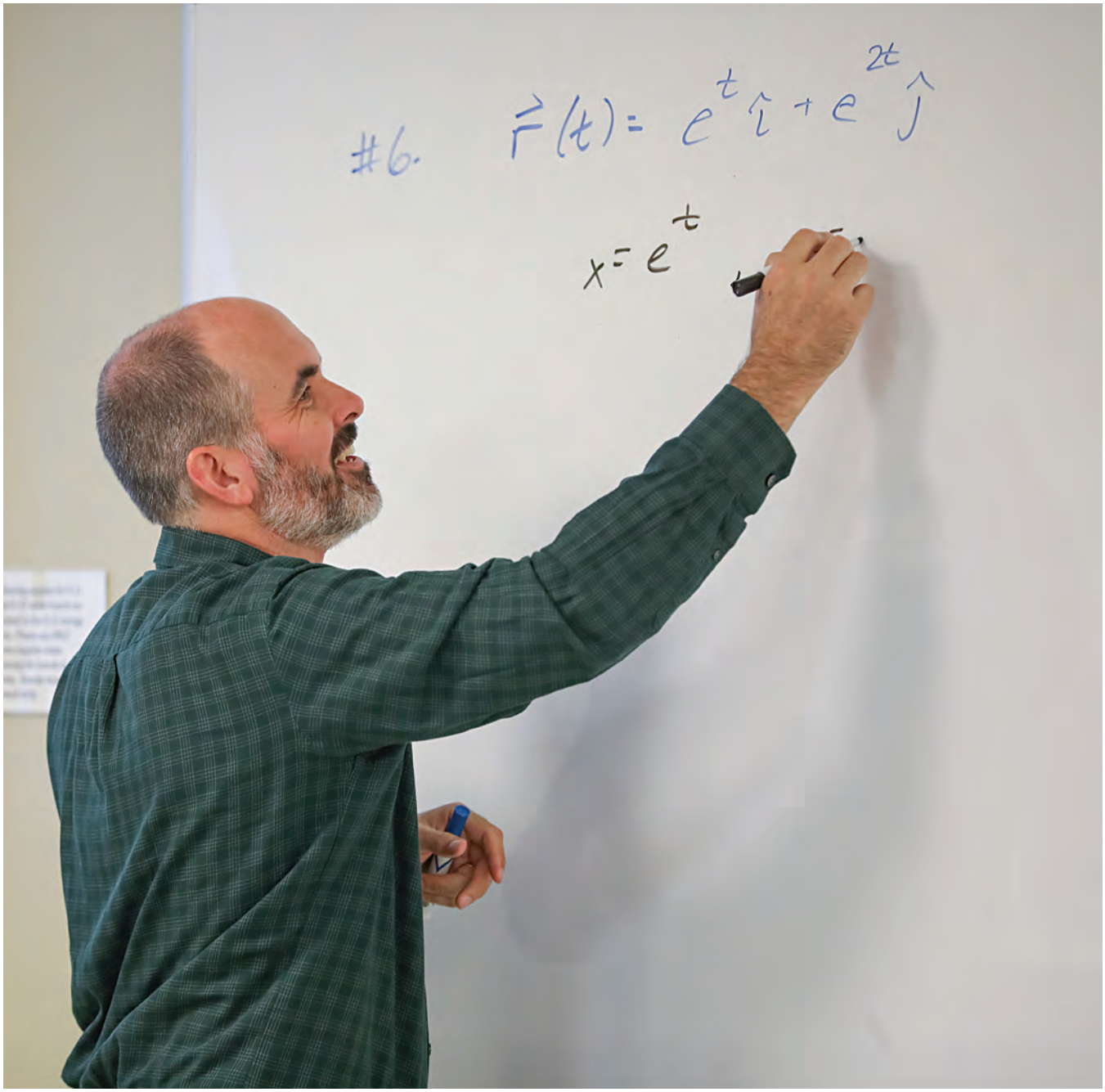
Within the speech-language pathology field, the concepts of language difference and language deficiency are often muddled. Consequently, over and under-diagnosis of language and speech disorders in children who speak English as a second language is very common. Two fallacies are often made with this population: a true language or speech disorder is attributed to a lack of English proficiency, or a lack of English proficiency is diagnosed as a language or speech disorder. A systemic gap in literature and education and chronic lack of multilingual educators and speech-language pathologists can often lead to poor diagnosis and treatment among this population. A sociopolitical analysis of this issue will be provided as well as an in-depth case study among West Tennessee speech-language pathologists detailing their current felt-preparedness and future plans of action in order to remedy this systemic failure.

Family Structure and Psychological Development: Effects on Literacy in the Inner-City (O)

Presenter: Kailie Cromwell
Faculty Project Advisor: Phillip Ryan

Factors such as poverty, socioeconomic status, and family structure and dynamics greatly impact the issue of adult illiteracy. One of the leading causes of illiteracy in adults is generational illiteracy—when parents cannot read, their children are more likely to grow into functionally illiterate adults. Using psychological frameworks as a lens to look deeper into adult illiteracy, this paper will focus primarily on family structure and dynamics as they impact different developmental stages. The implications of this project are important for all language teachers. My emphasis on psychological development and family dynamics will help language teachers who may not have thought about psychological backgrounds and developmental challenges that many illiterate adults face in their formative years. By understanding factors outside the classroom and in earlier stages of life, teachers will be better equipped to aid illiterate adults in overcoming problems associated with the absence of clear developmental stage markers in language acquisition. ■

MATHEMATICS



Lost in the Divergence Zone (O)

Presenter: Abigail Branson
Faculty Project Advisor: Bryan Dawson

In this talk, we will consider the level comparison test for series, based on infinitesimal calculus, which outlines the fate of the infinite series if the reciprocal of the Ω term in a series is either always in the convergence zone or always in the divergence zone. Will a series still be able to converge if it has an infinite number of terms in the divergence zone? After finding a few such series on divergence levels consecutively further from the convergence zone, I propose that the answer is yes – if there is a sufficiently large proportion of terms in the convergence zone to those in the divergence zone. In order to understand this, we will cover proofs that show the sum of the reciprocals of squares and fourth powers. We will also define convergence and divergence zones. During this we will consider a story to enhance comprehension of the topic. ■

NURSING [GRADUATE]

Comparison of International Health Care Systems: Russia (P)

Presenters: Charles Carter, Henrry Garcia, and Shane Martien
Faculty Project Advisor: Shari Wherry

Russian healthcare is a complex system striving to compete with the world's top nations. Various similarities and differences exist within Russian healthcare compared to more familiar systems, such as healthcare within the United States, the United Kingdom, Switzerland, etc. However, when examined closely, the similarities are more minute than the differences. The DNP class of Nursing Healthcare Policy and Economics has provided the systems in place within the United States. This research brings quantitative and qualitative comparisons between Russian healthcare and other nations that have conformed to worldly standards. These comparisons include payer system, financing/supply, reimbursement, production, provider choice, challenges, world ranking (WHO and Legatum Institute's Prosperity Index), and gross domestic product spent on healthcare (Henderson, 2018).

