Biology

Literature review

Rich, Memphis; LaFrance, Isabelle; Canole, Maggie *Great Barrier Reef Conservation & Management*

The Great Barrier Reef is one of, dare I say the most biological diverse ecosystem on the planet. The vast coral formations have allowed for thousands of species of aquatic organisms to live and thrive in this wondrous biome. Unfortunately human based issues such as pollution, habitat destruction, and global climate change has severally impacted this ecosystem for the worse. Although not all hope is lost. Many conservation agencies across the planet have worked tirelessly to help restore and preserve this magnificent biome. In this literature review we will discuss some of the many efforts that conservation has done to help keep this amazing ecosystem alive, and if they have been successful or not.

Faculty Advisor Cary Chevalier

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Literature review

Hansen, Jacob; Bracken, Michael; Schneeflock, Keaton *Ocelot*

Our literature review is about the Ocelot and providing information on it's ecological niche, habitat use, population density and how that effects its genetic diversity and any threats or limiting factors it faces.

Faculty Advisor Cary Chevalier

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Literature review

Wilhelmsen, Shelton; Turner, Falcon; Keithley, Daya *The Conservation Status, Threats, and Management of Pangolins*

We will be discussing the conservation status, threats, and management of the 8 species of pangolins. This includes reasons for poaching, habitat loss, and cultural significance.

Faculty Advisor Cary Chevalier

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Literature review

Bien, Cooper; Livers, Anna; Kolb, Blayke *History of Waterfowl Conservation*

Literature Review over the History of Waterfowl Conservation.

Faculty Advisor Cary Chevalier

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Literature review

Meyer, Bailie; Barta, Jack *Beaver Dam Analog Wetland Restoration*

Beavers are a vital component of the health of an ecosystem. Their damming of waterways creates important wetlands for wildlife to thrive in. Understanding the impacts beaver dams have and how they are built allows humans to mimic the structure in places of their choosing. Beaver Dam Analogs (BDA's) are man-made structures that can be built in specific areas to improve wetlands through water quality, fish communities, bird communities, and vegetation growth. Slowing down the flow of water with BDA's is an important tool we can use to restore pieces of land that have been overused and restore the health of streams and stream banks. Our project aims to explore just how big the benefits of BDA's have on our environment.

Faculty Advisor Dr. C

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Literature review

Ireland, Cheyenne; Hollingsworth, Tyler *Tasmanian Devil Management*

The Tasmanian Devil is the largest carnivorous marsupial in the world. They have been endangered since 2008 due to a contagious cancer called "Devil Facial Tumor Disease".

Faculty Advisor Dr. C

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Literature review

Coon, Alika; Jameson, Connor; Peaslee, Camrin *Invasive Pet Species & Their Impacts on Florida's Terrestrial Ecosystem*

Invasive pet species are a major pathway for non-native wildlife introductions in Florida, where warm climate and diverse habitats allow many released or escaped animals to establish self-sustaining populations. This poster examines the ecological, economic, and social impacts of invasive pet species on Florida's terrestrial ecosystems. Key impacts include predation on native species, competition for resources, habitat alteration, and the spread of diseases and parasites, all of which contribute to population declines and reduced biodiversity. Species such as Burmese pythons, Green iguanas, and Argentine tegus exemplify how traits like high reproductive rates, generalist diets, and lack of natural predators enable rapid population growth and ecosystem distribution. Current strategies focus on prevention through regulation and education, as well as control methods like trapping, removal programs, and pet surrender initiatives. However, challenges such as cryptic species behavior, rapid reproduction, and habitat complexity make long-term management difficult. Addressing invasive pet species requires a combination of policy enforcement, public engagement, and sustained ecological management to protect Florida's native ecosystems.

Faculty Advisor Dr. Cary Chevalier

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Literature review

Windsor, Bryce; Todd, Marshall; Vanbelkum, Briar *Natural History and Conservation of Bald Eagles in North America*

Bald Eagles are important components of various North American ecosystems, recognized for their iconic appearance. This poster focus on the biology of Bald Eagles, including their role as keystone species, habitat use, and diet, their recovery from the brink of extinction and current conservation concerns such as habitat loss, contaminant poisoning, and climate changes as well as their current protections such as the Bald and Golden Eagle protection . Overall this poster focuses on the ecological importance of Bald Eagles and the need for their continued protection.

Faculty Advisor Dr. Chevalier

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Literature review

Spradley, Amber; Sharp, Jada; Veronika, Hendrickson *Urbanization and Wildlife*

How urbanization has effected wildlife.

