

Participant Abstracts

EMU Academic and Creative Excellence Festival 2018

Oral Presentations

Kindered Peacebuilding; a Strategic Initiative to Build Peace in Post- Conflict Syria

Samira Abou Alfa

Faculty Mentor: Aziz, Myriam

Background/ significance of the topic: Seven Years of war in Syria has resulted in the death of around hundred thousand of civilians (20% children) and around 6 million registered refugees all over the world. According to the Vulnerability Assessment of Syrian refugees in Lebanon by UNHCR, UNICEF, and World Food program, December 2017, Lebanon hosts over one million of registered refugees within its borders which makes the second large population of Syrian refugees in the world and the highest per capita population of refugee in the World. This assessment provides that 55% of this population is under the age of 18 (children). According to this document, this community relies mostly on foreign aid in housing, food security, healthcare and others. Special attention has drawn to Syrian children by providing child protection services and education. However, Syrian children who constitute a large part of the Syrian refugee population are still at the receiving end of human security and haven't considered part of peacebuilding initiatives.

This research project explores the ability of the Syrian refugee population in Lebanon, especially adolescents, to provide a long-term, bottom-up opportunity for sustainable peacebuilding and for transforming the cycle of violence in the Syrian conflict. Thus, this research is a proposal for pilot kindering peacebuilding project in Lebanon as a strategy to build peace in the post-conflict Syria.

Research Questions: Why it is important to center the voice of the Syrian adolescents in Lebanon in the peacebuilding initiatives, and how providing peace education to Syrian adolescents in Lebanon can help transform and disrupt the cycle of violence in post-conflict Syria?

The Format of this research project: This research will be in the format of a proposal.

Laura's College Years: A Novel Excerpt

Kaitlin Abrahams

Faculty Mentor: Gusler, Chad

Indiana is a long ways away from Maine—and that's a good thing. At least if you're Laura Whitfield. An aspiring painter, she wants to leave her past, especially her artistic but alcoholic father, behind her. College seems like the perfect place to do this, even if her roommate seems just as conservative as her mother and her first party falls flat. Maybe the key is a little romance, if she's not too shy. But, if all else fails, she can always lock herself in the art studio.

Edna Pontellier: Feminist or Failure?

Kaitlin Abrahams

Faculty Mentor: White, Andrew

I would like to evaluate Chopin's feminist potential, embodied by Edna, via the lens of feminism both past and present. What can we learn from her feminism and its failure? Does it fail? How can we give Chopin credit for coming up with new ideas instead of just judging her with anachronistic self-righteousness? What can she teach us about intersectionality in feminism? An analysis of Chopin can tell us much about the relations between women and women as well as what happens when a woman decides to sever all relational ties. Does Chopin critique Edna's failure to embrace women of other races and socioeconomic statuses? Given her literary rebellion, what did her contemporary critics and readers think of her? What can we learn from her responses and how effective her feminist agenda was in her own day? Did she even have a feminist agenda?

Exposing reality with stories: changing the narrative across cultures

Lindsay Acker

Faculty Mentor: Rhodes, Gloria

This talk, given at a TEDx event in Buffalo, New York, explores the importance of story-telling in the peacebuilding process. Telling stories is by no means the be-all and end-all of Peacebuilding. It is, however, a beginning. Those stories create a narrative that influences how we see the world around us. How we see the world around us in turn influences how we interact with that world. If I want to change actions, then, I need to change the perceptions that lead to those actions. And if I want to change perception, I need to change the narrative that creates it. To change the narrative, I need to tell different stories. A selection of stories from the Middle East show the importance of storytelling.

Eagles Store: Where Vocational Skills are Taught Through Community Collaboration

Taylor Allen

Faculty Mentor: Leaman, Lori

Although students with multiple disabilities often receive special education services and occupational therapy services, they are often delivered separately, which often contributes to a shortage in coordination of services and collaboration of professionals in order to provide the best practice and support for the learning needs of the children to whom services are being provided (Patton, Hutton, & MacCobb, 2015). Additionally, evidence exists that students with disabilities are more likely to experience unemployment, underemployment, lower wages, and dissatisfaction with their jobs. Evidence also suggests that only about a quarter of the students with disabilities graduate from high school with a diploma because most of them drop out of high school and attempt to go into the workforce without a high school diploma or any vocational skills that are appealing for employer to want to hire (Levinson & Palmer, 2005). The purpose of this project was to design a collaborative teaching unit, involving a special education teacher and a volunteer future occupational therapist, in a functional/adapted curriculum classroom, in order to: (a) increase functional life skills that can be used by the students in the special education department for the purpose of obtaining post-secondary employment in the service industry; (b) increase collaboration of occupational therapy in the school system and educators in the special education department. The setting was the Maury River Middle School Life Skills classroom with ten participants with disabilities ranging from intellectual disabilities, health impairments such as seizure disorders and cerebral palsy, Autism Spectrum Disorder, and

Down Syndrome. A program was designed to teach the students life skills that they could use in order to: (a) be able to go shopping at a grocery store by themselves and be able to successfully exchange the proper amount of money for their items; (b) correctly put the items into the system as a cashier and be able to collect the money from the customer and then give them the correct amount of change in return; (c) properly place grocery items in bags; and (d) provide customers with the proper customer service. An iPad application was designed for the Eagles Store and was used by the students as a cash register to operate the store. The teaching methods included the following: modelling, prompting and cueing that is provided and then faded, and providing instructional feedback and error correction (Heward, 2013). Results of student learning and of the collaboration between educators and a future occupational therapist will be shared.

A Look Inside Mennonite Disaster Service

Cassidy Bontrager

Faculty Mentor: Dula, Peter

Does Sleep Deprivation Effect Learning and Spatial Awareness in Mice

Jeremy Brenneman

Faculty Mentor: Yoder, Jim

In this experiment I observed the speed of learning a novel skill and special awareness in mice. To perform this experiment, two groups of mice were used; one group of mice were trained under normal sleep conditions and one group was trained while suffering from sleep deprivation. The mice were placed in a Water Morris Maze which is a five foot in diameter pool containing a small platform hidden beneath the surface of the water. The mice are tasked with locating the platform in order for extraction from the maze. They are able to use an object on the outside of the maze as a reference point. The mice will be allowed to swim in the maze for a total of 5 minutes with time for free swimming and time where the mouse is shown the location of the platform by being placed on it. The purpose is using these tests is to compare the time it takes to learn the location of the hidden platform between the two groups of mice. This experiment will give insight into how an organisms' ability to learn a novel skill changes when sleep deprived.

A call for equality in Harriet Jacobs' Incidents in the Life of a Slave Girl

Emily Clatterbuck

Faculty Mentor: White, Andrew

Harriet Jacobs was a fugitive slave who escaped to the North in order to redeem her human qualities by breaking out of slavery and to free her children as well. Her narrative exposes the evils of slavery, especially from the female point of view, and also addresses the blatant inequality in the northern states. Instead of ending her narrative with freedom in the northern states as most slave narratives do, Jacobs continues writing in order to call to attention for her readership the injustices done to her and occurring for many blacks of that time. Jacobs calls for equality with her narrative by appealing to two readerships: northern white women and African Americans. With her writing style and appeals to her readership, Harriet Jacobs crafts a call for equality that starts with abolition in *Incidents in the Life of a Slave Girl*.

With the help of at least eight secondary sources, I will analyze Jacobs' purpose for and execution of calling on her readership to stand together for equality in the United States by focusing on abolition first.

Reconciliation between the people of former Yugoslavia

Filip Cvetanovski

Economic Inequality and Food Insecurity

Alex Daniel

Faculty Mentor: Hurst, Carol

Abstract

This presentation addresses the lack of attention and need for aid in the area of economic inequality and food insecurity for social workers and their profession. By reviewing current programs and possible solutions, this presentation is able to distinguish and bring light to the possible benefits and harms. With statistics on the number of persons who go hungry in the United States, a rich country where food should be plentiful, Libal, Tomczak, Spath and Harding are prompting renewed calls for social work action. Along-side their work Martinez and Kawam call on social work to address food insecurity by providing different advocacy routes, policy work and awareness campaigns. This presentation will also analyze the policy context of HB bill 696 submitted in the 2018 session of the Virginia General Assembly, and make suggestions about why the bill was not passed. This bill is titled, "Food stamps; eligibility for program, work requirement."

Keywords: Economic inequality, food insecurity, social welfare programs, poverty, social policy, food stamps

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Discovering God: A Spiritual Journey Invitation

Gabriel Dodd

Faculty Mentor: Yoder, Lonnie

The Christian life is a journey of exploring a God that is already very near to us. Whether or not we pay attention to God, it seems obvious that God has always been present to us, and wants us to engage in a process of discovering what that means in our lives. In a recent study through the IRB at EMU, a survey of 212 people shows that the church has not done a great job in the past teaching young people ways to listen/talk with God, equipping them with ways to pray, or

asking them what their thoughts of the bible are. Jesus engaged with his disciples in an exploratory fashion by answering their questions with a story, a challenge, or with another question. Jesus did not hand out easy answers, or invite others to come follow him without involving their whole selves. As we learn from Jesus' example, how may we invite the young people in our culture to a journey with Jesus - to an awareness of God's presence? Recent research on the spiritual lives of young people suggests that young people are interested in God, but not so interested in church. Research also suggests that young people are influenced most through their relationships. When I look for information about how to listen to God, or how to talk to God, I find a lot of resources for adults who are familiar with churchy lingo, or curriculum for adults to teach to young people. There is hardly any resource for youth to access directly. In a culture that is less influenced by the church communities, I am interested in providing resources for youth to access directly in order to discover God through spiritual practices that also promote community within a biblical foundation.