Comparison of International Health Care Systems: Finland (P)

Presenters: Payton Naifeh, Cassie Moseley, and Katie Yewell
Faculty Project Advisor: Shari Wherry

Finland is a high-income, low-poverty country, and thus, their healthcare system is an anomaly compared to other countries. Each municipality in Finland controls the day-to-day aspects of the universal healthcare system, while the government controls specialties and facilities. Even with a successful system, Finnish people are looking for reform due to regional inequities within the current System (Keskimaki et al., 2019). This presentation aims to briefly educate the listener on the complex aspects of the Finnish Healthcare System and offer a multifactorial comparison to the current United States healthcare system.

Comparison of International Health Care Systems: Israel (P)

Presenters: Daniel Baker, Kevin Brooks, and Jerry Nguyen
Faculty Project Advisor: Shari Wherry

Access, development, and distribution of healthcare throughout the world are affected by many factors. The DNP class of Nursing Health Policy and Economics examines the economic and political factors affecting health care in the United States and different countries. The overall objective in this poster is to compare the United States healthcare system to the highly developed country of Israel. This comparison analysis will investigate factors such as the payer system, finance and supply, reimbursement, and healthcare production. Additionally, insurance plans with provider choice and their challenges will also be examined. Finally, Israel's overall World Health Organization ranking and the gross domestic product spent on healthcare will also be discussed (Henderson, 2018).

Comparison of International Health Care Systems: United Kingdom (P)

Presenters: Jessica Howell, Heather Vega, and Brooke Work
Faculty Project Advisor: Shari Wherry

The National Health Service (NHS) is a government-funded program that provides free healthcare to all United Kingdom (UK) citizens. It is one of the world's most recognized universal healthcare programs. The NHS was approved in 1948 and is accessible to all UK residents, and even some nonresidents with certain restrictions. The NHS regulates hospitals via trusts to provide services. Diagnosis related group (DRG) rates set by the NHS determine reimbursement. In 2021, the UK spent approximately 11.9% of its gross domestic product (GDP) on healthcare. It ranks #18 according to the World Health Organization (WHO) world health report published in 2000. Financial constraints due to overspending have forced the NHS to develop some cost-containment measures to address deficits.

Comparison of International Health Care Systems: Mexico (P)

Presenters: Kayla Bonilla, Andrea Egbuna, and Angel Guy
Faculty Project Advisor: Shari Wherry

Mexico's health care system is a combination of public and private sectors. Public healthcare is provided through institutions such as the Mexican Social Security Institute (IMSS) and the Institute of Security and Social Services for State Workers (ISSSTE). These public institutions are funded by the government, employer taxes, and employee taxes. IMSS offers healthcare to any foreign or Mexican resident employed in Mexico. Those not employed can enroll voluntarily for public healthcare but must be legal residents of Mexico. On the other hand, private insurance is offered to individuals who must pay a premium determined by their risk profile. Those who don't qualify for either healthcare scheme can enroll and be provided health insurance under the Institute of Health for Wellbeing (INSABI), formerly Seguro Popular (Columbia Public Health, 2019).

Comparison of Canadian and United States Health Care Systems (P)

Presenters: Kelsea Brannon, Wright Hobgood, and Robert Smith
Faculty Project Advisor: Shari Wherry

Though the United States and Canada share national borders, their perspective healthcare systems are vastly different. We plan to present a poster that compares many aspects of medical delivery between the two countries. Statistics from the World Health Organization will be used to compare numbers between the countries. A look at the challenges faced by Canada in the delivery of healthcare and what role geography, demographics, and culture have played. Canadians use a tax-based, publicly funded Medicare that covers core medical and hospital services (Martin et al., 2018). The United States has the most expensive medical care in the world, that does not yield high-paying results. The country to the north takes pride that they offer healthcare coverage based on need rather than the ability to pay.

Comparison of International Health Care Systems: Germany (P)

Presenters: Shelley Brewer, Lindsey Cook, and Alicia Wilson
Faculty Project Advisor: Shari Wherry

The DNP class of Nursing Health Policy has studied the economic health reform in the United States and studied reasons why healthcare costs are more than in other countries. To learn more about this, the class will compare other countries to the United States in areas including healthcare payer systems, reimbursements, provider choice, financing, challenges, production, gross domestic product spent on healthcare, and world ranking (WHO). This subgroup of the class will focus on Germany and provide the details of the healthcare system. Germany spends more on health as compared with other European countries and health insurance is considered a requirement.

NURSING [GRADUATE]

Comparison of International Health Care Systems: Spain (P)

Presenters: Laura Jarosemich and Erica Thompson
Faculty Project Advisor: Shari Wherry

Spain has a healthcare system in which approximately 98-100% of the population receives care under the National Health System; however, many people also have private insurance to supplement the public coverage. According to the World Health Organization, Spain ranked in the top ten world ranking for healthcare. This poster presentation explores the Spanish healthcare system including effectiveness for patient outcomes, financial cost, provider choices available to patients, structure of the system, and gross domestic product spent on healthcare. Additionally, the Spanish government continues to focus resources for improvement toward challenges within the system such as increased prescription costs, and patient access. Discussion of these and other variables will also be reviewed throughout the poster.

Comparison of International Health Care Systems: India (P)

Presenters: Jordan Bell, Taylor Bishop, and Collin Janke
Faculty Project Advisor: Shari Wherry

India faces challenges in healthcare, including lack of access and high costs (Kasthuri, 2018). Despite these challenges, India's healthcare system has made several positive strides in recent years. However, the debate still remains whether healthcare is a privilege or a right. This DNP International comparison of healthcare systems will highlight the political and economic factors in India compared to the United States. Areas that will be addressed include the payer system, financing/supply, reimbursement, production, provider choice, challenges, world ranking (WHO), and gross domestic product spent on healthcare (Henderson, 2018). The members of this group have compiled a poster presentation with detailed information for India's comparison of health care purposes.

Comparison of International Health Care Systems: Australia (P)

Presenters: Derel Clayton and Anthony Lowe, Jr.
Faculty Project Advisor: Shari Wherry

The industrialized characteristics of healthcare in Australia, characterized by increasing divisions

of Health and Economics, will be discussed compared to similar healthcare systems. The consolidation of Australian healthcare has utilized a single-payer model since 1984 (NMA, 2022). According to the World Health Organization (2022), Australia's life expectancy for men and women, 81.3 and 84.8, ranks number 6 globally. Evaluation of the financial benefit of a healthy nation, practice, and patterns of physicians results in Australia spending less on healthcare and medications. For this reason, Australia has been identified as a country that spends the least on healthcare, about 9.4% of the gross domestic product (Dixit & Sambasivan, 2018). Various categories with further details will identify the healthcare system in Australia.

Comparison of International Healthcare Systems: Egypt & United States (P)

Presenters: Heather Moran, Kim Ward, and Jennifer Williams
Faculty Project Advisor: Shari D. Wherry

Healthcare across the world is vastly different. Most countries have healthcare; however, the delivery, access, quality of medical care, health insurance requirements, and governmental control can vary drastically when comparing countries. This project will compare the United States healthcare system to Egypt's, focusing on their economic influence regarding payer systems, reimbursement, production, financing/supply, provider selection, challenges, world ranking (WHO), and overall gross domestic product (GDP) of healthcare expenditures. The aim is to show how geography, demographics, and culture influence healthcare system organization. Additionally, by examining the similarities and differences between these two developed countries, it will hopefully provide a clearer picture of healthcare in Egypt.