Faculty Advisor Dr.Chevalier

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Research

Schlorff, Phoenix; Ramey, Joey; Haynes-Green, Brittney; Thompson, Megan; Svojanovsky, Stan; Barta, Csengele *VELVET BEAN SEED SOIL INCLUSIONS DECREASE THE SALT STRESS SUSCEPTIBILITY OF TOMATO THROUGH ALLELOCHEMICAL MODULATION OF TOMATO NUTRITION.*

Velvet bean (Mucuna pruriens, VB) has been reported to produce a variety of secondary metabolites with allelopathic potential that influence the growth and development of other species. Our earlier studies identified a growth-enhancing effect of VB seeds degrading in the soil, in tomato plants, pointing to a mechanism involving a direct chemical stimulatory effect of VB allelochemicals. This work found that VB soil inclusions enhance growth and development, pigment concentrations, and light-energy-utilizing capacity of tomato plants compared to controls growing in soil without VB inclusions. The current work hypothesized that VB allelochemicals also enhance resistance to abiotic stress in tomatoes. We found that tomato plants irrigated with saline water (0-400 mM) were significantly less affected by salt stress than plants irrigated with saline water in soil without VB amendments. While photosynthesis of controls decreased to 15% of pre-stress levels, VB-treated plants retained 80% of their pre-stress photosynthesis rates even at the highest concentrations of applied saline irrigation and accumulated much lower amounts of biochemical stress markers (H_2O_2, lipid peroxidation products, chlorophyll breakdown products, etc.) than the controls. Based on nutrient analysis and non-targeted metabolomic data, we hypothesize that VB allelochemicals directly affect sodium-transport mechanisms in tomato roots, decreasing sodium uptake in VB-exposed plants through sodium exclusion, thereby allowing these plants to better tolerate higher soil salinity than the controls. Supported by the American Society of Plant Biologists SURF (grant to P.S. and C.B.), and the Missouri Western State University Foundation funding to P.S. and C.B.

Faculty Advisor Csengele Barta

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Research

Calhoun, Trystin; Shoots, Logan; Vanlalchhandami, Ruth *The Effects of Caffeine on Apoptosis in HeLa Cells*

We completed research to see if caffeine would induce apoptosis in cancer cells, specifically HeLa cells. HeLa cells are cervical cancer cells that are described as “immortal,” and are used in cancer-related experiments across the globe. Cancer cells evade apoptosis through many different pathways, which is how we determined which experiments we wanted to conduct based on the results we expected. We conducted both the DAPI and Western Blot procedures to measure apoptosis in untreated cells, cells treated with caffeine, and cells treated with cycloheximide as a positive control for apoptosis. In the DAPI test, we stained cells with a fluorescent dye, DAPI, which measures how compromised the cell membrane is through apoptosis. Through the Western Blot procedure, we measured if PARP-1 was cleaved, which is evidence of apoptosis. Through our results, we found that caffeine does induce apoptosis in HeLa cells, which proves our hypothesis to be correct.

Faculty Advisor Dr. Walton

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Research

Ducey, Adam; Bratcher, Grace; Holmes, Ellen *How Safe is SYBR Safe? An Analysis of DNA Gel Stains on Their Ability to Induce Apoptosis in HeLa Cells*

Ethidium bromide(EtBr) is an effective dye in DNA gel electrophoresis; however, it is highly toxic to humans. One alternative that has been developed to combat EtBrtoxcicity is SYBR Safe(SYBR) from ThermoFisher, which is being marketed as an effective, less toxic alternative for DNA gel electrophoresis. In this experiment, the apoptotic effect of SYBR is tested and compared to EtBr using HeLa cells, using DAPI cell staining and western blot analysis. This work observes clear apoptotic induction by both EtBr and SYBR, and offers insight into the toxic behavior of both of these compounds. However more experiments will need to be carried out to better understand the full toxicity of both compounds.

Faculty Advisor Dr. Walton

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Research

Faragher, Callie; Brook, Jessica; Depner, Chaleigh; Hagemen, Maizie *Creatine Effect on HeLa Cells*

This study investigated whether creatine, a common supplement, could protect cells from "programmed cell death" also known as apoptosis. To test this, researchers used HeLa cells and exposed them to a chemical called cycloheximide, which creates high levels of stress and usually forces cells to die. The

experiment was organized into three groups: a control group of healthy cells, a group treated with the stress chemical alone, and a group treated with creatine monohydrate.

To see what was happening inside the cells, the team used special fluorescent dyes and microscopic imaging. In the group given only the stress chemical, the cells showed clear signs of breaking down, such as fragmented centers and positive staining for "death markers." However, the cells that received creatine stayed organized and healthy, looking almost identical to the control group. These protected cells did not show any signs of the damage seen in the stressed group.

The findings suggest that creatine acts as a powerful shield by boosting cellular energy and reducing stress. Because the creatine-treated cells successfully resisted the death process even after it was triggered, this research provides compelling evidence that creatine could be a key tool in keeping cells alive and healthy under extreme pressure. This has exciting potential for future medical research into protecting various types of cells in the body from disease-related damage.

Faculty Advisor Kriston Walton

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Summary of an internship or practicum experience.

Bien, Cooper *Internship Presentation with USDA APHIS*

Preseting a poster over my internship with USDA APHIS at Rosecrans Memorial Airport.

Faculty Advisor Cary Chevalier

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Summary of an internship or practicum experience.

Hansen, Jacob *4-H Volunteer Internship*

A review of my experience running Wildlife Conservation workshops as part of my internship.

Faculty Advisor Cary Chevalier

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Summary of an internship or practicum experience.

Peaslee, Camrin *Loess Bluffs National Wildlife Refuge Internship*

My internship at the Loess Bluffs National Wildlife Refuge, where I gained hands-on experience in wildlife conservation. I helped collect native seeds for habitat restoration, track turtles using telemetry, and conduct bird surveys to monitor populations. I also used mapping tools to record data and improved my ability to identify different bird species. Overall, this experience helped me better understand how wildlife refuges are managed and strengthened my interest in working in conservation.