Unpacking the unconditional cash transfer paradigm

Aaron Dunmore

Faculty Mentor: Gingrich, Chris

Throughout the short history of international development, policy makers have faced one key question: how best to get aid money into the hands of the poor? The unconditional cash transfer (UCT) paradigm represents a novel approach to this question. By putting development funds directly in the hands of the poor, UCTs can close credit and savings gaps and increase consumption, while minimizing overhead when compared to other transfer solutions. And while UCT skeptics point to the risk that recipients will overspend on luxury goods, or that transfers will be spent entirely on consumption, evidence shows that these fears are widely unfounded. Furthermore, the income effect of cash transfer receipt likely promotes spending on social goods like health care and education.

Race, Culture, and Community at EMU: A Study of Campus Engagement

Aaron Dunmore with Barge, Scott

Faculty Mentor: Leaman, Lori

Like many liberal arts colleges of its size, EMU is adapting to a changing higher education environment. As the university strives to reach students from new markets, the student body's demographic makeup has changed significantly. In particular, recruitment efforts have seen enrollment of a growing number of students from non-Mennonite cultural backgrounds. However, the campus has a lot of work to do, if it is to be inclusive to students outside of its white, Mennonite "core." In his 2016 senior thesis, Peacebuilding and Development major Jonathan Nisly found that black students at EMU feel alienation and lack a sense of belonging, related to their exclusion from spaces held by Mennonites and Mennonite culture. The campus climate reflects a community where students of different demographic groups mingle infrequently, and where leadership positions in the campus community tend to be held by students who look most like the university's faculty and staff: white, upper-middle class, and Mennonite. This descriptive study seeks to continue Nisly's line of inquiry, painting a clearer picture of the issue of exclusion at EMU by synthesizing several existing datasets to develop metrics for inclusion and engagement in the campus community. A senior undergraduate economics major, working with the EMU VP of Institutional Effectiveness, investigate rates of

participation in student leadership roles and rates of attendance at on-campus events, and responses to questions from the 2017 NSSE Student Survey related to inclusion, across student body demographic groups.

Nisly, J. (2016, December 1). Race and belonging: How black students experience Eastern Mennonite University and what should change (Unpublished undergraduate thesis). Department of Applied Social Sciences, Eastern Mennonite University, Harrisonburg.

Unknown Heroes: The Merchant Marine of Gloucester and Mathews Counties

Benjamin Durren

Faculty Mentor: Sawin, Mark

America is very proud of its history of supporting and honoring its fallen heroes in war, unfortunately there is one group of individuals that risked everything and has never been formally recognized or compensated for their work. These men served all over the world and suffered the highest casualty rate of any armed forces branch at a ratio of 1 out of 26. This study examines the almost unknown history of the Merchant Marine and specifically their service during World War II, using the stories of men from Gloucester and Mathews counties in Virginia as case studies of the experiences of WWII Merchant Marines as a whole. These men faced more adversity than most other service members faced during the war, however, they did not, and still do not have the same recognition and compensation that other WWII veterans received. This study will demonstrate the vast injustice of this reality by highlighting the importance and significance of these men's service, and the realities that caused them to be hidden from America's historical memory for so long.

An overview of peacebuilding in China

Eric Eberly

Faculty Mentor: Seidel, Timothy

This research project aims to investigate peacebuilding in the world's most populous nation, the People's Republic of China. Among many Western NGOs, doing peacebuilding work in China is not on the radar and recently implemented registration regulations for NGOs in China mean that even fewer will attempt to do so. The growing inequality of wealth between the rural / urban populations, degradation of the environment, and the government's heavy hand against restive minority populations in the western part of the country are all areas in need of intervention. Although the government leaves little room for civil society, especially from International NGOs, peacebuilding work does occur in some sectors, though it is frequently not labeled as such. The possibility of even less room in civil society for peacebuilding work since the abolishment of the two-term limit to the presidency this past week appears distinct. The prospect of Xi Jinping serving a life term as chairman of the party, president, and head of the Central Military Commission may erode the consensus-style leadership approach of the past, and create the most powerful Chinese leader since Mao Zedong. This study will use Lederach and Mansfield's wheel of Strategic Peacebuilding Paths to investigate which sectors are most active in the Chinese context, which are closed, and which among the dormant categories may be most open to interventions from INGOS and domestic peacebuilders. The results of the study are especially pertinent to me as I consider moving back to China in the summer of 2019.

The Accessibility Of Vaginal Births After Cesarean

Dallas Fink

Faculty Mentor: Schaeffer, Ann

Over the years the rate of cesarean sections has been on the rise. The prevalence of cesarean sections place many mothers at risk of increased bleeding, longer hospital stays, and infection. An alternative for some women, who meet the criteria, is a vaginal birth after cesarean. A vaginal birth after cesarean (VBAC), offers women the opportunity to experience a natural delivery, less bleeding risks, and better infant outcomes, with only a slightly higher risk of uterine rupture. Policies on VBAC's vary between hospitals and providers. Research has shown that for most women a VBAC is a safe alternative to a repeat cesarean, with favorable outcomes. In light of this research many hospitals still do not make the option for a VBAC readily assessable to women seeking this option. Based on the evidence and the preference of expectant mothers, health care systems and staff need to address the disparity between cesarean births and VBAC's. Policies should be updated over time to reflect evidenced based practices.

Water in weather

Colton Frey

Faculty Mentor: Shultz, Ron

Immersed as a full-time teacher for a semester, Colton Frey embarked on a journey with twenty-four second graders to learn about water in weather. This eleven-lesson unit took place over three weeks and included digital integration, multiple forms of assessment, and artistic expression. The goals of this unit were to see how weather effects our daily lives and how severe weather, when it occurs, can be extremely dangerous. Students participated in activities like a blind obstacle course with howling winds, making fake snow, producing their own weather broadcast, and creating a study guide for each part of the unit. Pictures and videos opened many student's eyes to the reality of severe weather and how much it can change your life when studying both hurricanes and tornadoes. The participants in the study are six, seven, and eight year-olds from a school in the Shenandoah Valley. Among the twenty-four participants are ten English Learners, three of whom speak fluent Russian, and seven Hispanic students. The reading levels in the class vary from PPC to 6th grade. The assessments provide eye opening data into the world of English Learners and learning disabilities.

Ecological nostalgia: a problem of aesthetics

Liesl Graber

Faculty Mentor: Beachy, Kirsten

Writing speculative fiction creates a fun aesthetic problem: how do I write about reality without actually writing about reality? To explore this problem hands-on, I use speculative fiction to prod themes of humanity's ecological and emotional relationship with the earth, each other, and progress. With the tools of magical realism and science fiction, I question these relationships, poking at our perceived realities to show that which cannot exist within the neat box of the world as we know it.

What happens if we take sustainability seriously, fix climate change, and do everything right? What problems will still persist, simply because we are human? Or, on the other hand: What does the world look like as an emotional desert? What would happen in such a world if you

could, in a cup of tea, capture the sound and emotion of rain? I hold these contrasting future realities side by side in two short stories, one indifferently green and lush, one indifferently dusty and scorching, both lacking an emotional connection to the earth, both suffering from the loss of one of our favorite emotions: nostalgia.

Inspired by the writing styles of David Foster Wallace, George Saunders, Sophia Samatar, and Aimee Bender, I tackle the aesthetic problem of unrealistic reality — or is it realistic unreality? Expect word play, sustainable world building, forest cities, wonky water cycles, nature descriptions, a tea virtuoso, and a few magical metaphors tossed in just for fun.

Fanny Fern and the consequences of omniscience

Liesl Graber

Faculty Mentor: White, Andrew

Much of the criticism surrounding Fanny Fern's Ruth Hall focuses on the autobiographical nature of her story or the effect of her sentimentalism, but the criticism largely neglects to address the more fine-tuned aspect of her craft outside the lens of sentimentalism. My paper will focus, from a writing and craft perspective, on the character development of the title character.

With the help of her omniscient narrator, Fern jumps between characters, populating the book with ranging perspectives on Ruth's account. When using this technique, by default we spend less time inside the title character's head. Intentionally or not, Fern creates a distance between the reader and Ruth Hall's personal experience, which seems to go directly against the point of sentimental writing. There are many physical gaps in the novel, obvious ones being what happens between the short chapters, another being one that the reader cannot physically see in the novel: a well-rounded sense of Ruth's character from Ruth's point of view.

A lot of what we know about Ruth's character comes from secondary characters, who all serve as foils for Ruth's own character. Because of this, Ruth as we read her is not defined by affirmative descriptions, but more from Othering — she is not like Mrs. Hall, therefore Ruth must have the traits Mrs. Hall does not. Because the novel points out what Ruth is not, rather than what she is, and we get a wispy, wraithlike understanding of her personality. This strikes me as odd, especially in an "autobiographical" novel.

Due to this game of show and tell, Ruth becomes an empty shell character into which the female readership can insert herself, populate, and explore the emotional world Fern has created.

This paper explores the whys, hows, and so whats of this technique.

Finding Forgiveness.

Winifred Gray-Johnson

Faculty Mentor: Rhodes, Gloria

Finding forgiveness is a research study that look at personal journeys of sexual abuse victims as they come to terms with the injustice of their past experience and attempt reconciliation as a healing tactic but more importantly, as a way to keep within their beliefs of their christian faith. The study addresses the tension that some victims of abuse struggle with in reconciliation: the ability to forgive one's offender. What is forgiveness? What does that look like for a victim of abuse? As Christians, Christ has called us to be Christ-like, to have a love like His, a peace like

His. A victim who's begun the healing/reconciliation process must then be able to forgive the offender(s). Is this attainable? How is it achieved? This study is based on a deductive assumption that forgiveness as a (christian) victim is an integral part of the healing process.