Comparison of International Health Care Systems: China (P)

Presenters: Megan Burckhard, Jordan Fentress, and Andrew Sayres
Faculty Project Advisor: Shari D. Wherry

According to Yi (2021), the national medical security system in China is the largest healthcare security network in the world, covering over 95% of the population with their basic medical insurance (BMI) program. Additionally, China's "medical insurance fund is sustainable and growing," with revenue exceeding expenditures by 35 million Chinese Yen in 2019 (Yi, 2021). However, China still struggles to provide full and equal access to their Three-Tier Healthcare Delivery System in all regions and provinces (Jia et al., 2022). For our poster presentation, we will explore the political and economic factors of China's healthcare system. Our fellow DNP classmates in Nursing Health Policy and Economics will present similar info for their respective countries allowing comparison of international healthcare.

Reducing CRNA Burnout: Utilizing Daily Mindfulness and Wellness Techniques to Decrease Stress and Burnout (P)

Presenter: Jen Dahle
Faculty Project Advisor: Tracy Walker

Certified registered nurse anesthetists (CRNAs) experience high responsibility and stress in their careers, leading to high levels of burnout. When individuals experience burnout, they become disengaged, ineffective, overextended, and dissatisfied with their work (Aronsson et al., 2017; Sanfilippo et al., 2017; Vells et al., 2021). Utilizing wellness and mindfulness techniques has been shown to reduce stress and burnout (Vells et al., 2021). The Maslach Burnout Inventory (MBI) was administered to an anesthesia department in rural Tennessee. Sixteen CRNAs participated and were asked to complete the questionnaire, followed by completing one additional mindfulness or wellness activity every day for seven days. At the end of the seven days, the CRNAs were to complete the MBI questionnaire again. The pre-test revealed a high degree of burnout, with the majority of CRNAs showing high levels of emotional exhaustion (87.5%), depersonalization (81.25%), and low levels of personal accomplishment (56.2%). After the seven-day interventions, the post-test showed an improvement in burnout severity, with moderate emotional exhaustion (50%), depersonalization (43.75%), and improved personal accomplishment (62.5%). Further investigation of the interventions and their sustainability necessitates a larger sample size and a longer intervention duration.

Dexmedetomidine vs. Midazolam for Peri-Procedural Sedation (P)

Presenter: Ashley Pratt
Faculty Project Advisor: Jordan Palmer

Midazolam has been the preoperative drug of choice for sedation and anxiety for years despite its undesirable side effects. Dexmedetomidine is becoming more popular, and research has found it a better option for those with post-traumatic stress disorder, high risk of emergence delirium, and those patients we want to maintain spontaneous ventilation. Dexmedetomidine provides multiple benefits, such as attenuation of SNS response, anxiety relief, decreased coughing and gagging, and analgesia, which reduces opioid consumption and length of stay. Anesthesia providers, patients, and surgeons were satisfied or even preferred sedation with dexmedetomidine over midazolam. Dexmedetomidine should be considered for the right patient population for periprocedural sedation to avoid undesirable side effects and maximize patient satisfaction and outcomes.

ERAS Versus Non-ERAS in Abdominal Surgery: A Quality Improvement Project (P)

Presenter: Natashia Melton
Faculty Project Advisor: TaMara Carter

ERAS has been around for more than 20 years, with efficient data supporting its utilization. However, despite data indicating that Enhanced Recovery After Surgery (ERAS) programs, few centers have successfully adopted this approach within the U.S. (Sarin et al., 2016). Still, today, Anesthesia providers rely heavily on opioids to ensure analgesia in patients undergoing procedures associated with noxious stimuli (Morrow et al., 2022). For colorectal surgery, the return of bowel function is a crucial indicator of recovery; ileus formation leads to substantially increased length of stay and hospital costs (Simpson, Bao, & Agarwala, 2019). The main goal of ERAS protocols is to reduce the physiological response to the surgical insult (Echeverria-Villalobos et al., 2020). This project examined the use of ERAS in abdominal surgeries utilizing a retrospective chart review and questionnaire to collect information while educating the staff on the importance of ERAS at Jackson Madison County General Hospital.

The Use of Diaphragmatic Ultrasound after Neuromuscular Blockade Reversal (P)

Presenters: Gleyndon Kern and Jennifer Kern
Faculty Project Advisor: Ross Palmer

Diaphragm ultrasonography (DUS) is used to assess diaphragm function in the intensive care setting, but its use in the perioperative setting is new (Lang et al., 2021). The diaphragm function can be evaluated using ultrasound assessment at the zone of apposition during inspiratory and expiratory respiratory activity (Yu et al., 2021). To assess the quality of the diaphragm function, a simple equation is used to measure the diaphragm's thickening fraction (TF%). In this study, three healthy subjects underwent a right-sided DUS using a linear probe in the right-recombinant position. The TF% of subject one through three were 210%, 110%, and 252%, respectively. Patients with lower postoperative diaphragm TF% developed more PPCs (Yu et al., 2021). Predicted extubation failure occurs at TF% of less than 36.3 to 37.1% (Mercurio et al., 2021). Patients at higher risk for PPCs or undergoing surgical procedures surrounding the phrenic nerve will most benefit from a DUS (Vetrugno et al., 2019). The authors lastly developed an educational video demonstrating how to perform a DUS.

NURSING [GRADUATE]

Dexamethasone as an Adjuvant for Peripheral Nerve Blocks: An Evidence-Based Practice Update Project (P)

Presenter: Shairah Hortelano
Faculty Project Advisor: Tracy Walker

Pain is inevitable during the perioperative period. Managing it can be challenging, with many factors having to be considered. Uncontrolled pain becomes a burden to patients and can lead to chronic pain. This results in the increased use of opioids and the costs of healthcare. A multimodal approach to pain management includes the implementation of regional anesthesia. Peripheral nerve blocks are often used to help alleviate and control pain. This method decreases opioid consumption, minimizes its adverse effects, decreases anesthetic requirements, and prevents the progression of chronic pain. Adjuvants can be added to local anesthetics in peripheral nerve blocks to prolong its duration, provide more extended periods of analgesia, and minimize opioid usage. Dexamethasone is a glucocorticoid that increases the effectiveness of peripheral nerve blocks when administered perineurally and intravascularly with minimal side effects. This evidence-based practice update project aims to assess the literature on dexamethasone in peripheral nerve blocks and provide a practice recommendation to optimize pain management. The outcome is to utilize dexamethasone as the adjuvant for peripheral nerve blocks for the standard of practice.

Does Education on Magnesium Sulfate Change Practice? (P)

Presenter: Curtis Sutera
Faculty Project Advisor: Jordan Palmer

Through an investigation of the literature, magnesium sulfate (MgSO4) was identified as a possible technique to lower postoperative pain scores and decrease opioid consumption. The evidence supports utilization of MgSO4 with other techniques, including nerve blocks, opioids, and other medications for a multimodal approach to postoperative pain management. According to Gao et al. (2020), patients receiving magnesium sulfate had lower verbal numerical pain scores from one minute to four-hour postoperatively which is supported with a P value of 0.074 and 0.003 respectively. In addition, Nadri et al. (2018) reported less overall morphine administration in the postoperative when patient receives MgSO4. This Quality Improvement project aims to determine if providing education to anesthesia providers on current MgSO4 evidence will result in practice change. During a seven-week implementation phase at Hardin Medical Center in Savannah, TN, providers were evaluated on their knowledge of magnesium sulfate. The same providers were then educated and reassessed following the implantation phases. Results included an approximate 20% increase from pre to post-test scores and a p-value of 0.005 following a paired t-test. These results provide evidence that practice change has occurred. However, more extensive studies are needed due to the relatively small sample size and the need to for standardized pain management doses for MgSO4.