Faculty Advisor Cary Chevalier

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Literature review

Puetz, Sydney *An Investigation of Gadolinium*

Element No. 64 – gadolinium (Gd), is a member of the lanthanide family possessing magnetic and nuclear features that render it an irreplaceable component of modern science. Initially misidentified as "didymium" in 1841, Gadolinium was isolated in pure form by Paul-Émile Lecoq de Boisbaudran in 1886. The present work provides a summary of Gadolinium's history and discovery, natural occurrence, extraction from natural sources, purification, applications, and key compounds and uses. Medical and industrial applications such as nuclear flux control and gadolinium chelates as MRA contrast agents are noted, with Gadolinium (III) Oxide being a large contributor to the high value of this rare-earth element.

Faculty Advisor Dr. Jeff Woodford

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Literature review

Holmes, Ellen *G-Quadruplexes: Structure, Function, and Biological Significance*

G-quadruplexes (G4s) are non-canonical nucleic acid secondary structures that form within guanine-rich DNA or RNA sequences. These formations of stacked planar tetrads with guanine are stabilized by Hoogsteen hydrogen bonding and monovalent cations (particularly K+ or Na+) within the central cavity created by the structure. The four strand segments can be parallel or antiparallel, connected by loops that are classified as lateral, diagonal, or "propeller."

Biophysical studies such as circular dichroism spectroscopy have been used to identify the sequence motifs that can predict G4 formation. These potential G4 (pG4) motifs are located in telomeres, 90% of human DNA replication origins, and >40% of human gene promoters. Additionally, promoters of human oncogenes and regulatory genes are more likely to contain pG4s than housekeeping and tumor suppressor genes. As such, these sequence motifs may influence DNA replication, recombination, and gene regulation. G-quadruplexes are promising therapeutic targets in anticancer strategies, as selective stabilization of G4 structures can disrupt telomerase function or suppress oncogene expression.

Faculty Advisor Dr. Stan Svojanovsky

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Literature review

Bratcher, Grace *Lutetium: Properties and Uses*

An overview of the lanthanide element Lutetium and its history, properties, and uses.

Faculty Advisor Dr. Woodford

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Literature review

Jolley, Alex *Samarium*

This work will be an informative poster regarding the lanthanide, Samarium. It will inform readers of its discovery, usage, and more. The purpose of this poster is to showcase to the audience an element many may not have heard of or know much about. Despite not being the most popular element on the periodic table, Samarium is extremely useful and fascinating. This is the reasoning behind the presentation of this poster and what readers will hopefully learn when they read it.

Faculty Advisor Dr. Woodford

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Literature review

Ducey, Adam *Information and Applications of Ytterbium One of Earths Most Powerful Lanthanide*

Ytterbium is the 70th element on the periodic table, belonging to a group of 14 rare earth elements known as lanthanides. These metals express interesting properties, making them valuable in commercial and industrial processes over other, more commonly used elements. Due to ytterbium's closed valence shell, it displays unique physical characteristics making it an especially sought after metal in scientific and commercial applications. This poster will highlight the properties, source, and background information on this element, as well as focusing on three ytterbium-containing compounds: YbH6, YbF3, and Yb[Fe(CN)6], and their applications and importance in both the industrial and scientific world.

Faculty Advisor Dr. Woodford

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Literature review

Jackson, Delaney *Holmium - Lanthanide metal exploration*

This will be a literature review of the Lanthanide metal Holmium. The lanthanide metals is a series of metals that all have similar properties to each other. They are mostly known for magnetic properties. Lanthanides go though an extraction process from minerals. Most lanthanide metals are found in the same type of minerals. Holmium compounds have many applications including specialized glass, medical lasers, nuclear power, and potential use in quantum computers.

Faculty Advisor Jeff Woodford

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Literature review

Priedite, Johanna *Lanthanide rare-earth metals: Erbium*

Erbium is a lanthanide rare-earth element known for its unique optical properties and technological importance. Unlike other rare-earth metals, erbium is not naturally abundant but can be found in several minerals. From those minerals, erbium is separated through specialized processes such as solvent extraction or ion exchange. Erbium is widely used in fiber-optic communication systems, medical and dental lasers, glass production, and nuclear technology. Erbium compounds are typically synthesized by

reacting erbium metal or salts with oxygen, halides, and organic ligands to achieve characteristic light emission and stability in various technologies.

Faculty Advisor Jeffrey N. Woodford

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Literature review

Beck, Andrew *DIABETIC KETOACIDOSIS*

Diabetes mellitus affects approximately 830 million people worldwide and is the eighth leading cause of death, according to the World Health Organization. Although diabetes is perceived as manageable, when poorly controlled it can lead to severe long-term complications, including chronic kidney disease, retinopathy, cardiovascular events, and limb amputations.

Understanding the biochemical basis of conditions is essential for accurate diagnosis, recognition of clinical presentations, and effective treatment. This work focuses on diabetic ketoacidosis (DKA) and its pathogenesis, investigating the underlying metabolic dysregulations and alternative energy pathways. By linking these biochemical mechanisms to clinical presentation, this analysis highlights how understanding disease mechanisms informs physician diagnosis and management.