Impact and implications of firearm control bill for people who are at-risk of hurting themselves or others

Meg Greene with Hochstetler, Noah

Faculty Mentor: Hurst, Carol

In the aftermath of national publicized shootings, public officials and citizens alike have demanded broadened authority over the mentally ill who pose a threat to themselves or others. Unfortunately, many of these elected officials have yet to take a stand on curbing the overall access to guns. In doing so, many have stepped into a very complicated debate in our country between the right to keep and bear arms for those with mental health disorders and overall public safety. These situations have garnered large reactions from mental health and gun control advocates alike who are fighting to get guns out of the hands of those deemed unfit to have them. This presentation analyzes the policy context of HB 198 submitted in the 2018 session of the Virginia General Assembly. Bill 198 calls for the court controlled removal of firearms from people who are at risk of hurting themselves or others. The bill brings up strong emotions, questions, and concerns about what this process would look like for the people and systems that are involved. Should gun restrictions be placed on people who are convicted of stalking, who are fugitives from justice, individuals who are addicted to, or are unlawful use or distributors of marijuana and other controlled substances? Regardless if the bill were to pass or not, it provides an opportunity to explore the many possibilities of what gun control can look like, as well as a place to think about personal opinions attached to this topic.

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Why the Current Human Rights Regime Fails to Protect and What Can Be Done To Change It

Noah Haglund

Faculty Mentor: Seidel, Tim

From previous literature, this study portrays how the ratification of human rights treaties can actually lead to worsening human rights practices under certain states. To explain this pattern, this study argues that this occurs because of two reasons: (1) states are able to, and thus, ratify human rights treaties to legitimate their actions and (1) the infeasibility of human rights enforcement mechanisms, and the current day discourse that puts human rights on a pedestal, allows states to benefit from treaty ratification while not altering their practices. In doing so, an alternative system to our current human rights regime is discussed.

Colonialism and the Construction of Dependency: How the U.S. and France Underdeveloped Haiti

Abe Hartzler

Faculty Mentor: Seidel, Timothy

Haiti, once the richest colony in the Americas is now the poorest country in the west. While an enormous amount of aid has poured into the country over the past few decades, it has done little to lift Haiti out of poverty. To understand Haiti's situation, we must look into the past and examine the forces which created and shaped the nation. In doing so, we discover a history of colonial and neo-colonial control that served to underdevelop Haiti. To develop, it is imperative that Haiti breaks away from the control of its colonizers and determines its own future.

Impact of Health Literacy on Acetaminophen Awareness within the Eastern Mennonite University (EMU) Community

Mehdi Hasan

Faculty Mentor: Halterman, Julia

Acetaminophen Overdose has surpassed Viral Hepatitis as the leading cause of Acute Liver Failure. Concerns over acetaminophen awareness prompted the 2003 National Assessment of Adult Health Literacy (NAAL), the study had found that (1) a majority (~77 million) of Americans were demarcated with basic or below basic health proficiencies (able to perform simple literacy tasks such as reading instructions), and (2) that lower health literacy was associated with less education and an increased number of negative health outcomes. In 2006, the National Survey of American College Students (NSACS), had found that average literacy scores for college students were statistically higher than the literacy of American adults; However, little evidence is known pertaining to the acetaminophen awareness of the U.S. population, the health literacy scores of the EMU student population, and reasons for the rise acetaminophen-overdose induced acute liver failure within the U.S. Thus, as health literacy is shortly defined as the ability to make appropriate health decisions, it is hypothesized that general health literacy scores within the EMU student population will positively associate to awareness of acetaminophen knowledge/risks. To test this, a survey containing the Medical Term Recognition Test and an acetaminophen awareness questionnaire were administered to EMU students. Utilizing one-stage cluster sampling method, health literacy scores were accrued from randomly-chosen EMU classrooms. The study participants were divided into three groups: low, marginal, and functional health literacy. A one-way ANOVA test compared the mean acetaminophen awareness score of each individual to the three health literacy groups to reveal a relationship among each group's averaged health literacy score. The results were that low health literacy was proven to be a statistically significant marker of decreased acetaminophen awareness. Health awareness promotional programs are advised to increase individual understanding of improper health behavior and risks especially to the dangers of over-the-counter medications.

Memory of Murder and a Thirst for Revenge

Zachary Headings

Faculty Mentor: Gusler, Chad

Since his parents were murdered in front of him when he was only 14 years old, Na'arik has been alone. He moved from place to place, pick up odd jobs: anything from protecting bards from local drunkards to delving into forgotten tombs to retrieve treasures. Whenever possible, he works alone.

When one adventure unlocks a memory about his parents' murder, Na'arik teams up with a sorceress to find the killer and bring them to justice. But memories -- even the most clear ones -- can be wrong and Na'arik finds that his thirst for revenge might not be as justified as he thinks.

Winning over the American Wallet: Plotting the Rise of Japanese Automobiles in 1970s

America

Mario Hernández

Faculty Mentor: Sawin, Mark

In 1971, when Japanese vehicles were being sold for the first time in America, the three biggest Japanese companies (Toyota, Nissan, and Honda) were responsible for 4% of all market sales. By comparison, the three largest American companies (Ford, GM, and Chrysler) occupied 83% of the American marketplace. By 2011, the gap in market sales between the two triplets was only 17%. The present paper tracks the rise of Japanese cars in the United States and the environment that allowed for their increased popularity. In the 1970s, America faced a time of hardships and uncertainty surrounding a global energy crisis, an economic recession, and alarming labor disputes. The failure from America and American car companies to properly address and resolve these issues allowed Japanese companies to become more successful in America. Japan, unlike the United States, properly adapted in the face of similar turmoil—ironically in part due to American investment—and Japanese companies were able to break into the American market. Once in direct competition, Japanese cars were soon touted as better equipped to meet the needs of Americans. Better fuel economy, smaller engine size, and implementation of front-wheel drive highlighted the advantages of Japanese cars. Moreover, public relations and economic scandals, and failure to pass emissions tests made it more difficult for American companies to compete with their Japanese counterparts. Over time, Japanese cars continued to grow at the expense of American car companies, making it easier to see the series of decisions and actions from both American and Japanese sides that culminated in the decline of American car companies' market share and economic competitiveness.

Analysis of nursing home standards

Rebekah Hoskins

Faculty Mentor: Hurst, Carol

This presentation will address the proposed minimum direct care staffing standards for nursing homes. Many believe the answer to quality care in nursing homes lies behind minimum direct care staffing. However, many unintended consequences come with these staffing standards. And it appears that the answer does not actually lie in staffing standards, but rather in relationships with patients. Some unintended consequences come with a raise in staffing standards such as a lower skill mix, higher expense, reduction in non-direct care staff, and lower quality of care. A positive result of the staffing standards has been found in an increased level of staffing. This presentation also discusses the relationship between quality care in nursing homes and social workers' roles. And finally, analyzes the policy content of HB309, a nursing home bill, considered in the 2018 session of the Virginia General Assembly. The idea is to increase the hours of direct care per patient in order to increase quality of life and health care; sadly, the negative consequences far outweigh the positive results.

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SANCTUARY

Ana Hunter-Nickels with Witmer, Elizabeth

Faculty Mentor: Hurst, Carol

The word sanctuary has historically been associated with immigration in the United States. Sanctuary refers to the protection and refuge that different organizations and groups extend to undocumented immigrants against immigration enforcement. Both historically and contemporarily, undocumented immigrants who are pending deportation have found refuge in churches, schools, communities, and hospitals, to name a few. Our presentation focuses on exploring the history of sanctuary and the contemporary implications of sanctuary policies on undocumented immigrants in the United States. All research is peer-reviewed and are academic articles which have been found using the EMU Library databases. We wish to create a space for dialogue that critically engages the participants, humanizes immigrants, and their experiences. We want to educate and advocate for our undocumented brothers and sisters in the U.S. and our community by discussing the historical roots and present implications of sanctuary.

Keywords: sanctuary, Sanctuary Movement, undocumented immigrants, HB1257

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Documentation of Student Learning

Janae Kauffman

Faculty Mentor: Evans, Kathy

In this presentation I will be sharing the process and results of a student teach project entitled the documentation of student learning. The purpose of the DOSL was to document the learning of a group of students that I was able to teach over the course of my first student teaching placement. The group of students that I focused on were 17 9th and 10th grade geometry students at a high school in Rockingham County. The group consisted of four male and 13 female students. Using the reflective teaching model that was guided by various forms of assessment, the student learning was observed and used to shape the lesson for the next class period. To observe the student growth over the course of this unit, I had each student complete a pretest and a posttest that focused on the main objectives of the unit, classifying polygons,

angles of polygons, and properties of quadrilaterals. Each lesson that was taught focused on one, or more, of the unit objectives and moved the students towards meeting those goals. The presentation will outline the context of the project, the lessons that were taught, and the findings from the classroom-based research project.

Art as Mediator

Sarah Longenecker

Faculty Mentor: Dula, Peter

Leading A More Sustainable Harrisonburg

Cerrie Mendoza with Curtis, Josh

Hummel, Jack

Faculty Mentor: Holsinger, Jenni

As part of the Climate Action Plan at EMU, we are researching actions and policies to recommend to the City of Harrisonburg to implement in order to reduce carbon emissions released by the city. Our goal is to gather information on how other cities in Virginia have tried to reduce their carbon footprint by implementing more sustainable policies and infrastructures. The focus of the research project revolves around three sectors: Land Use, Water Conservation, and Renewable Energies. Using Virginia Beach Public Schools as a comparison for the possibilities Harrisonburg Public School Systems can replicate may encourage faculty, staff, and students to live and learn in a more sustainable environment. Providing applications of water conservation and renewable energies in our institutions and residential planning can be beneficial in leading Harrisonburg to a more sustainable city.