Quadratus Lumborum Block Approach Comparison: A Cadaveric Dye Study (P)

Presenters: Amanda Cox and Amanda Terwilliger
Faculty Project Advisor: Ross Palmer

The Quadratus Lumborum (QL) block has recently become popular due to its ability to provide multimodal pain coverage for various truncal procedures in the adult population. Recent studies reveal that the QL block can successfully reduce postoperative pain and opioid consumption for up to 48 hours. Another benefit of the QL block is its somatic and visceral coverage, unlike other regional methods used for abdominal wall and pelvic procedures. The QL block can be performed using three different approaches: lateral (QLB 1), posterior (QLB 2), and anterior (QLB 3). The primary purpose of this project was to evaluate which approach offers greater somatic and visceral coverage when comparing the lateral and posterior approaches. A formalin-fixed human cadaveric dye study was conducted using methylene blue dye to simulate local anesthetic spread. The results of this study suggest that the posterior approach may offer superior analgesia compared to the lateral approach.

In Adult Patients Undergoing General Anesthesia with Endotracheal Tube, is the Use of a 5cc Syringe Versus a 10cc Syringe Effective in Reducing ETT Cuff Overinflation? (P)

Presenter: Charles Banks, III
Faculty Project Advisor: Ross Palmer

Background: An endotracheal tube (ETT) has a cuff (ETTc) that is inflated via a syringe. It is optimal to inflate the ETTc to a pressure between 20 and 30 cm H2O. Anesthesia providers commonly use a 10cc syringe to inflate the ETTc. About 2 to 4cc is needed to establish the optimal range, which can be supplied with a 5cc syringe. *Methods*: Anesthesia providers received a pre-evaluation regarding current techniques of how cuff pressure is assessed. Participants received education about ETTc pressures and research regarding the benefits of utilizing a 5cc syringe. Providers used the 5cc syringe for a month and completed a post-evaluation at the completion of this trial. *Results*: With 13 participants, 11 made a practice chance to utilizing the 5cc syringe to inflate the ETTc. *Conclusion*: After education and utilizing the 5cc syringe, most of the anesthesia providers made a practice change to help decrease ETTc overinflation.

Utilizing Ketorolac to Decrease Perioperative Opioid Requirements: A Quality Improvement Project (P)

Presenter: Scott Venable
Faculty Project Advisor: Tracy Walker

Ketorolac administration at the time of emergence from anesthesia safely decreases postoperative opioid consumption. There are several barriers to ketorolac's use based on false beliefs held by anesthetists. A quality improvement project was performed to decrease these barriers in the practicing CRNAs and Union SRNA's at Jackson Madison County General Hospital (JMCGH). An electronic Pre-test measured common barriers to ketorolac's use. Research that countered said barriers was then presented to participants. A post-intervention assessment remeasured the same barriers. The responses were statistically analyzed using a Likert-scale pre-test/post-test model. A significant change in mean scores was found regarding positive perception of ketorolac's efficacy at decreasing opioid consumption (p values of .0073 and 0.03). A two-week pre-intervention chart review of ketorolac's use in total hip and total knee surgeries established baseline data. A 4-week post-intervention chart review found an increase in ketorolac's use in the specialties evaluated (42% preintervention vs. 57% postintervention).

Anesthetic Considerations to Prevent Emergence Delirium in Patients with Post Traumatic Stress Disorder (P)

Presenter: Jasmine Gonzales
Faculty Project Advisor: TaMara Carter

Post-Traumatic Stress Disorder (PTSD) is an independent predictor of Emergence Delirium (ED). Currently, there are no standardized anesthetic guidelines to decrease ED in patients with PTSD, leaving a significant knowledge gap in anesthesia providers. Literature suggests that pre-operative interviewing, environmental adjustments, and the use of Ketamine and Dexmedetomidine prevent ED in patients with PTSD. This educational project aimed to fill the knowledge gap regarding anesthesia considerations in patients with PTSD to prevent ED. Nurse Anesthetists and Nurse Anesthesia students (n=32) were surveyed to assess current knowledge and practice. Participants reviewed an educational tool and a post survey examined if the tool enhanced their knowledge. Pre- and post-test results revealed that the educational intervention enhanced knowledge and led practice change in anesthesia providers caring for patients with PTSD. Patients with PTSD are at an increased risk of experiencing ED. Anesthesia providers should tailor their anesthetic plans accordingly to prevent this potentially dangerous phenomenon.

Peer Mentorship Strategies to Cultivate Secure Attachment and Improve Self-Efficacy in the Novice Certified Registered Nurse Anesthetist (P)

Presenter: Rebecca Davis
Faculty Project Advisor: TaMara Carter

Nurse anesthesia is a challenging path a registered nurse may take in pursuit of an advanced practice degree. Following graduation from a doctoral program, the CRNA now practices as an independent provider. Often, an environment ripe with stress, anxiety, and burnout awaits the newly graduated CRNA. This stress can manifest as a reduction in self-efficacy levels and dramatic increases in turnover rates. This project examines the effects of mentorship on the novice CRNA during the first year of practice. Integrative research of recent literature describing the use of mentorship in CRNAs and related healthcare fields was utilized. This information was interpreted and aggregated to form questions surrounding peer mentorship in a novice CRNA and assess the presence and usefulness of such mentorship for these providers. Analysis and summation of literature and the accumulation of data regarding current CRNAs facilitates the adoption of formal peer mentorship programs for novice CRNAs.

Sonographic Evaluation of the Effect of Gum Chewing on Gastric Volume (P)

Presenters: Matthew D. Johnson and Samuel L. Seaton
Faculty Project Advisor: Andrew Rice

This scholarly project aims to demonstrate the importance of understanding and utilizing gastric ultrasonography in patients who do not fit the standard NPO guideline. This is done by assessing subjects who chewed gum but were otherwise NPO. Aspiration pneumonitis is a condition that leads to lung tissue injury and severe respiratory damage. Aspiration in the perioperative setting significantly increase morbidity and mortality (Faylar & Kantzavelos, 2018). Doyle (2019) conducted a meta-analysis of multiple randomized control trials that summarizes a clinical problem related to inconsistency in proceeding with surgery if a patient chewed gum during his/her preoperative fasting period. For this project, three individuals were used to collect data on. The three subjects remained NPO for >12 hours. All subjects were scanned using a Mindray ultrasound with curvilinear probe in the supine and RLD positions. The gastric antrum was identified, and the gastric cross-sectional area (CSA) was calculated using the ellipse function under direction of an experienced Point of Care Ultrasound (POCUS) expert. Subjects were each provided sugar-free gum to chew. Subjects were re-evaluated at 15, 30, 45 minutes, and CSA measurements were obtained. All patients had a CSA <10 cm2, except for subject three at 30 min, who exceeded NPO basal secretions with a gastric antrum measurement of 10.23 cm2. Images and videos were captured during the process to develop an instructional video that will be

offered to anesthesia providers for educational purposes. It is determined that NPO guidelines are frequently unreliable, and patients often chew gum, eat candy, dip tobacco, etc. before their surgical procedure. The use of POCUS aids in providing a safe and consistent anesthetic when NPO status is questionable. The study results support training CRNAs and implementing gastric POCUS into anesthesia practice. *Educational Video:*
https://www.youtube.com/watch?v=yk73oVuDBSA