Faculty Advisor Stan Svojanovsky

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Literature review

Richardson, Elizabeth *GLYCOLYSIS PROCESS*

The Glycolysis Process is a catabolic process wherein glucose degrades in a step-wise function and converts metabolic energy into ATP and NADH. This process occurs in two main phases with five reactions per phase. The Warburg Effect is the observation that cancer cells use glycolysis for energy production. This converts the glucose to lactate, compared to the Glycolysis Process where glucose converts to pyruvate. This is a case study review on Glycolysis, the process of the Warburg effect, and how they function in our bodies.

Faculty Advisor Stan Svojanovsky

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Literature review

Bratcher, Grace *BIOCHEMICAL METABOLISM AND REACTIONS TO OVER-THE-COUNTER NSAIDs*

Non-steroidal anti-inflammatory drugs (NSAIDs) are a popular over-the-counter drug for treatment of fever, inflammation, and pain. The aim is to understand the mechanism of how NSAIDs work, how they are metabolized, and potential reactions.

Faculty Advisor Stan Svojanovsky

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Literature review

Kelly, Jared *EFFECTIVENESS OF L-DOPA AS A PLANT GROWTH REGULATOR*

L-DOPA, the precursor to dopamine, has strong regulatory effects on plant growth when expressed in the soil. Invasive plants use L-DOPA in combination with other allelopathic compounds to inhibit competitive plants while being able to thrive in the same conditions. Here we'll address what it takes to function and how it is thought to work.

Faculty Advisor Stan Svojanovsky

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Literature review

Zeigler, Kaytee *POSTMORTEM BIOCHEMISTRY AND FORENSIC ANALYSIS*

After death, the human body undergoes a series of predictable biochemical changes driven by the cessation of cellular respiration and the onset of decomposition processes such as autolysis and putrefaction. This 2013 study examines postmortem alterations in blood chemistry, with a focus on pH and metabolite concentrations, to evaluate their potential use in estimating the postmortem interval (PMI).

Results showed a significant decrease in blood pH in samples collected directly from the corpse, while samples stored in vials exhibited a smaller decline. Additionally, metabolites such as ammonia, hypoxanthine, and formic acid increased substantially in corpse-derived blood compared to stored samples. These changes are attributed to the accumulation of acidic byproducts, the shift to anaerobic metabolism, and the breakdown of proteins and amino acids during autolysis.

The findings highlight that biochemical markers in postmortem plasma reflect ongoing decomposition processes and may provide a reliable method for estimating time since death. Overall, this study supports the use of biochemical analysis as a valuable tool in forensic investigation.

Faculty Advisor Stan Svojanovsky

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Literature review

Elder, Seth *PLANT-PLANT COMMUNICATION VIA PHENOLIC ALLEOPATHY*

Plant–plant communication plays a vital role in ecosystem dynamics, allowing plants to interact and compete through chemical signaling. One key mechanism of this communication is phenolic allelopathy, where plants release phenolic compounds into the environment to influence neighboring organisms. These compounds can inhibit growth, alter nutrient uptake, and induce stress responses in surrounding plants. Research shows that phenolic allelopathy is a dynamic, regulated process influenced by environmental conditions and plant interactions.

Understanding these mechanisms provides insight into plant competition, ecosystem structure, and potential applications in sustainable agriculture.

Faculty Advisor Stan Svojanovsky

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Literature review

Puetz, Sydney *UPR-AUTOPHAGY SYNERGY AND CONTRIBUTION TO DISEASE*

Proteostasis of the proteome operates through an intricate Proteostasis Network (PN) that controls cell fate during stressful conditions. The core of the PN is represented by an interplay between the Unfolded Protein Response (UPR) and autophagy-lysosome pathway (ALP). This presentation attempts to compile existing information and prove that UPR and autophagy are undoubtedly connected in a scale of balance of proteostasis, with extremes resulting in different disorders.

In this context, employing studies of malignant and neurodegenerative models, this research aims to demonstrate how tumor cells manipulate the UPR-autophagy axis (by using PERK, IRE1, and ATF6 signaling pathways) to build a defensive barrier against stress, thereby facilitating the process of metastasis and therapy resistance. On the contrary, when dealing with irreversible cells (e.g., neurons), disruption in this system results in a catastrophe. Specifically, according to experiments, there is a strong correlation between a 50% decrease in autophagic markers and a doubling of levels of toxic amyloid-beta (Aβ) proteins, which cause apoptosis. Therefore, by establishing the existence of this UPR-autophagy synergy as the main controlling force behind the proteostasis scale, this work proves the PN to be a crucial element connecting cancer and degeneration.

Faculty Advisor Stan Svojanovsky

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Research

Ducey, Adam *APPLICATION OF BIOCHEMICAL RESEARCH IN MODERN DRUG DEVELOPMENT*

Biochemistry has been a key player in the development of modern drugs, allowing humans to develop more advanced medicinal technologies. An important aspect in the drug-making process is the development of reliable delivery methods for drugs and other compounds. Techniques such as Red blood cell membrane-camouflaged nanoparticles, hyaluronic acid-based drug nano-carriers, polymer-lipid hybrid nanoparticles, and self-microemulsifying drug-delivery systems are some of the few upcoming and effective delivery methods in today's drug process. This poster will give insight into these modern drug delivery techniques and the effectiveness that they have displayed in laboratory settings.