Ethics in providing prenatal care to refugee women

Emma Millar

Faculty Mentor: Schaeffer, Ann

Ethics in providing prenatal care to refugee women

In the midst of the Refugee Crisis, many organizations work tirelessly to provide basic needs to individuals and families undergoing resettlement. Although they are set up with basic needs and tools to restart their lives here, refugees often lack access to medical care. As a result, refugee women do not have adequate access to prenatal care, leading to poorer health outcomes for both the mother and child. Refugee women who give birth experience higher rates of preterm, low birth-weight, and stillborn babies, as well as a higher incidence of maternal death. These implications can be carried throughout the child's entire life and contribute to a lower global standard of health. Based on the ethical theories of utilitarianism and deontology, as well as the American Nurses' Association's Code of Ethics, there is a moral duty by the nurse to provide prenatal treatment to this group of women.

The goal of this project is to define how refugee women are impacted by inadequate access to prenatal care, how this impacts the global standard of health, how the nurse has an ethical duty to provide medical care to refugee women, and what actions nurses can take to improve this situation. The controversy surrounding the provision of medical care to refugees will also be addressed.

The project was done by choosing a current health concern, researching and analyzing current, peer-reviewed journal articles relevant to the topic, and compiling the information into a scholarly, APA-style paper.

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Uncle Tom's cabin

Xhorxhina Ndoka

Faculty Mentor: White, Andrew

Uncle Tom's Cabin it is one of the most polemic novels before abolitionism. Considering that in the time that it was published it outsold the Bible, the audiences were massive. Due to the issues that it lays out, it was also criticized as a political novel. Uncle Tom it is the main protagonist which as it is as well the center of the novel. The description of the three slave masters that Tom encounters: Shelby, Augustine, Legree, reflects upon the caliber of the slave holders of the time. Moreover, there are additional characters such as Topsy and Evangeline that according to several critics, mirror the two distinct races also perpetuating stereotypes about their backgrounds. Considering that Stowe was the daughter of a preacher, her novel was aligned closely to Christian values. Therefore, throughout the Novel she makes sure that the hypocrisy of the time it is revealed by stating Christian values and the factual examples. Stowe's novel it was the main spark that initiated the Civil War and as well the Abolitionism. Additionally, the novel represent examples of women's treatment and the misbalance that it existed at the time. However, since Stowe presented her life principles as well, she was criticized for fueling patriarchy. In other words the power misbalance between the two sexes it is reflected and enforced by Stowe's composition. However, Uncle Tom's cabin reflects upon several themes such as the terrors of slavery, the treatment of women in that certain phase of the history, and the interrelation of Christian values in the slavery system.

After all is said and done: Forest management, litigation, and the 2017 Montana Fires

Brandi Nelson

Faculty Mentor: Sawin, Mark

2017 saw over one million acres burn across Montana in one of the worst fire seasons in the state's history. The Kootenai National Forest had four large fires, two of which became the nation's top fire priorities. Before the smoke cleared, fiery debate burst out over how to best manage the forest and mitigate risks to the Wildland-Urban Interface. Using the fires in the Ksanka district of the Kootenai as a case study, this paper illustrates the negative effects of polarization among environmental groups, government, and industry which results in land management issues being decided by judges rather than land management professionals. An examination of three Ksanka fires through interviews with environmental groups, Forest Service employees, logging professionals, and victims of the wildfires vividly illustrate the problems that must be solved. The history of land management practices and environmental laws provide background to these stories, and environmental planning documents and forest practice guides to reduce wildfire risk, as well as the appeals and objections to federal environmental analyses filed by environmental groups, illustrate the contentious and complex nature of this issue. Ultimately, however, research shows that all interested parties must use past experiences to guide them, and they must focus more on collaboration than litigation if wildfires are ever to be effectively managed.

Care Coordination in Middle Schools

Jennifer Norton

Faculty Mentor: Tyson, Don

The lifespan of case management in healthcare is less than 30 years old. The Case Management Society of America defined case management in 1996 and updated the definition in 2002: "Case management (CM) is a collaborative process of assessment, planning and facilitation and advocacy for options and services to meet an individual's health needs through communication and available resources to promote quality and cost-effective outcomes" (Birmingham & Colon, 2005). Schools are an ideal environment to provide case management services for children and families since attendance is mandated and schools are geographically accessible to families.

Bonaiuto (2007) studied case management in the schools, focusing specifically on how school nurse driven case management impacted attendance, academic performance, behavior, quality of life (QOL) and health compliance. This quality improvement project sought to re-establish a standardized multi-disciplinary care coordination program for both Hempfield Middle Schools (grades 7 & 8). The mission of this program was to identify and provide interventions for students referred by school staff who exhibited academic, emotional, behavioral, social and/or physical health risk factors. The Care Coordination program seeks to minimize duplication of supports and services, prevent gaps in service, and efficiently utilize available interventions and supports.

School data including attendance, behavior tracking, health measures, nurse visits, and academic achievement are examined to measure the effectiveness of the Care Coordination program. Additionally, permission was obtained to utilize the PedsQL™ instrument as an evidence-based tool to measure both student and parent perceptions of quality of life factors

(Varni, 1998). Consistent with Bonaiuto's (2007) discovery, it is anticipated that 84% of students will show improvement in attendance, academics, health, quality of life, and/or behavior metrics after Care Coordination interventions are implemented. Supplementary project outcomes included electronic documents for staff use, community resource materials, professional development programming, and a tool bank of coping mechanisms.

Self-care May Not Be Enough: Secondary Traumatic Stress and Organizations: A Multiple Methods Study

Trina Trotter Nussbaum

A Bloody Mess: How Developed and Developing Nations Socialize, Politicize and Economize Women's Hygiene

Katrina Poplett

Faculty Mentor: Seidel, Tim

This paper looks at the social and political economy of sanitary napkins and tampons from around the world. There is a focus on how the social and political economies of sanitary napkins and tampons differ based on the stage of development of the region. While the availability of disposable sanitary napkins varies greatly, stigmas and myths about menstruation are universally seen and heard across the globe. There are different assumptions about menstruation and products associated with women's hygiene, internationally and domestically. Problems with the lack of and harms of sanitary napkins and tampons are becoming more publicized because of conversations women around the globe are demanding of their governments and also of their society. This paper looks at how the social and political economy of tampons and sanitary napkins is vastly different within developed and developing countries, with each type of country facing their own challenges.

Experiencing World War I

Zachary Sauder

Faculty Mentor: Yoder, Paul

The project reflects a study conducted with a group of students in a 7th grade U.S. History classroom. Data was collected to track student learning throughout the course of a unit on World War I. Specifically, data was collected on the main points of the unit as well as the map of Europe during this time. Pictures and videos were used throughout the unit to give students a base understanding of the curriculum. Reading and writing activities were then used to promote critical thinking and deeper understanding. Students struggled most with the understanding of the map of Europe and the Allied and Central powers. These struggles were confirmed when students struggled on a map quiz. Subsequent lessons were revised, and warm up activities that had students engage the different countries were added. By the end of the unit, students made visible progress in their knowledge of the countries in Europe, and their roles in the war. The summative assessment showed much improvement in student knowledge on the topic of World War I. Many students, including those with IEPs, did very well on the final assessment. Students proved that they knew the information from the unit that was on the SOL curriculum framework.

From Cronkite to Colbert: the evolution of television news in America

Caleb Schrock-Hurst

Faculty Mentor: Sawin, Mark

Consumption of news media today is more polarized than ever, but this phenomenon of directed and politicized news cannot be fully understood without looking at how our dominant news sources came into being. The rise of network news, followed by the rise of cable news, has created a power struggle that drives news makers to the edges of the political spectrum and is ultimately part of the reason for an inability to find common ground over political issues. From Cronkite's dominance to Colbert and a host of other comedians spin on news, coverage continues to change and impact political understanding on a daily basis. Coverage of DACA and the DREAM Act is used as a case study and provides further insight into how dominant news sources compete and cover the same events in radically different ways.

Success or Failure: portrayal of women, Native Americans, and American roots in Lydia Maria Child's Hobomok

Caleb Schrock-Hurst

Faculty Mentor: White, Andrew

Though Lydia Maria Child's *Hobomok* intends to advance feminism, defend the rights of Native Americans, and carve out an American niche in the literary world, it ultimately falls flat on all fronts, failing to push the reader to more compassionate or deep understandings of Native Americans and women while also failing to break out of the form of Europe novels or create a uniquely American story. *Hobomok* may be the titular character and a sacrificial martyr for the happiness of Mary, but he is primarily portrayed as only a love interest for Mary and does not break the stereotypes of the Puritan's Native American allies; ultimately Child fails to find a solution for the 'Native Problem' other than death for the Native American. Mary Conant may be a somewhat complex character struggling for her father's approval and the approval of Brown, but her centrality to the story is not really important as a means for her to connect the Native American and Puritan community; she fails to be more unique than being moderately outspoken for her day. The story centers almost exclusively on love and religious conflicts, two things that have been happening in Europe long before white settlers came to North America, the setting could easily be anywhere where the tentacles of colonization were extending in the 1600s. *Hobomok* is a good novel, but does not push any of these issues to a satisfactory degree.