3D Printing Meets Anesthesia: A Predictive Study Correlating ETT Size for Tracheal Stenosis via POCUS (P)

Presenters: Codie Moszczynski and Samantha Pickarts
Faculty Project Advisor: Andrew Rice

Background and Significance: After the COVID-19 pandemic, anesthesia providers should anticipate delivering care to patients with iatrogenic tracheal stenosis due to prolonged tracheal intubation. Without extreme caution, the deleterious effects of unrecognized, severe tracheal stenosis can pose a significant health and safety risk to patients undergoing anesthesia. This scholarly project assessed the relationship between the diameter of a stenotic tracheal lesion using point-of-care ultrasound (POCUS) and how it correlates to endotracheal tube (ETT) size using 3D-printed tracheas. *Methods*: This project utilized a mixed methods approach incorporating analytical and qualitative methods. A predictive study model was utilized to correlate the measured cross-sectional diameter of a tracheal lesion with the recommended internal diameter of an ETT as set forth by The American Society for Testing and Materials. The study utilized innovative 3D-printed tracheas printed at Union University 3D Laboratory that were subsequently submerged in medical-grade ballistic gelatin for sonography. The study results were compiled to create an educational course to train anesthesia providers to predict ETT size in patients with suspected tracheal stenosis utilizing ultrasonography. *Results*: A Likert survey measuring self-reported outcomes after completion of the educational course addressing confidence and knowledge of POCUS, the usability and usefulness of POCUS in personal practice, and potential perceived barriers to implementation. Fifty-seven point seven percent (57.7%) of respondents (n=26) reported ultrasound knowledge was the primary barrier to using POCUS in their current practice. After completing the educational course for airway POCUS, 84.6% of respondents felt more confident in their ability to perform upper airway assessment and predict ETT size for patients with tracheal stenosis. *Conclusion*: Utilization of an innovative 3D-printed airway model with varying degrees of stenosis can help eliminate barriers to airway POCUS assessment for patients with suspected iatrogenic tracheal stenosis. Additional studies are needed for clinical correlation and success of anesthesia providers in the clinical setting performing airway sonography.

Applied Virtual Reality Simulation for Anesthetic Block Education (P)

Presenters: Joshua Lawson and Garrett Rhodes
Faculty Project Advisor: Jordan Palmer

Virtual reality is an emerging technology that has the potential to revolutionize the teaching and training of anesthesia professionals. The latest wireless self-contained devices offer learners a depth of immersion unseen before with previous virtual applications. Therefore, there are few studies evaluating the effectiveness of these newer devices. In our study, we use the latest, consumer grade, virtual reality devices and applications available to immerse students in an interactive virtual cadaver dissection, where they are taught, hands-on, the anatomy and methodology of an ultrasound-guided popliteal nerve block. Nineteen students were guided through this educational experience and evaluated pre-experience and post-experience for improvements in understanding, performance confidence, perception, and comfort of the experience. Students involved had a 92.6% increase in perceived ability to perform the block, a 34.2% increase in confidence in attempting the block in clinical or lab, 100% reported a greater understanding of the blocking process, 100% post-study perception of VR being useful for anesthesia education, with 100% stating they would recommend the experience for a fellow student or colleague. 89.5% report no discomfort with factory standard comfort measures, and there were 0 instances of nausea or disorientation (previous barriers of older virtual reality devices). Respectfully submitted for judging in the TANA poster competition.

Decreasing Opioid Adverse Drug Events and Enhancing Recovery after Cardiac Surgery Using Erector Spinae Plane Block: A Quality Improvement Project (P)

Presenters: Lauren Larsen and Kellie McGiffin
Faculty Project Advisor: Jordan Palmer

In this project, a retrospective chart review was conducted to examine the efficacy of using an erector spinae plane (ESP) block in decreasing opioid consumption in cardiac surgery via sternotomy. A literature review suggests that implementing an ESP block will reduce the incidence of opioid-related adverse events (ORADEs) and enhance recovery after surgery (ERAS). This paper examined the following variables: 24-hour postoperative morphine equivalents, length of hospital stay, and the incidence of postoperative nausea and vomiting. The Epic SlicerDicer system was utilized to collect the data for this project. The findings were a lower incidence of postoperative morphine equivalents and length of hospital stay in the group who received the ESP block preoperatively. No statistical difference was found in the incidence of postoperative nausea and vomiting between the two groups. The data was disseminated using a structured educational intervention on the ESP block and a pre-post-test questionnaire design. The authors of this project have no conflict of interest related to the topic presented.

The Use of Ketamine for Postpartum Depression (P)

Presenter: Molly Mills
Faculty Project Advisor: TaMara Carter

Background: Patients that undergo Caesarian section are at risk for developing postpartum depression. Ketamine is being used in a wide variety of environments for treatment of mental health issues. One area of focus is the use of ketamine for analgesic properties after Caesarian section reducing the chances of a patient having postpartum depression. *Purpose*: The purpose of this study was to collect information about utilizing ketamine for Caesarian section analgesia and reduction in postpartum depression and educate anesthesia providers on the information found. *Design/Methods*: The project was carried out using a pre and post-test to evaluate anesthesia providers knowledge on the use of ketamine for treatment of PPD and if the providers integrated the use of ketamine into their practice with providing care to patients undergoing Caesarian section. A retrospective chart review was conducted to determine use of ketamine in this facility. After the education was complete, data was collected to determine if the education changed the practice of the anesthesia providers. *Outcome measures*: The outcome was measured by the evaluation of the pre and post-test that was distributed to the participants. There was a comparison of the pre-education use of ketamine and post-education use of ketamine. *Implications/Conclusions*:

NURSING [GRADUATE]

The providers use the information gathered to assist them in selecting the best plan of care of this population.

Enhancing Pain Management in Black Patients: Employing Racial Implicit Bias Training (P)

Presenters: Albert Scott Jr. and Erica Wooten
Faculty Project Advisor: Andrew Rice

Implicit bias has been an educational subject used in medical professional education for decades. Certified Registered Nurse Anesthesiologists (CRNA) have an important opportunity and obligation to recognize implicit bias and confront racism when noticed. The purpose of this project was to provide implicit bias self-awareness education to CRNAs to improve perioperative pain management in African American patients. This project utilized a six-point, design-thinking framework to form a pre-test questionnaire. Researchers aspired to gain information on implicit bias self-awareness, provide education, and gather results from multiple post-test questionnaires to assess for potential practice change. The Likert Scale was used to assess self-awareness and the intent to change. Descriptive statistics were used for data interpretation. In conclusion, post-education, participants reported increased personal and professional clinical cognizance of racial implicit bias. Additionally, this training elicited providers with an enhanced belief in providing better pain management for African American patients.