Faculty Advisor Stan Svojanovsky

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Research

Hawker, Noah; Wendt, Mason; Collins, Marybeth; Dvorak, Skylar; Sobieszczyk, Isaac *Evaluating the Usability of PINJIMU Orchid in A Coffee Cup Set Assembly Instructions*

Our project is designed to test how functional and practical the Assembly instructions of a PINJIMU Orchid in A Coffee Cup Set. Usability is the idea that a product can be used efficiently and effortlessly to accomplish the goals set in a user's mind. We will measure both qualitative and quantitative data gathered from five participants within a thirty to forty-five-minute session. Quantitative data collected includes task completion rate and time-on-task for each step of the assembly process. Qualitative data will be collected through the utilization of the think-aloud protocol and a follow-up interview after testing is completed.

Faculty Advisor Dr. Kaye Adkins

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Research

Stanton, Alexis; Bolonyi, Eve; Williams, Reid; Vassallo, Alan; Webb, Sydney *Testing the Usability of Origami Star Instructions*

Our project is a test of the usability of instructions on how to fold an origami star. Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Barnum). Usability can be evaluated by quantitative and qualitative data. Quantitative data is determined by the amount of time each participant uses to complete the instructions and the numbers of errors by the participants when following the instructions. Qualitative data is determined by the think-aloud protocol and the follow-up interviews with the participants.

Faculty Advisor Dr. Kaye Adkins

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Research

McKowen, Trey; Stone, Koen; Cruz, Joseph; Gates, Ella; Mcdowell, Tommy *Usability Testing of Instructions on how to use a manual can opener*

This project is a test of the usability of instructions for opening a can using a manual can opener. According to the Barnum Textbook, usability is "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use", and can be evaluated through quantitative and qualitative measures. Quantitative data collected includes the time it takes for them to complete the instructions. Qualitative data is collected through the think-aloud protocol and a follow-up interview.

Faculty Advisor Dr. Kaye Adkins

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Research

Richardson, Elizabeth; Valentine, Keith; Dinwiddie, Hali; Turner, Khristian *The Usability of Tying a Bow*

This project is a test of the usability of instructions for tying a bow on a present. Usability is defined as the extent to which users can use a product with effectiveness and efficiency while producing a satisfactory result. Usability can be evaluated through both quantitative and qualitative measures. Our quantitative data collected includes the time it takes to complete the task, restarts and accuracy. Our qualitative research is collected through the think-aloud protocol and a follow-up questionnaire, which helps us understand participants' opinions on the usability of the instructions.

Faculty Advisor Dr. Kaye Adkins

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Research

Hyer, Tess; Herrejon, Juan; Walton, Trevor *Usability Testing: Can you make an Origami Jumping Frog?*

This project is a test of the usability of digital instructions on how to make an origami jumping frog. Usability is a process of testing instructions to observe efficiency, effectiveness, and user satisfaction. The usability will be evaluated using qualitative and quantitative measurements. The qualitative data are the think-aloud protocol, the post-test interview, and whether the frog can jump. The quantitative data for this project are the minutes to complete, the number of mistakes, the number of times to restart, and the number of questions asked.

Faculty Advisor Dr. Kaye Adkins

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Research

Kendall, Annaliese; Justus, Krystal; Callen, Laci; Bauer, James *Usability Study of Origami Frog Instructions*

This project is a test of the usability of origami frog instructions. Usability is defined as the extent to which a product can be used by specified user to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use, and can be evaluated through quantitative and qualitative measures. Quantitative data collected includes the time it takes to complete the origami, as well as how many mistakes the participant makes. Qualitative data is collected through the think-aloud protocol and a follow-up interview.

Faculty Advisor Dr. Kaye Adkins

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Research

Conrad, Drew; Kelley, Jesse; Deffenbaugh, Hailey; Caceres, Reuben *Usability Study of Tying a Tie*

This project is a test of the usability of a set of video instructions on how to tie a tie. Usability is the state or quality of being effective, efficient, and satisfying and can be evaluated through both quantitative and qualitative means. Quantitative data is collected by measuring the amount of time it takes for the participant to complete the video, and the number of times they pause the video. Qualitative data is collected through the think-aloud protocol, and a follow up interview.

Faculty Advisor Dr. Kaye Adkins

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Research

Hall, Andria; Clark, Hailey; Piearson, Simeon; Wing, Jommel *Usability Study of How to Tie a Formal Tie*

Communications

Research

Andria Hall, Haley Clark, Simeon Piearson, and Jommel Wing

This project is a test of the usability of visual instructions on how to tie a formal tie. Usability for our group project is how easy something is to use and how well instructions help complete a task; this can be evaluated through quantitative and qualitive measures. The quantitative data collected includes how long it takes for participants to complete the task, how many times they had to start over. Our qualitative data is collected through the think-aloud protocol and a follow-up interview.

Instructor: Dr. Kaye Adkins

Faculty Advisor Dr. Kaye Adkins

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Research

Constable, Atlas *Usability for instructions on how to make a Lego Squirtle*

This project is a test of the usability of how to build a Lego Squirtle. Usability is whether the instructions usability clearly guide the participants successfully through the Lego set, and can be evaluated through quantitative and qualitative measures. Quantitative data collected includes how long it took to build the set within 5 to 8 minutes. Qualitative data is collected through the think-aloud protocol and a follow-up interview.