The Power of a Story

Susanna Sewall

Faculty Mentor: Leaman, Lori

What do you do with a story of suffering? In the medical field the focus is often on the patient's physical diagnosis in order to discharge them from the hospital as quickly as possible. However, medical professionals often fixate on the physiological problem that they do not address the patient's psychological pain (Charon, 2008). The goal of this project was to educate nurses on how to provide more holistic care for their patients by valuing the story the patient narrates (Charon, 2008). The purpose of the project was two-fold: (1) Explore the psychological aspects and impact of pain that people experience from physiological, societal, and economic stressors, based on the researcher's interactions with patients; (2) To identify forms of artistic expression nurses can use to process their own grief and respond holistically to their patients' suffering.

To accomplish these goals the researcher: (a) Investigated the psychology of pain and the pain process through articles, literature, and talking with professionals in the psychology and counseling fields; (b) Developed a personal philosophy regarding the purpose of pain in life through a paper influenced from findings in (a); (c) Learned what the essence of poetry was; (d) Learned how psychology, artistic expression, and nursing can all intertwine to produce more effective professional nurses; (e) Developed 10 poetry pieces as a therapeutic exercise to process patients' suffering.

Research methods were qualitative through interviews with professionals from Psychology, Counseling, Nursing, and English. Additional research was conducted by exploring books on the topic of pain. Results from the interdisciplinary project will be shared to show the power of sharing one's story for both the storyteller and the listener.

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Mental Health Criminalization

Susanna Sewall with Mortensen, Taylor

Qadir, Ruadya

Mckoy, Lania

Faculty Mentor: Rittenhouse, Catherine

Everyone falls on a mental health illness spectrum. Unfortunately, society fears and stigmatizes individuals on the extreme spectrum with diagnosable mental illnesses, which negatively impacts accessibility to effective mental health treatments for those who need them (Perese, 2007). The goal of this project is educating the public on the vicious cycle of criminalizing the mentally ill. Granted, not every person suffering from mental illness will be criminalized, but without providing primary preventative treatment they are more likely to be institutionalized within the prison system (Huxtor, 2013; Slate, Buffington-Vollum, Johnson, 2013). The researchers address the cycle's threefold origins which include: public perception, limited resources, and ambiguous responsibility. The researchers also educate the audience on an inside look at the day in the life of a mentally ill prisoner. Then, the researchers address the barriers that nurses face in advocating for the mentally ill. Finally, the researchers discuss prevention strategies to eliminate the need of criminalization as an intervention for the mentally ill. The primary research method is conducted through interviews with: former prisoners, policemen, psychiatric nurses working both in and out of the prison, and mental health community services. In addition, further research methods utilized includes qualitative and quantitative research studies. By informing the public about prevention of the criminalization of the mentally ill, the researchers hope to shine a light on a new way of thinking about mental health treatment.

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Youth and Violent Extremism in Afghanistan

Bahman Shahi

Faculty Mentor: Aziz, Myriam

According to the United Nations Population Fund (UNFPA), about 63.7 percent of Afghans are under twenty-five years of age, while such growing young population coming to the work force is a sign of bringing prosperity to the society, this growing population is also exploited for war and radicalism. Under my thematic research project, I am looking to explore the root causes of youth radicalization/violent extremism in Afghanistan. My assumption is that the youth population in Afghanistan (male and female) are vulnerable in the current conflict. They are trapped in a cycle of violence, with changing roles of victims and aggressors. They are being exploited by both the Afghan government and the insurgent groups. They are dying in both fronts of the current conflict. Since the establishment of the state building program in Afghanistan, certain groups are ignored and are not empowered. It has led to polarization of the society to the more progressive people and the more extremists. The narrative of each side demonizes the other which led to further polarization. In the midst of these different narratives, the youth population are vulnerable population which are being exploited in all ends. I will explore the literature on youth, violent extremism, and deradicalization programs and offer my suggestions for tackling this issue in Afghanistan. I will do this project in the format of a scholarly article.

Nurses as educators: Exploring strategies for teaching culturally diverse learners

Stephanie Slabach Brubaker

Faculty Mentor: Leaman, Lori

In the United States, individual classroom teachers are responsible for finding time to teach nutrition to their students (Prelip, 2006). Nutrition can get skipped, leaving students without healthy diet decision tools and placing them at a higher risk for the future development of chronic diseases like diabetes, heart disease, and obesity (CDC, 2016). It is imperative that children start making educated, healthy food decisions when they are young. School nurses, though they do not receive specific education training, can take responsibility for teaching nutrition. Nurses should learn to create nutrition lessons that are developmentally and culturally appropriate to ensure all students learn how to make smart diet choices. Special considerations must be made for English language learners and children unfamiliar with the United States culture. The purpose of this project was to bridge the gap between nursing training and the need for sound teaching practices when working with young patients. An UG senior-level nursing student designed and implemented a 2-day unit on nutrition for grades 2 and 3 at a local elementary school in a mid-sized city in Virginia. The researcher gathered evidence-based strategies for teaching diverse groups of children about nutrition through a review of the literature and interviews with a school nurse and two elementary education professors. This information was used to create two lesson plans to teach the value of eating breakfast and to give tools for making healthy breakfast options in the home setting. The lessons were taught on two separate occasions and then evaluated by both the instructor and student participants. A pre- and post-teaching activity provided a measure of the nutrition concepts learned. Based on the results, recommendations will be made for how nurses can conduct developmentally and culturally appropriate teaching in the school setting or when working with young patients in clinical settings.

Henry County, VA: A Profile of Industrial Development and Decline

William Stanley

Faculty Mentor: Sawin, Mark

In 2009, Henry County, Virginia saw unemployment levels reach as high as 20%, the highest in the state at the time. The area had once been home to some of the most prosperous furniture businesses in the world, with companies like Bassett Furniture Industries and Stanley Furniture being headquartered in the area. These were companies operated by single families, and the success of the region depended on the success of those families. Towns like Bassett and Stanleytown, comprised mainly of Scots-Irish descendants who moved from the more mountainous neighboring counties, grew up around the factories to supply a labor force. Housing was provided by the companies, as were basic town services and institutions like schools, banks, infrastructure maintenance, and utilities. The industry was wildly successful through the 1980s. However, in the late 80s and 90s, the area followed the national trend of many factory towns, with factories closing due to the inability to compete with foreign manufacturing. Bassett and Stanleytown are unique from other well documented examples from regions like the Rust Belt in that there was a paternalistic culture and reliance on a few families for the overall wellbeing of the town. Examples of this can be seen in housing, institutions named after and funded by the Bassetts, like Pocahontas Bassett Church, and a reluctance of workers to unionize out of respect for the families. In this way, Henry County is representative of less documented trends in Southern industry. Today, without the once successful furniture industry, the area sees high unemployment and ubiquitous community health issues, and the way back to prosperity is unclear and contentious.

Bridging the Gap: Medicaid Expansion Advocacy

Rachel Sturm with Slabach Brubaker, Stephanie
Walker, Thomas

Faculty Mentor: Rittenhouse, Catherine

In the state of Virginia, there are over one million people who are uninsured (Kaiser, 2013). 420,000 of these people would receive coverage through the expansion of Medicaid under the Affordable Care Act, if the state of Virginia chose to participate in the Federal expansion program (Cassidy & Hanken, 2017). In 2014, Virginia decided not to expand Medicaid, leaving those 400,000, and others, in a gap between qualifying for Medicaid and receiving federal subsidies for the Marketplace (Kaiser, 2013). The result is an overwhelming number of uninsured Virginians receiving little preventative care and ultimately driving medical costs upward when their healthcare costs are unpaid.

The purpose of the presentation is to encourage nurses, and others in the community, to advocate for the expansion of Medicaid in Virginia by bringing awareness to this growing issue, facilitating understanding about the United States insurance system, and providing tools and methods of advocacy. The researchers, three senior level nursing students, conducted a literature review, interviews with experts, a survey of community opinion, and political inquiry. Through an exploration of the differing perspectives on this issue and alternative methods of health care, recommendations will be given to both nurses and concerned citizens on how they can lead the charge and compel our leaders to work together to expand Medicaid. Nurses, joining forces with the community, will be the bridge that unites government policies with our society's needs.

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Traumagenic Stress, Green Spaces, Meditation, and Dignity: What influence does trauma-informed and resilient strategies/practices have on organizational culture and employee well-being?

Matt Tibbles

Implementing narrative nursing in introductory undergraduate nursing education

Beth Toner

Faculty Mentor: Tyson, Don

Care that takes into account what is important to patients and families, as well as the context of their lives, has been shown to improve patient outcomes. Researchers and clinicians from a wide variety of disciplines have devoted considerable resources to exploring the potential narrative and storytelling have to improve patient care and health outcomes. Physician Rita Charon has pioneered the field of narrative medicine, and has posited that physicians who build “narrative competence” will “quickly and accurately hear and interpret what a patient tries to say” (Charon, 2004, p. 862). The research in this field is disparate and relatively nascent, but studies point to the impact narrative-like approaches can have in medical education and medicine on patient care and patient outcomes.

As part of a capstone project in the MSN program at Eastern Mennonite University (EMU), the concept of narrative nursing – the integration of story into patient care – was introduced as a unit within the already established Conceptual Framework of Nursing course offered to EMU undergraduate (second-degree) students as an accelerated course in May 2017. Readings, forum questions, guest lecture(s) and assigned writing were designed to build competence in nursing students to use narrative to care for patients holistically, improve the quality of patient care, and prevent their own burnout. Online forum questions were also used assess student attitudes toward health care narrative throughout. By building “narrative muscle memory” in nursing students early in their education—helping them understand narrative’s importance and considering where it can naturally fit into the care they provide—we believe increase the chances that narrative will have a long-term positive impact not just on patients (in terms of improved outcomes and care quality), but also on nurses (in terms of reduced burnout and increased satisfaction—even joy—in their vocation).