Cadaveric Evaluation of Different Approaches for Anterior Serratus Plane Blocks (P)

Presenters: Josh Morse and Justin Woods
Faculty Project Advisor: Andrew Rice

The anterior serratus plane block (ASPB) was developed to provide chest wall analgesia to patients having anterolateral wall surgeries (Shang et al., 2020). Due to the relatively easily identifiable landmarks, the ASPB is quickly gaining popularity among anesthesia providers. However, despite the block's growing utility, current guidelines give no definitive recommendation as to which technique is superior (Superficial or Deep) in facilitating local anesthetic spread and subsequent better dermatomal coverage for patients receiving a serratus plane block. A cadaveric dye study was performed to compare two different approaches to the ASPB and assess the anatomical spread and staining of nerves in the chest wall. This study was conducted using an embalmed cadaver, 0.01% methylene blue dye, and linear array ultrasound probe, along with the assistance of a regional anesthesia expert and clinical anatomist. Cadaveric findings should be correlated with further clinical studies; however, the findings imply better analgesia with the superficial approach.

Less is More: Fraction of Inspired Oxygen During General Anesthesia with Endotracheal Intubation (P)

Presenter: Tiffani Tran
Faculty Project Advisor: Ross Palmer

Background. In 2016, the World Health Organization recommended that adult surgical patients undergoing general anesthesia with endotracheal intubation should receive a fraction of inspired oxygen (FiO2) greater than 80%. Although a high FiO2 may improve tissue oxygenation, it can alter pulmonary function. *Methods*. This study employed a prospective quasi-experimental design with one-group pre-tests and post-tests. Participants included 40 anesthesia providers (anesthesiologists, certified registered nurse anesthetists, and student registered nurse anesthetists). A review of literature was conducted to evaluate current practice and to create an educational tool regarding hyperoxia. *Results*. Pre- and post-test results revealed a change in practice, decreasing FiO2 to below 50% during maintenance. The majority of participants agreed that hyperoxia is harmful. *Conclusion*. Oxygen is not harmless. Anesthesia providers should individualize patient care to specific needs and be vigilant in titrating FiO2 as needed to avoid both hyperoxia and hypoxia.

The Effect of Structured Mentorship and Onboarding: A Quality Improvement Project (O)

Presenters: Dana Dorris and Kayla Lambert
Faculty Project Advisor: Amy Williams

The United States is experiencing a nursing faculty shortage which greatly impacts the number of nurses entering professional practice. Nurse faculty transitioning from clinical practice to academia face challenges that often have a negative impact on job satisfaction and feelings of competence. Despite barriers, quality nursing faculty are needed. The purpose of this QI project was to evaluate effects of an eight-week structured onboarding mentorship on novice nursing faculty's job satisfaction and feelings of competence. Novice faculty were paired with a mentor and completed weekly meetings and online onboarding curriculum based on NLN Nurse Educator Core Competencies. A pretest/posttest method assessed feelings of competence and job satisfaction before and after the eight-week intervention. Results indicated increased feelings of competence and no change in job satisfaction. Outcomes demonstrate how mentorship and structured orientation can positively benefit novice faculty's experiences and competence during transition into academia.

Reducing Steroid Administration in Adults with Acute Upper Respiratory Illness (O)

Presenter: Contesta Corey
Faculty Project Advisor: Cathy Ammerman

Problem: There is limited research to support the practice of using systemic steroid treatment for mild to moderate symptoms of acute upper respiratory infections (AURIs). *Background*: Practice guidelines do not recommend the use of systemic steroids in the treatment of mild to moderate symptoms of AURIs; however, they are frequently prescribed. *Aim*: Reduce the use of systemic steroids (injectable and oral) in adults with mild to moderate acute upper respiratory illnesses (AURIs). *Methods*: A Rapid cycle Plan-Do-Study-Act (PDSA) project was implemented over 8 weeks. *Results*: The use of systemic steroids was significantly reduced. *Conclusion*: Steroid use can be reduced for patients with mild or moderate symptoms of acute upper respiratory infections.

The QCCT Approach for Sexual Health Assessments (O)

Presenter: Candace Hubbert
Faculty Project Advisor: Shari D. Wherry

This podium presentation will discuss the findings of assessment compliance related to healthcare providers' approach when addressing sexual health. The adolescent and young adult population, particularly those ages 15 to 24, account for almost half the 20 million new sexually transmitted infections (STIs) in the United States (Centers for Disease Control and Prevention, 2021). A solution to providers' inconsistent approach to sexual health-related visits for specific adolescents and young adults will be presented. The quality improvement (QI) goal was to increase providers' compliance by 30% using education and a new standardized tool called QCCT during sexual health-related visits and physical/wellness exams.

Efficacy of Amitriptyline Education for Chronic Pain Management in a Medical Clinic for Refugees: A Quality Improvement Project (O)

Presenter: Chad Hinton
Faculty Project Advisor: Jordan Palmer

Despite widespread evidence advocating the use of amitriptyline in treating chronic pain and its low-cost profile, refugees in the Middle East often do not receive treatment beyond paracetamol for their chronic pain. This quality improvement project sought to educate stakeholders on the use of amitriptyline as an analgesic, increasing its analgesic use with the goal of reducing pain severity and increasing functionality in a refugee population over 2 months. An initial pre-education survey was administered, followed by an education in-service on the topic of analgesic usage of amitriptyline. After provider education, 17 clinic patients were prescribed amitriptyline of which 12 returned to the clinic for follow-up. Post-survey results were collected at the end of the eight-week project. Results of the post-survey indicated a statistically significant ($p = .002506$) increase in stakeholders prescribing amitriptyline, resulting in patients experiencing a statistically significant ($p < .00001$) reduction in pain and increased functional capacity.

The Impact of Remote Work on Nurse Leader Satisfaction (O)