Faculty Advisor Kaye adkins

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Summary of an internship or practicum experience.

Huang, Luling; Martinez, Kiana; Warren, Kendall *Beyond the Questions: Audio and Video Essentials for Interviews*

You've secured the interview and done your research. Now, how do you capture it professionally? This session covers the essential practical considerations for setting up a video interview, from lighting and framing to microphone setup. Join us to master the on-set audio and video logistics that transform a simple conversation into successful visual storytelling.

Faculty Advisor Luling Huang

lhuang@missouriwestern.eduCriminal Justice and Legal Studies, Other

Literature review

Reese, Elizabeth *Cold Cases and the Evolution of Forensic Technology*

Cold cases remain a significant challenge within the criminal justice system, often constrained by the technological and investigative capabilities available at the time of the original inquiry. Advances in forensic science have transformed the ability to revisit and resolve these cases, particularly through developments in DNA analysis, forensic genealogy, and digital forensics. This research examines how modern forensic technologies contribute to solving cold cases by analyzing key investigative methods and notable case studies, including the Golden State Killer and Green River Killer cases.

Findings indicate that technological advancements significantly increase the potential for case clearance, particularly when combined with interdisciplinary collaboration and renewed investigative strategies. However, challenges such as evidence degradation, legal limitations, and ethical concerns remain barriers to widespread success. This study concludes that while forensic innovation has reshaped cold case investigations, continued development, funding, and policy oversight are essential to maximize its effectiveness.

Faculty Advisor Montella Smith

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Research

Nelson, Maya *Edu 348: Language and Culture Project*

Title: Mandarin language and culture research project.

Name: Maya- mnelson32@missouriwestern.edu

Advisor: Dr. Adams, badams16@missouriwestern.edu

For future educators it is important to create an inclusive and supportive environment in the classroom for my students. To do this we must recognize the biases and challenges that teacher will face in the classroom regarding language. This includes educating ourselves about the many different languages we might find in the classroom. In this project, I have used the App-Duolingo in learning one of the many languages teachers can find in the classroom, Mandarin. I will talk about the history and biases regarding Mandarin culture, beliefs and its language. Findings will help me as a future and others to have skills and confidence in cross-cultural competency in cultures beyond our national boundaries and insights and understanding needed to understand how all people living on earth are interconnected. Additionally, I believe that researching language and its background will help me dismantle learning blocks from the language that I may face with my future students and their families.

Faculty Advisor Benedict Adams

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Research

Westling, Logan; Westling, Logan *Venezuelan Language for my Spring Language and Culture Research Project*

As teacher candidates, one deep fundamental question we have been reflecting in our EDU 308-Diversity class this semester is: How we can create a classroom environment that is welcoming for all students from all background and does not stereotype and trivialize their experiences? To answer this question, I decided to explore a captivating Venezuelan language. In the activity portion of my project, I plan to ask the 15-20 questions about their upbringing, what their language means to them, and how difficult it was to move continents and start speaking a new language, while trying to make sure they aren't forgetting their first and native language. I believe that engaging with his experiences and viewpoints will not only broaden my understanding of this culture but also equip me with valuable insights that I can integrate into my future classroom. This project aims to enrich my teaching approach by providing me with a deeper appreciation of cultural diversity, which is essential for creating an inclusive and welcoming atmosphere for all students which I will share with all others

Faculty Advisor Dr Adams

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Research

Byrd, Morgan *Educational needs of students from Mexican Spanish Origin through Language & Culture Research Project*

It is so difficult to create a welcoming classroom community for students from culturally and linguistically backgrounds, as well as ensure that they are able to meet highest academic standards if you do not understand their cultures, beliefs, and values. At the same time, research states that nearly 90% of teachers leave their profession before five years because of frustration, misunderstanding, classroom management, and lack of motivation due to lack proper teacher training and exposure.

This study examines how to meet educational needs of Spanish students from Mexico through the Language and Culture Research Project done in class this semester. Data was collected through an array of different historical and cultural websites and also personally, learning the language through the language learning app Duolingo. Findings reveal significant growth as a teacher candidate with my ability to understand students from a cultural background which is different from mine. Through this learning process and experience, I am confident that it will give me insight into their cultural values, traditions, and daily life, enriching my understanding of their world and become the admired teacher I want to become.

Faculty Advisor Dr. Adams

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Research

Curtis, Kylie *Integrating the Hausa Language of Nigeria into my Preschool Classroom*

This semester, we explored how misconceptions and biases are built about the people and community we know very little about. One of the big assignments in our class this semester was the Language & Culture Research project in which we explored different cultures through language which is significant in

cultivating individual's identity. By examining Hausa, a language in Nigeria, I created a culture and learning environment in my preschool classroom that increased participation and willingness to share his culture with others in the student that was struggling with his identity. My findings suggest that culturally responsive teaching practices not only benefit the targeted student by fostering confidence and engagement but also enrich the classroom community by promoting diversity, empathy, and cross-cultural understanding among all learners.

Faculty Advisor Dr. Benedict Adams

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Summary of an internship or practicum experience.