French secularism and its impact on Muslim women

Aminata Wallet Mohamed

Faculty Mentor: Holsinger, Jenni

My research focuses on how Muslim women view French secularism or the strict neutrality with respect to religion in France. The definition of secularism (laicity) was established in 1905 and is based on the separation of religion and state. The laicity emphasizes on freedom to choose one's religion or a political party while seeking to respect individual choices and ideas. The opinions of Muslim women toward French secular laws have been much discussed during the last ten years, most notably after France put in place the law of 2004, which “banned ostentatious signs” of religion in public schools and the law of 2010, which banned the burqa in public places. What is unclear is how Muslim women experience these laws. Do Muslim women see these laws as a form of discrimination against them or do they feel the laws provide them with a sense of freedom? I explore this question through an online survey of Muslim women in France, obtained through snowball sampling. After presenting a quantitative and qualitative analysis of the survey data, policy implications are discussed.

Can restorative justice approaches be used to address and respond to violent harms?

Mikayla Waters-Crittenton with Applebaum, Sarah

Shahi, Bahman

Aboual Alfa, Samira

Faculty Mentor: Turner, Johonna

Can restorative justice potentially be utilized to address violent harms? Yes, it can and should be a part of our current justice model. Since the current system is not reaching its goals for addressing violent harms, trying something new is likely to be more helpful than detrimental and restorative justice can be that new something. Restorative justice is not a panacea, but it is something proven to be beneficial. By being survivor centered it addresses needs on an individual and group level in a way that is, arguably, currently unaddressed. Despite the fact the victims or survivors of a violent offense face the danger of being drawn into the victim-aggressor cycle (Yoder, 2005). By encouraging accountability restorative justice does not allow offenders to simply ignore what they have done or the harms caused. According to neuroscientist Daniel Reisel the elements of holding someone accountable can directly lead to neurogenesis, which can effectively lead to new learned behaviors from adult criminals. Neurogenesis is the act of creating new brain cells; these cells allow us to develop the ability to interact safely and respectfully with other humans. A system focused on safety can lead to a more positive societal level of interaction and increase community cohesion which is its own deterrent for crime.

Documentation of Student Learning in a 7th Grade English Classroom

Kate Weaver

Faculty Mentor: Yoder, Paul

The goal of this project is to assess the student learning during a unit of instruction. I taught a unit on comma rules to 7th grade students. I used a pre-assessment to check for the prior knowledge of the students on the topic before beginning instruction. I then taught the 12 comma rules to the students over a period of four weeks. I used teaching strategies like review games and mini-quizzes to test for comprehension along the way. After four weeks of instruction, I spent two class periods on review before administering the post-assessment to the students. The post-assessment was the same as the pre-assessment in order to check for understanding and learning in the students. For the unit and project, I used resources from the "Comma Crazy" Unit, which my cooperating teacher purchased through Teachers Pay Teachers. Overall, the goal of the project was to document what the students learned over the course of a unit on comma instruction. This goal was completed through implementations of pre- and post-assessments.

Improving Student Learning Through an Interactive Classroom Environment with Effective Co-Teaching and Reflective Practices

Alexa Weeks

Faculty Mentor: Hough, Tracy

This documentation of student learning project involves thinking about the ways the teachers should deliver an entire unit, related to a specific standard of learning, in order for students to be successful. The goal of this project was to document one unit from beginning to end and measure the success of students. This unit covers the 3.7 science Virginia Standards of Learning and focuses on soil, it's components, physical characteristics, and conservation. This goal was achieved by giving a class of 19 students a diagnostic assessment, numerous formative assessments, and one summative assessment. After looking at the data throughout the entire unit, it was evident that in order for students to be successful at the end of a unit, the teacher should practice reflective teaching strategies, the use of effective co-teaching models, and a

classroom management system that clearly sets expectations and guidelines. This documentation of student learning project clearly provided feedback that could be use to better inform my teaching practices.

Using Portfolio Manager to create baseline energy consumption data for a local business coalition

Amanda Williams with Mumaw, Joseph
Musembi, Arnold
Hartzler, Abe
Faculty Mentor: Holsinger, Jenni

The purpose of this project is to aide a local business coalition, formed by Renew Rocktown, in analyzing their carbon footprint. The coalition was formed in late 2017 with the intent to reduce carbon footprint as a collective, and to incorporate more sustainable practices. We started by logging data into Portfolio Manager, a collaborative web program that tracks carbon footprint variables such as energy use, water use, and waste. Results then can be shared between businesses. Energy data use for the past year for participating businesses, along with square footage of buildings, were entered into Portfolio Manager and suggestions to reduce energy consumption were made to individual businesses. A baseline energy consumption report of all businesses will be presented at the Renew Rocktown meeting. This project also seeks to help business owners learn how to use Portfolio Manager, by creating a protocol for business owners to use the program. This allows them to continue analyzing energy consumption in the future.

The Relationship Between Canopy Cover and Stream Water Temperature in Two Headwater Streams Near Bergton, VA.

Amanda Williams with Daley, Hannah
Faculty Mentor: Yoder, Jim

The purpose of this study was to determine the correlation between canopy coverage and water temperature in two headwater streams that form the North Fork of the Shenandoah River near Bergton, VA. The German River and Crab Run are important streams as they are sources of nutrient and sediment into the Shenandoah River, serve as an important trout fishing and other recreational opportunities for the Bergton community and are one of the southern most habitats for the endemic *Glyptemys insculpta* (wood turtle). Over the past few years, water temperature data in Crab Run and the German Rivers was collected as part of a larger restoration project throughout the watershed. This data indicated maximum temperatures frequently exceeded levels which could adversely affect biotic life. Previous data collected also suggested that the temperature of Crab Run is higher and more variable than that of the German River. Other studies have suggested that spikes in summertime temperatures may be due to lack of canopy coverage, which would allow solar radiation to cause higher temperatures and more fluctuation within the stream. We compared water temperature and percent canopy coverage of the two streams by collecting data using Labquest temperature probes and densimeters to determine percent canopy coverage. Measurement of canopy coverage and water temperatures were taken every 25 m for 2.5 km along each stream. Along with determining possible correlation between canopy cover and water temperature, this data may be useful to determine possible sites of underground water flow for further study.

Urban Agriculture: Food Security in Developing Countries

Gillian Zahr

Faculty Mentor: Gingrich, Chris

Due to the dramatic increase of urbanization in developing countries, people are moving into overcrowded slums and lack the access to necessary amounts of food. As a result, many low-income families find themselves in situations of food insecurity. Urban agricultural practices, such as sack gardening, pose possible solutions to food crises by increasing dietary diversity, nutritional benefits and income. However, urban agriculture faces many issues. The two most important issues include land accessibility and government policies, however other issues are apparent such as gender inequality, suitability of materials, and water sanitation. Nevertheless, the benefits, and improvements that can be made, prove urban agriculture increases food security of low-income persons in overcrowded slums.

Poster Presentations

Self-care Development within Elementary aged Population

Emily Augsburger with Kuhns, Jennifer

Thomas, Haley

Thorne, Abe

Faculty Mentor: Emswiler, Jan

This project is an effort to improve the quality of life of a specific population. We are working with an after school program known as the Boys and Girls Club of America . More specifically, the Boys and Girls Club that meets at Spotswood Elementary School in Harrisonburg, Virginia. Our goal is to improve the self-care of the students in this program. In collaboration with teachers and faculty associated with the school and the program, we aim to give children the skills to better care for themselves, both internally and externally. We hope to teach these children about hand and mouth hygiene, nutritional needs, and mindfulness. We established these priorities in care because they are needed skills that are currently not sufficiently taught. In many cases, these principles are enforced, but not explained. We believe that these skills are imperative for the population we are working with because the kids should begin to use these skills in everyday life, and continue developing them for the rest of their lives. We believe that the current model of teaching is not sufficient for the population and without further intervention they will experience a deficit until they are otherwise taught, which is often after medical problems arise relating from the lack of self-care. The teaching will take place after school, during the Boys and Girls Club program. We will collaborate to teach these skills in a way that is appropriate for the learning styles and ability of the children present. This will likely be utilizing kinesthetic teaching strategies that focus on the pragmatic skills as well as the rationalization behind the skills we are teaching. We hope to see the children learn and begin to practice the taught techniques before terminating our relationship with the given population to determine efficacy of teaching and learning.

The use of English Ivy to reuptake heavy metals from solid or aqueous environments

Parviz Barraghi with Pou, Martin

Faculty Mentor: Siderhurst, Matthew

Heavy metals are among the most important sorts of contaminant in the environment. Beside the natural activities, almost all human activities also have potential contribution to produce heavy metals as side effects. Migration of these contaminants into non-contaminated areas as dust or leachates through the soil and spreading of heavy metals containing sewage sludge are a few examples of events contributing towards contamination of the ecosystems. Several methods already used to clean up the environment from these kinds of contaminants, but most of them are costly and difficult to get optimum results. Using plants to uptake these heavy metals has been examined by many scientists as a viable, and cost effective method. Among the most widespread and easiest to grow plants is the English Ivy. English Ivy (*Hedera helix*) is native to most of Europe and western Asia. A rampant, clinging evergreen vine, it is a familiar sight in gardens, waste spaces, on house walls, tree trunks and in wild areas across its native habitat. Ivy has been brought to North America by early settlers and its propagation is extremely easy and

fast. If it is proven to have advantage in uptake of heavy metals like Cu from the soil, it will be a great source in cleaning contaminated lands without much effort and cost.