Presenter: Katherine Barnes
Faculty Project Advisor: Cynthia Powers

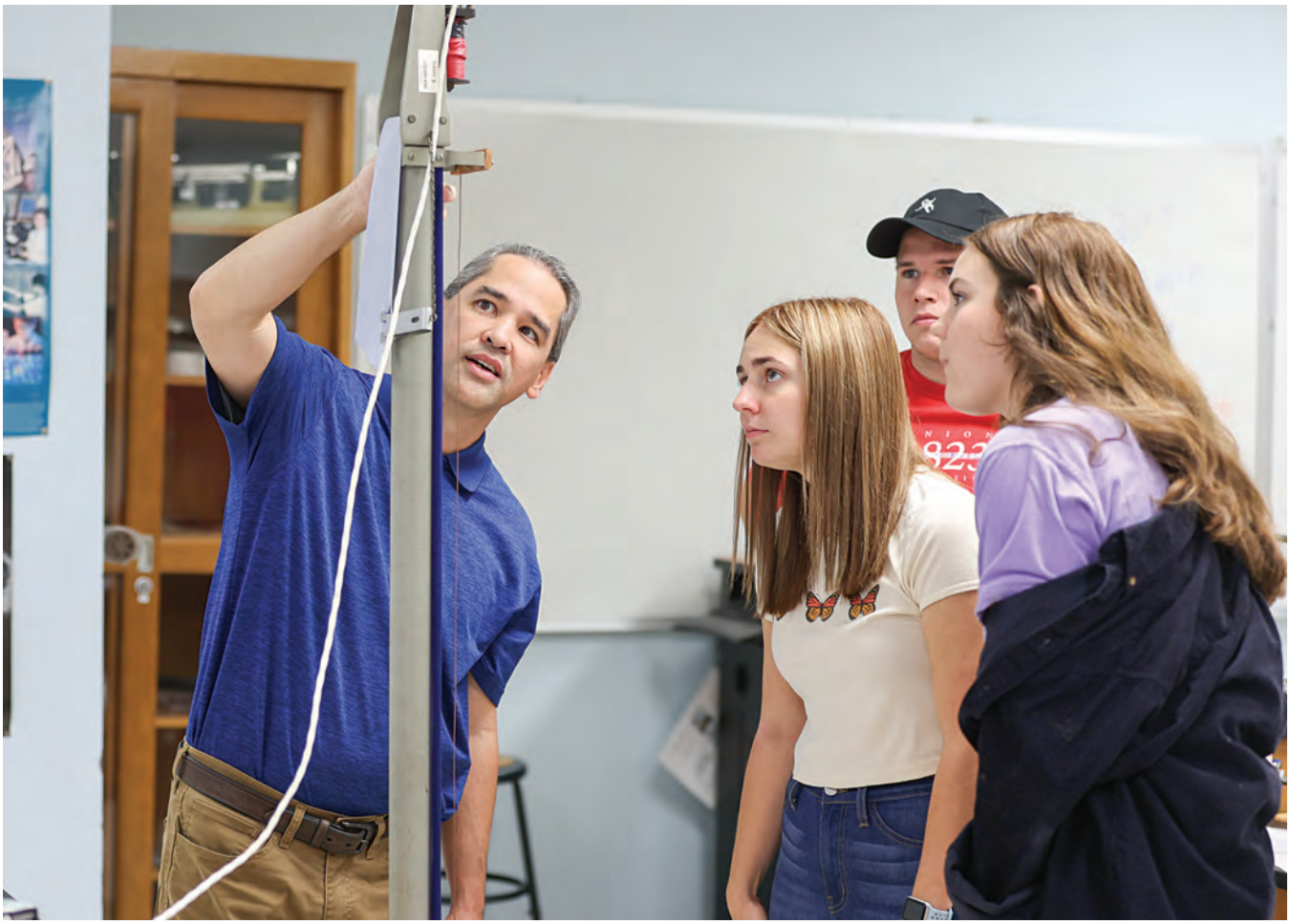
Nurse leaders play an important role in achieving healthcare organization's goals. The job stressors inherent in leading one or more complex departments, with 24/7 accountability, may contribute to dissatisfaction, lack of work-life balance, burnout, and turnover. The consequences can further impact leadership effectiveness. Understanding that the satisfaction of nurse leaders also impacts staff nurse retention, which in turn can affect the quality of patient care, makes this situation vitally important to healthcare organizations. This project sought to determine how remote working one day per pay period, as opposed to working on site, would impact the job satisfaction of nurse leaders.

Tdap Related Vaccine Hesitancy in Pregnancy and Across the Lifespan: A Quality Improvement Project (O)

Presenter: Jodine James
Faculty Project Advisor: Brad Creekmore

In this quality improvement project, a collaborative, comprehensive patient/provided-centered approach was developed to identify and mitigate factors related to Tdap hesitancy among pregnant women and across the general lifespan. Using a retrospective chart review, data collected for project baseline data about Tdap vaccination history for patients 27 to 36 weeks gestation, a general review of those who received, did not receive or had optimized Tdap coverage via electronic medical record (EMR). In addition, an educational module was implemented for providers with pre-posttest survey data and provider knowledge feedback to measure the practice change. During the data collection, improved provider knowledge grew beyond the 10th percentile to the 24th percentile after implementing the educational module. The QI project aim was to increase practice change for Tdap uptake by 10% in patients seen at CCHS by December 1, 2022. ■

PHYSICS



Unpacking Grading & Assessment Practices in Upper-Division Physics (O)

Presenter: Jessica Searl
Faculty Project Advisor: David Ward

Racial and gender disparities in physics student outcomes have prompted research into a variety of possible contributing factors. There has, however, been very little research conducted examining the impact of grading and assessment methods in upper-division physics on student engagement and success. We examined the impact of different types of feedback and assessment, particularly comparing students' experience in an 'ungraded' course, a class where the assignments were not graded but were assessed with verbal feedback, versus a traditionally graded course. We conducted semi-structured interviews with four upper-division physics students about their experiences with both standard physics grading and feedback practices as well as in an ungraded course. The presentation examines the student responses and analyzes the impact of current practices.

The Long-Term Impacts of Attending a Low-Income School (O)

Presenter: Taylor Overcast
Faculty Project Advisor: David Ward

The issues with today's educational system are multifaceted. There are issues relating to ethnic segregation, socioeconomic segregation, locational issues, and many more; however, the issue of socioeconomic segregation perpetrates several common dividers – gender, ethnicity, and location. Therefore, the long-term impacts of attending a low-income school will be the focus. Specifically, the relationship of a low-income childhood and attending a 4-year institution to study a STEM field will be the focal point of the presentation. The data behind the cyclical nature of poverty, and the impact of parental education level on students' projected education completion will be studied. The additional hardships that low-income students face will be examined – lack of sleep, technology, and extracurriculars. In addition, the impacts of low-income conditions on test scores, teacher retention rates, and college attendance will be explored. Finally, the data of STEM-focused bachelor degrees achieved by low-income students will be presented. ■

POLITICAL SCIENCE

Can We Live with Liberalism? An Investigation into the Sustainability of the Dominant Approach (O)

Presenter: Merry Ashlyn Gatewood
Faculty Project Advisor: Hunter Baker

Classical liberalism has failed America. "Liberalism" is used here to refer to the political ideology which advocates the free market, limited government, and the protection of individual and political freedom. This paper seeks first to explain the long-term effects of liberal ideology in America and outline some of the failings of classical liberalism, specifically the gradual breakdown of faith, plural society, and community. Second, this thesis seeks to address liberalism's nexus with capitalism and its accompanying ill effects, including in greater detail one specific case study, the recent phenomenon of "surveillance capitalism." This paper hypothesizes that surveillance capitalism has thrived in America because of "free market" dogmatism, social atomization, and the unbalanced nature of the private, public, and plural sectors in America. Last, a set of solutions is proposed. ■

PSYCHOLOGY

Examining the Path from Adverse Childhood Experiences to Faith Maturity: Self-Compassion as a Mediator (P)

Presenters: Cameron Chadwick, Halle Garner, and Mary Beth Propes
Faculty Project Advisor: Mollie Carter-Neal

Emerging adulthood is a developmental period including faith exploration and maturity. Research has explored adverse childhood experiences (ACEs) and emerging adulthood, but little research concerns how this trauma impacts faith during emerging adulthood. Self-compassion is a body of research wherein its impact on faith maturity is limited. This study adds to research on the impacts of ACEs on faith maturity including self-compassion as a mediator. Participants (n=245) at a private, religiously affiliated university self-reported ACEs, self-compassion, and faith maturity. Results of the path analysis suggest a negative relationship from ACEs to faith maturity. Results indicate participants reporting more ACEs also endorse higher self-compassion, which is positively associated with faith maturity. This is the first study that establishes self-compassion as a partial mediator of the relationship from ACEs to faith maturity, such that when emerging adults with ACEs develop self-compassion, they are more likely to gain faith maturity.