Couch, Natalee *Langauge and Culture Project*

Abstract: Field work immersion in a local Hispanic church and attending their Spanish-language service for my Language and Culture Research Project

This semester, we explored how misconceptions and biases are built about the people and community we know very little about. One of the big assignments in our class this semester was the Language & Culture Research project in which we explored different cultures through language which is significant in cultivating individual's identity. By examining Spanish language through attending a Hispanic Church Service where Spanish is the primary language, I chose to go outside my box. I believe that this is a helpful activity for me because it gives me basic knowledge of the language so that I can understand the culture of these people and be able to engage with any students. By attending the service, I will have the opportunity to hear the language spoken naturally and see how language and culture are deeply connected. Additionally, this project will give me a better understanding of the traditions and culture so that I can effectively include aspects of culture and I will be able to connect with students that come from this culture and come up with effective strategies to incorporate their culture and language into the curriculum. Ultimately, I will share the results with the research community as we strive to be the best educators to our diverse students of today.

Faculty Advisor Benedict Adams

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Literature review

Haydn, Richardson *Opimizing Lead Times in Custom Heavy Equipment Manufacturing*

High-Complexity/Low-Volume (HCLV) manufacturing environments—such as those used for Aerial Devices and Digger Derricks—face persistent delays caused by design-loop inefficiencies and manufacturability errors discovered too late in production. This project investigates how CAD-integrated Design for Manufacturability (DfM), Knowledge-Based Engineering (KBE), and automated workflow gates can reduce these delays. By synthesizing research on SolidWorks API automation, adaptive bend compensation for HSLA steels, and rule-based manufacturability checks, this study identifies a systemic design-to-manufacturing gap that contributes to extended lead times. Findings indicate that shifting manufacturability validation upstream into the CAD environment can reduce design-related rework by

approximately 40% and significantly stabilize production schedules. The integration of parametric modeling, automated DfM rules, and PDM-based quality gates supports a “First-Time-Right” workflow that improves accuracy, reduces rework, and enhances predictability in custom heavy-equipment production.

Faculty Advisor Dr. Zhu

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Literature review

Stickler, Jackson *Human Centric AI Framework for Quality Management*

Artificial Intelligence (AI) has become increasingly integrated into manufacturing quality management systems enabling predictive analysis and real time process monitoring. These advancements allow organizations to detect errors in their model earlier and optimize decision making processes. However, current AI driven models often lack explainability, accountability, and seamless integration with traditional quality management tools such as Statistical Process Control (SPC), Failure Mode and Effects Analysis (FMEA), and Corrective and Preventive Action (CAPA). This limitation introduces challenges in transparency, regulatory compliance, and trust in quality critical environments.

Faculty Advisor Goksu Avdan

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Research

Bingham, Jayden *Sensors in Manufacturing and How It Helps AI*

Sensors such as temperature, pressure, proximity, flow, level, load, vibration, vision, humidity, and much more are used in manufacturing to collect data from different processes. This data can be reviewed by humans to help decision-making practices to improve efficiency. However, AI learning models, digital twins, and algorithms can analyze large sets of data quickly and accurately to enhance quality, safety, and maintenance of manufacturing operations.

Faculty Advisor Dr.Jinwen Zhu

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Research

Bingham, Jayden *Types of Maintenance in Manufacturing*

Maintenance in manufacturing is critical to the longevity of a production line and its components. Reactive maintenance is the most expensive with repairs being made once a fault or emergency failure has occurred. Preventive maintenance tries to reduce unplanned downtime and failures by having routine inspections of production equipment. Reactive maintenance is a proactive maintenance type that uses AI and sensory data to accurately predict when failure is going to occur, trying to lessen unnecessary inspections.

Faculty Advisor Dr.Jinwen Zhu

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Research

Byers, Samuel *Quality Management in a Modern Manufacturing Setting*

The transition to Industry 4.0 has introduced advanced digital technologies that challenge the effectiveness of traditional quality management systems (QMS). Conventional approaches such as statistical process control (SPC), corrective and preventive action (CAPA), and Six Sigma often rely on fragmented data and reactive decision-making, limiting their ability to support modern manufacturing environments. This poster proposes a conceptual Quality 4.0 framework that integrates traditional quality processes with digital capabilities, including connectivity, contextualized data, analytics, and visualization.

Faculty Advisor Goksu Avdan

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Research

Byers, Samuel *Artificial Intelligence in Production Planning and Scheduling*

Manufacturing systems have become increasingly complex as global supply chains, automation technologies, and data-driven decision systems have evolved. Traditional production planning and scheduling methods were designed for relatively stable manufacturing environments in which production demand, machine availability, and resource constraints remained predictable. However, modern production systems must operate in dynamic environments characterized by fluctuating demand, equipment failures, supply disruptions, and rapidly changing market conditions. These challenges have created the need for more advanced planning systems capable of responding quickly to operational changes while maintaining efficiency and productivity. The objective of this analysis is to examine how artificial intelligence technologies are being applied to improve production planning and scheduling within modern manufacturing environments. Specifically, the review focuses on several key research questions:

● How artificial intelligence improves production planning and scheduling processes.

● How machine learning frameworks support data-driven decision making in manufacturing systems.

● How Industry 4.0 technologies integrate with artificial intelligence to enable intelligent production systems.