Limitation of Photovoltaic cells' efficiency in ambient light in comparison to direct sunlight

Parviz Barraghi

Faculty Mentor: Siderhurst, Matthew

As the world population grows our usage of energy increases. The rapid increase of electronic advancements also requires better sources for electricity production which relies on lesser fossil fuel consumption as well. One of the cleanest sources of unlimited energy at our disposal is solar power. Although our solar cell technology is at its early stages, these photovoltaic solar cells have a relatively low output under direct sunlight. This low efficiency is slashed even further at ambient lights indoors under incandescent light sources. Using a photovoltaic cell and a volt meter contraption, I measured different electricity outputs at different times of the day under direct sunlight outdoors, and indoor and find the optimal position for the placement of the photovoltaic based on amount of electricity production in an ambient light.

Claude Debussy and His Influence on Bebop and Other Modern Music

Kaleb Branner

Faculty Mentor: Keebaugh, Ryan

Much has been said concerning Claude Debussy, his contributions to music, and his genius. However, we should not look at Debussy with a sentimental gaze, as his music continues to inspire our modern music, both directly and indirectly. If you say the word "color" in reference to music, chances are you are referring to the timbre, texture, and emotion of the music. Our modern definition of "color" is undeniably influenced by the way in which the public described the work of Debussy and other impressionists at the turn of the century. This fascination with music being used to influence emotion as compared to music being used to give you an emotion spread like wildfire, and continues to be used in modern music.

This mindset has a very strong relation to the creations of several Bebop jazz musicians of the late 1950's such as Miles Davis and John Coltrane. Like Debussy, these two men were also very sporadic in terms of musical direction. Also like Debussy, they wanted people to hear their music and enjoy it, but they also did not want to be labeled and be put in a box. All three of these musicians wanted their music to speak for itself and be timeless, not blend in or simply be catchy. More importantly what these three wanted to accomplish was a texture and sound that was free, and gave them a blank canvas to create on, not holding them back with any boundaries. To do this, they all used similar techniques such as the use of modes and scales. They also had no regard for traditional harmony or harmonic progression; wherever they heard their music going, that is where they took it.

Effect of Cu concentrations on Sunflower Development

Rachael Brenneman with Eye, Grace

Colvin, Skylar

Faculty Mentor: Siderhurst, Matthew

In this experiment we are examining the effects of varying concentration levels of Cu^{2+} in the soil on the development of sunflowers *Helianthus annuus* (*H. annuus*) from seed to full plant. *H. annuus* seeds were planted in concentrations of 0 ppm, 20 ppm, 200 ppm, 2000 ppm and

allowed to grow without interruption. After the end of the four week growing period, BCA (Bicinchoninic acid) or AAS (Atomic absorption spectrophotometry) will be used to measure the final concentration of Cu^{2+} in the soil and the *H. annuus*. This type of experiment (phytoremediation) is significant in cleaning heavy metal particles out of soil to prevent food contamination.

The impact of varying environmental stimuli on albumin's stability

Micah Buller

Faculty Mentor: Cessna, Steve

Albumin stands as a helpful model protein for a number of medical and research studies. With its general similarity to other proteins, it can be tested against harsh environments to see if it can withstand it and then properly refold to proper function. Some environments include high levels of heat and different levels of pH. The importance of protein stability is key for bodily tasks. It is important that a protein be able to remain folded or be able to refold after or during environmental changes. This shows the importance of having stable proteins in medicine and other research aspects. With albumin itself not responsible for various diseases, it is easily accessible and offers similar results as the disease-causing proteins. This information is important to know due to the fact that stability and aggregation of various proteins have high correlation with potential disease such as Alzheimer's and Parkinson's. With albumin being a good model for studies of protein stability, my goal of this experiment is to manipulate the environment of the albumin and test whether or not it will be able to refold to its stable self. In addition to testing the ability to refold, I would look for the level at which aggregation would occur from the changes in temperature and pH. The results that will be gathered will then be compared to literature to see if similar results were found.

The Use of Psoralen to Speed Up Solar Disinfection Process

Rachel Clatterbuck with Clatterbuck, Rachel

Faculty Mentor: Yoder, Jim

Millions of people suffer from a lack of access to safe drinking water. Solar disinfection (SODIS) is an easy way to disinfect water for drinking, but can take hours to complete. Solar disinfection methods usually involve the exposure of sunlight to polyethylene terephthalate bottles for 6 hours and can take up to 48 hours in cloudy weather conditions. This long treatment time makes solar disinfection impractical in some cases.

Psoralens are photoactive cyclic biomolecules and are essentially an uncharted catalyst to speed up the solar disinfection process. In the presence of sunlight, psoralens prevent DNA replication of microorganisms in water by forming covalent bonds between DNA strands which hinder them from breaking apart during DNA replication. Psoralens can be found in a variety of foods such as citrus fruits, figs, parsley and parsnips. The only source of psoralen successfully tested for solar disinfection is from the peel of limes. The purpose of this experiment is to test other sources of psoralen, such as celery and grapefruit and compare their ability to reduce coliform bacteria levels more rapidly than SODIS methods alone.

This experiment will be done by collecting the water from Blacks Run, which contains high levels of coliform bacteria, and examining coliform levels in 4 treatments, a standard SODIS control, SODIS with limes, SODIS with grapefruit, and SODIS with celery. Coliform levels will be

measured after 30 minutes, 2.5 hours and 6 hours by using Coliscan Plus Easygel kits. Data will be analyzed using an ANOVA.

If other sources of psoralen other than limes can also speed up the disinfection process, it may make SODIS easier for some communities to adopt.

Background Literature references:

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The Effects of Turbidity on Dissolved Oxygen Levels in Water

Rachel Clatterbuck with Clatterbuck, Rachel

Faculty Mentor: Yoder, Laurie

Turbidity is the effect of residue from moving solids on water which is used as a measurement of the clarity of water. Dirty or murky water is a sign of high turbidity. After a rain or storm, it is normal for the level of turbidity to increase due to extra pollutants or other matter getting into the water. Turbidity is measured by shining light through a sample of water and measuring the suspended particle concentration. Dissolved oxygen is an important measure of water quality and is essential for the viability of aquatic life. The purpose of this experiment is to find the effect of turbidity on dissolved oxygen concentration in water. Water samples will be collected from various locations and in various weather conditions such as after a rain storm, on a sunny day, and on a cloudy day, and will be measured for level of turbidity with the use of a turbidity meter as well as for dissolved oxygen with the use of a Dissolved Oxygen kit. The results of the turbidity and dissolved oxygen measurements will be compared in order to find a relationship between the two water quality measurements. This relationship will not only show the effect of turbidity on dissolved oxygen, but will show its effect on aquatic life and what weather conditions have the most effect.

Pinball ex Machina

Silas Clymer with Sauder, Rachel

Byer, Cameron

Faculty Mentor: Tian, Esther

Our project's goal was to design, construct, and program a functioning pinball machine. We brainstormed various ways of keeping score, which parts of the machine would be manual, and which components would be programmed. We eventually decided on a design that would allow us to create a product that could serve as a means of entertainment and fun for all ages. We soon realized that some of our ideas were more complex than our experience or time limit would allow and ended up having to make some alterations during the construction process. Our efforts were rewarded with a finished product that serves all the purposes it was meant to.

How to Make Natural Gas From Animal Waste

Phoebe Coffie with Yifru, Ayhubrhan

Faculty Mentor: Siderhurst, Matthew

The purpose of this research is to generate a natural biogas from animal waste specifically from cattle dung at Eastern Mennonite University chemistry department. It is expected that the animal waste will ferment over time to yield the natural biogas, methane. A method of gas extraction and filtration will be used to obtain the methane under monitored pressure. The significance of this study is to efficiently use our natural resources to create efficient renewable energy.

Language use and its relationship with mental health: A linguistic study

Clayton Cordell

Faculty Mentor: Balasch, Sonia

The goal of this study is to note the contexts and manners in which “depression” and “depressing” are discussed and used in contemporary American English. Because of the multiple distinct definitions of these words, they are already used broadly -- even when referring to mental health -- and may suffer the effects of being overused or used in inappropriate contexts.

As global Internet use increases, our increased connectivity lends itself to word usage spreading further and faster than it has in the past. Thus it follows that the implications of word usage may be increasing as well - if persons are more readily exposed to certain uses of language, this has the potential to shape their own language usage and thought processes.

The usage of "depression" and "depressing" was studied through the use of the Corpus of Contemporary American English (COCA) and the Corpus of Global Web-Based English (GloWbE). This study mainly focuses on the ways these words are used, but also briefly examines the ways in which our use of these terms in American English may be related to the actual mental health of U.S. residents.

The corpus linguistic analysis presented in this study found that occurrences of "depression" -- when related to mental health -- are more closely tied to the experience or discussion about depressive disorders, while "depressing" is increasing in use online and is more closely related to normal feelings or anecdotal usage. Possible relationships and implications are discussed.

Emotional contagion: Effects of emotional valence in social media posting

Clayton Cordell

Faculty Mentor: Koop, Greg

The implications of arousal and priming effects from online activity continue to be more consequential, especially since we do not understand well the impacts of our online selves on others' mood and cognition (or vice versa). Mood and emotional affect change elicited by online interactions — chatting, posting, commenting, emailing, etc — will very likely carry over into other aspects of everyday life, and almost certainly affect other online behaviors. If we know more about these consequences - and specifically how exposure to positive and negative content impacts people - we have the potential to foster more healthy interactions and behaviors online. As such, the continued study of emotional contagion in social media is crucial for understanding the ways communities function online, as well as the responsibilities we have as members of these communities to be both considerate of our own actions and aware of the effects of others on ourselves.