A Path from Social Media Social Comparison to Self-Compassion to Academic Grit (P)

Presenters: Faith Baker, Grace Bowerman, Isabella Flowers, and Rafael Tobler
Faculty Project Advisor: Mollie Carter-Neal

Academic grit, long-term persistence toward academic goals, is known to be a factor in academic success and program completion (Brooks, 2019; Li & Li, 2021). Social comparison is known to be associated with variables related to self-worth, which are known to be associated with academic outcomes, such as academic grit. The current study narrows this framework to examine relationships between social media social comparison (SMSC), self-compassion, and academic grit. Participants (n= 245) responded to a one-time survey assessing SMSC, self-compassion, and academic grit. The primary hypothesis of this study was not supported due to the lack of direct effect of SMSC on academic grit. Notably, this is the first study of the variable of SMSC in respect to academic grit in undergraduate students. Therefore, more research on the effect of SMSC on academic grit needs to be conducted. Nevertheless, an indirect path from SMSC to SC to AG was found.

Race as a Function of Social Connectedness and Social Identity at a Predominately White Institution (P)

Presenters: Sarah Edgren, Karah Martin, Katelin Rainey, and Madison Webb
Faculty Project Advisor: Mollie Carter-Neal

This study examined group differences and relationships between social identity and social connectedness based on race. We hypothesized that there would be group differences in the strength of social identity and feelings of social connectedness among white and non-white students, that race would predict social identity and social connectedness, and social identity would mediate the path from social identity to social connectedness. Participants (n = 245) included traditional undergraduate students at a predominantly white, private, religiously affiliated university, who endorsed their race and responded to the Social and Personal Identity Scale (SIPI) and the Social Connectedness Scale (SCS). We found group differences between students of color and white students on social connectedness and social identity at a predominantly white institution (PWI). Counterintuitively, students of color reported higher social identity and social connectedness. Additionally, the path model suggests that social identity partially mediates the relationship between race and social connectedness. ■

SOCIOLOGY AND FAMILY STUDIES

A Quantitative Analysis of Economic, Social, and Cultural Determinants of Childbirth Experiences in America (O)

Presenter: Katie Beth Dowling
Faculty Project Advisor: Matt Henderson

Abundant research demonstrates varied effects of culture, social hierarchies, and economics on pregnancy. Few studies, however, focus on these effects simultaneously, or utilize large representative population samples, resulting in an incomplete understanding of how pregnancy outcomes vary across the population. Relying on data from the National Survey of Family Growth, I analyze multiple economic, social, and cultural determinants of childbirth experiences. Analyses demonstrate a strong relationship between family characteristics, such as age of parents, mother's marital status, and mother's work status, and pregnancy outcomes, net of other socioeconomic factors. Results favor the conclusion that social and cultural factors play a greater role in the choices and experiences of pregnant women than economic ones. ■

THEOLOGY AND MISSIONS

2 Peter 1:16-18: Peter's Reception and Use of the Transfiguration (O)

Presenter: Jessica Bogle
Faculty Project Advisor: Matthew Albanese

In this paper, I explore how Peter receives the transfiguration, specifically in relation to the Gospel of Matthew (Matt 17:1-8; Mark 9:2-8; Luke 9:28-36). I chose this account because of the similarity in the voice's words and it being the fullest account. I also analyze noteworthy contrasts between the Synoptic Gospel accounts and explore the Old Testament references (Deut 18:15-19; Ps 2:1-12; Isa 42:1-9). The glory of Christ is displayed in all the Synoptic Gospels, and Peter leans into that by referencing the "Majestic Glory" (2 Pet 1:17). These accounts present Christ as the eschatological king, and Peter specifically uses this to rebuke false teachers within the church. Peter emphasizes the truth of his teaching and his authority as an apostle by reminding the church that he was witness to Christ's unmatchable glory and power, which confirms Christ as the one who fulfills the scriptures

Galatians 3:13 and the History of Crucifixion (O)

Presenter: Gabrielle Berry
Faculty Project Advisor: Mark Dubis

This presentation offers and exegesis of Galatians 3:13, part of which states, "Cursed is everyone who is hanged on a tree." This is a quote from Deuteronomy 21:22-23, which Paul applies to the crucifixion of Jesus. This statement is part of a larger argument where Paul shows that righteousness is by grace through faith in Jesus Christ. Salvation is only possible because Jesus took the curse of mankind's disobedience to God upon himself. However, some think this quote is misapplied because crucifixion was not yet invented at the time of the writing of Deuteronomy 21:22-23. This presentation will give an overview of the history of crucifixion and explain how Paul rightly applied Deuteronomy 21:22-23 to Jesus' crucifixion.

A Historical Commentary on Romans 13:1–7: How Christians Should Interact with the Government (O)

Presenter: Nicholas Bitterling
Faculty Project Advisor: Mark Dubis

One of the longest-lasting and most difficult debates in both political science and theology is the problem of the relationship between church and state. In Romans 13:1-7, Paul explains the purpose of government and exhorts subjection to it. Common questions regarding Paul's exhortation in this passage and its implications for both governmental actors and Christians include: "What is the scope/limits of the government?", "When is subjection to the government no longer necessary/obligatory?", and "What is the purpose/telos of the government?" In search of the answers to these questions, this research is a survey of Christian political thought presented via the examination of the beliefs of six Christian thinkers from the ancient to modern era. I first look at various passages from St. Augustine, St. Aquinas, John Calvin, Abraham Kuyper, Karl Barth, and John Howard Yoder, with particular attention to their commentaries on Romans but without overlooking their broader work. Then, I compare the views of these six Christian thinkers and determine the validity of their various positions through a conclusive exegetical commentary of the Greek text of Romans 13:1-7. Each thinker brings a unique perspective to the discussion and their contributions have valuable lessons for the modern reader. Based on their contributions, I present a constructed framework for Christian relationships with the government which is focused on exhortation to the Christian rather than the authorities themselves. This is because in Romans 13:1-7, Paul addresses the church in Rome rather than the governmental authorities, and a proper interpretation of the passage must keep the original audience in mind. ■

SYMPOSIUM

TWENTIETH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

RESEARCH GRANT RECIPIENTS *Fall 2022*

Undergraduate

Jeremy Blaschke, Benjamin Scott, and Collette Truitt: "A Multi-locus Phylogeny of Rhopalosomatid Wasps (*Vespoidea: Rhopalosomatidae*)"

Mark Bolyard and William Smith: "Examining the Retention of Intraspecies Phenotypic Variation of Chinese Elm During Regeneration"

Robert Bowen and Hannah Mitchell: "Analyzing the Immediate Physical Activity Response of Mice After Orchidectomy and Reintroduction to Testosterone"

Micah Fern and Jacob Phelps: "Validation of an American Alligator (*Alligator mississippiensis*) Specific Primer for Environmental DNA Surveying"

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