● How emerging AI tools such as digital twins, predictive analytics, and optimization algorithms enhance manufacturing performance.

● By addressing these objectives, this review aims to provide a comprehensive overview of the role that artificial intelligence plays in modern production planning systems.

Faculty Advisor Jinwen Zhu

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Literature review

Sandusky, Abby; Bosse, Zack; Goodman, Abbie; Hoffman, Gracelynn; Martynowski, Skyler; Leeman, AJ *Eliminating Chlorhexidine Use in Ventilator-Associated Pneumonia*

To assess oral care strategies for reducing ventilator-associated pneumonia (VAP), research compared chlorhexidine to other techniques in mechanically ventilated patients. Although chlorhexidine has been the standard of therapy, recent research suggests that it may not significantly lower VAP incidence. Alternative approaches and tailored dental care strategies offer promise for better results. These findings encourage a shift away from chlorhexidine-only techniques and toward patient-centered approaches.

Faculty Advisor Elissa Zorn

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Literature review

Burgess, Jaylin; Townsend, Lexi; Paz Blanco, Miguel; Williams, Hannah; Harper, Grace; Whisenhunt, Julia *The Relationship between Support Surfaces and Hospital Acquired Pressure Injuries*

Healthcare acquired pressure injuries are extremely pertinent to the nursing career, as they are frequently occurring and cause detrimental harm to patients. The disruption in circulation from the pressure between a part of the body and a support surface, results in tissue damage, and in severe cases necrosis. While the occurrence of this is often seen as a direct association with patient care, it is important to consider other factors, such as the surface the patient is expected to rest and heal on. The support surface "cushioning" the patient, plays a crucial role in comfort of the skin, and the risk of developing pressure related injury. With this being said, there are many differing forms of mattresses being manufactured, altering in thickness, density, firmness, and material. Although pressure ulcers gained in the healthcare environment are a significant concern, there is little research on the surface that should be playing a rile in prevention and healing of the skin.

Faculty Advisor Elissa Zorn

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Literature review

Romero, Ahsly; Sell, Justin; Taylor, Lumbard; Stark, Jazlyn; Ali, Brown *The impact of Nurse-to-Patient Ratios on Patient Outcomes and Safety.*

Patients in hospitals nationwide are widely experiencing adverse outcomes in care that could have been prevented with proper staffing. Our group analyzed multiple different sources and literature to determine the relationship between nurse-to-patient ratios and the impacts of quality of care, patient safety, and adverse patient outcomes. Evidence shows that higher ratios of patients to nurses are associated with increased workload, stress, errors, and hospital-acquired conditions. While hospitals may be trying to save money by hiring less nurses, they are paying for it in the long run by covering medical expenses of preventable outcomes on the hospital's end.

Faculty Advisor Elissa Zorn

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Research

Wilhoit, Dominic *The Mother of Radiation*

A brief history and a set of accomplishments of the scientist Marie Curie. This piece describes how Marie Curie shaped the world today with her work despite financial, personal, and public hardships along the way.

Faculty Advisor Advisor: Heather Kendall Instructor: Jeff Woodford

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Research

Walden, Kennedy; Babe, Emerson; Barber, Avery; Huitt, Kiah; angle, katie; Kissler, Natalee *Vaccination Hesitancy*

Vaccinations are one of the most effective ways of protecting individuals from preventable viral diseases. Yet vaccine hesitancy is still so prevalent. There are several contributors to hesitancy, with a significant influence coming from non-evidenced based recourses. As health care providers, we can help give our patients evidenced based information and be reciprocal advocates for vaccines. The goal for our listeners is to know how providing good education to patients can decrease vaccination hesitancy.

Faculty Advisor Elissa Zorn

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Research

Bottorff, Mackenzie; Clark, Anthony; Green, Destiny; McQueen, Caityln; Stewart, Quinci *Scrolling Past Bedtime: The Impact of Cellphone Use on Sleep*

Sleep is an important part of maintaining physical and mental well-being, yet many people struggle to get quality sleep. Participants completed a survey assessing smartphone use and sleep quality. The survey included questions about frequency of smartphone use, particularly before bedtime, and questions measuring perceived sleep quality and sleep-related behaviors.

Faculty Advisor Christine Ziemer

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Research

Dominguez, Marcos; Kelley, Kameryn; Main, Brett; Pastor Sancho, Claudia; Sandoval, Torie; Vienhage, Kendall *Here Comes the Sun—Does It Matter for Wellbeing?*

Prior research links poor weather, including cold temperatures and limited sunlight, to lower wellbeing. Building on this, the current study examines the relationship between sunlight, air temperature, and several indices of wellbeing, including fatigue, perceived stress, social isolation, and rumination, using a combination of self-report and objective weather data.

Faculty Advisor Zach Williamson

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Research

Andzi Quainoo, Alison; Ashford, Gannon; Gutierrez, Sebastian; Kimler, Morgan; Sam, Schoeberl; Mallory, Walker *The Cost of Distraction: Effects of Cell Phone Use on Attention and Memory*

This study examined how cell phone use interferes with attention and memory. Participants watched three videos, followed by a memory quiz. During the videos, participants either paid full attention, scrolled social media, or played a mobile game. Afterwards participants completed a measure of attention. We hypothesized that distraction impairs memory.

Faculty Advisor Ziemer

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