This experimental study manipulates the emotional valence of the content in simulated social media posts in an attempt to determine the strength of effect that positive or negative content elicits in a reader's own mood/affect -- as a proxy for interactions in social media.

Emotional contagion in social media is a phenomenon that has only been studied in a few instances, and it is generally conducted using regression analysis. This study would be one of the first to experimentally examine this phenomenon using validated analysis tools.

Water quality of Slate Lick River and Lake

John Dudley

Faculty Mentor: Yoder, Laurie

The water quality for the Slate Lick Lake and River is very important for the ecosystem for the Wood Turtle habitat. In this project, I will determine the pH, Nitrate Nitrogen, Phosphorus and sediment levels to determine the condition of water and how it affects turtle habitat.

The interaction between unc-53 and aex-3 proteins in C. elegans

Taylor Esau

Faculty Mentor: Schmidt, Kris

Caenorhabditis elegans is a useful model organism for studies of the neuromuscular junction (NMJ). The nematode NMJ has anatomical similarity to the human NMJ many NMJ proteins are conserved between the two species. Furthering our understanding of the NMJ is important and can accelerate the treatment of NMJ diseases such as myasthenia gravis. The *unc-53* gene in *C. elegans* is homologous to the human neuron navigator (NAV) family of genes. Previous studies have shown that *unc-53* animals are hypersensitive to the acetylcholinesterase inhibitor Aldicarb and exposure results in increased paralysis compared to wild-type. *aex-3/Rab3-GEF C. elegans* loss of function mutants, by contrast, are not sensitive to Aldicarb. Previous studies have also shown that UNC-53 and AEX-3 proteins physically interact, though the functional significance of this interaction is unknown. We are currently testing Aldicarb sensitivity in *unc-53*, *aex-3* and *unc-53; aex-3* null mutants to better understand the interactions between the genes.

Correlation and Magnitude between Marketing Indexes

Grace Eye with Clymer, Silas

Dalke, Olivia

Faculty Mentor: Byer, Owen

Our goal is to find any significant correlation between the marketing indexes S&P 500, Nikkei 225, Hang Seng, CAC 40, DAX, and FTSE 100. By using daily historical data from each index (downloaded from the internet) we will be able to track the daily closing values for the past 20 years. By analyzing this data our group can explore the following question: To what extent have different marketing indexes affected each other over the past 20 years based on daily closing values? If the equity performance of one affected another, which index was the biggest instigator and by what magnitude is it affecting other indexes?

Phytoremediation of Basil

Lauren Gumm with Yoder, Austin

Faculty Mentor: Siderhurst, Matthew

The process of phytoremediation is the uptake of contaminants by living greens. To more fully understand the extent of this process, we will be measuring the ability of basil to absorb copper in soil. Twelve total pots will be planted and observed. There will be four total treatment groups, three with different copper concentrations in soil, and a control group without the addition of copper. Each treatment group will have three samples to collect accurate data.

High salt diet feeding identifies four salt-sensitive tissues in the Sprague-Dawley rat

Braden Herman with Ferguson, Kaylee

Fernandez, Jared

Kauffman, Samantha

Spicher, Jason

King, Rachel

Halterman, Julia

Faculty Mentor: Halterman, Julia

The current diet of the average American contains an increasing amount of salt and high fructose corn syrup. Individuals with a higher sensitivity to salt have the potential for developing hypertension, and increased fructose consumption has been correlated with hypertension and metabolic syndrome; however, it remains unclear as to how dietary salt and fructose affect organ function at the molecular level. This study aimed to test the hypothesis that consumption of high salt and fructose diets would increase tissue-specific expression of two critical osmotically-regulated genes, nuclear factor of activated T-cells 5 (NFAT5) and aldose reductase (AR). Fifty Sprague-Dawley rats were placed on a control (0.25% NaCl, 6% fructose), 4% NaCl, 8% NaCl, or 64% fructose diet for 8 weeks. Fourteen different tissue samples were harvested and snap-frozen, followed by RNA purification, cDNA synthesis, and NFAT5 and AR gene expression quantification by real-time PCR. Our findings demonstrate that NFAT5 and AR expression are upregulated in the kidney medulla, liver, brain, and adipose tissue following consumption of a 4% NaCl and/or 8% NaCl diet. NFAT5 expression is also upregulated in the kidney cortex following consumption of a 64% fructose diet. These findings highlight the kidney medulla, liver, brain, and adipose tissue as being “salt-sensitive” tissues and reveal a novel fructose-mediated induction of NFAT5 expression in the kidney cortex. This study identifies the impact of high salt and high fructose diets at the gene expression level; further characterization of signaling mechanisms involved could help elucidate how these diets affect organ function long term.

Exploring the Effects of Varied Freezing and Thawing on Serum Albumin Stability and Denaturation.

Braden Herman

Faculty Mentor: Cessna, Stephen

Cryobiology remains a hotly researched topic with multiple journals specifically addressing the discipline. It is known that many invertebrates are able to freeze solid and then thaw and retain normal body functions. Furthermore, a study published in 2014 followed the freezing for extended periods of time (up to 6 months) and thawing of wood frogs in Alaska. The study found that these frogs were able to freeze for months at a time, thaw, and retain normal bodily functions without significant impact. This study contributed the ability of the frogs to freeze without harm to be due to cryoprotectant levels of glucose and the presence of antifreeze glycolipids. However, their study did not determine the differences in albumin structures or the

effects of the freezing on these structures. Research has been done in the biochemistry lab of Eastern Mennonite University, and other laboratories, on the effects of higher temperature on albumin denaturation and binding. Within these studies, proteins were exposed to varying high temperatures and the protein structure was measured directly following heating and then when the proteins had returned to room temperature and potentially returned to their original shape and form. Multiple studies found that denaturation occurred and did not return to original form upon return to room temperature at temperatures around 40 degrees Celsius and below but did not fully return to form at higher temperatures. This study will instead investigate the effects of freezing on the denaturation of the protein albumin. Varied lengths of freezing will be tested in addition to the effect of flash freezing. Furthermore, this study will also address the effects of different thawing methods and thawing periods on the structure and stability of albumin in regards to the application of cryobiology and cryoresearch.

The Art of Language: Linguistic Invention as a Means to Understanding Grammar

Joshua Holsapple

Faculty Mentor: Balasch, Zonia

Learning a new language as an adult is a difficult task; hopeful language learners, especially monolinguals, generally have immense difficulty learning all of the grammatical subtleties that differ from their mother tongue in adulthood. To examine the role of creativity as means to overcoming this obstacle, the researcher is involved in the creation of an artificial language, which includes unique phonology, morphology, grammar, syntax, and semantics, while taking some notes from extant languages like Welsh, Old Norse, and Latin. Two illustrative examples follow:

(1) Eorcj-ec et tsalt-cwiros

[éórtçh.ihk iht tshá†th.khwĩros]

Morning-SG.DAT at leave-FUT.1PL.SPR

“We will leave in the morning.”

Example (1) illustrates how linear time is viewed more dynamically; you cannot be in the morning as in English, but you can be traveling towards the morning as the postposition <et> and the dative form of <eorcjes> imply.

(2) Hvalcm cerv-ermu agh beld-mu

[hvə†khḡ khérv.irmʊ əɣ bét†d.mʊ]

How stag-ACC.PL and war-ACC.PL

“What do stags have to do with war?”

Example (2) illustrates the language’s ability to imply verbs with adverbs and conjunctions. This particular construction, the <hvalcm-agh> construction, is fairly typical when asking about existential comparisons (how are two or more things like each another?). Speakers of this language did not need a verb because <hvalcm>, “like, how,” questions the relationship between the nouns and <agh>, “and,” implies equality.

In creating the artificial language, the researcher had to apply a number of concepts from theoretical linguistics and found that doing so was an effective way to achieve a broader understanding of grammar. While these are just preliminary results, its outcomes warrant further inquiry on a larger scale.

*Note: In the IPA transcriptions, [h] should be superscript, except for the first consonant of <hvalcm>.

Redefining Redistricting

Emily Hostetler with Reimer-Berg, Andrew

Faculty Mentor: King, Daniel

We tasked ourselves with the issue of redistricting congressional districts to eliminate gerrymandering. Gerrymandering is the process of manipulating the boundaries of an electoral constituency so as to favor one party or class. This is an especially big problem when considering voting districts for elected officials in Congress. We decided that we would approach the problem of gerrymandering as it pertains to the state of Virginia. The only stipulations we were given were to make the districts “simple”, that we must be able to convincingly state why these districts are fair, and that all districts must have reasonably similar populations. We chose the definition of simple to be a shape that is geometrically compact, such as a circle. Thus we drew our maps to best represent a circular shape. We did this several ways, both estimating what the most compact district divisions were, and by drawing Hamilton paths to simulate how a computer might randomly select voting boundaries. After drawing these maps, we took population and shape data to analyze our results. Through this, we found that an effective method to get compact and fair districts is to look for circular boundaries that have equal population. Through our analysis of political parties and demographics, we found that this method represented the demographics of the entire state, and therefore is a fair method.

Construction of a Rechargeable Battery Charge by a Photovoltaic Cell

Jack Hummel with Raber, Gabriel

Faculty Mentor: Siderhurst, Matthew

The first part of this experiments constitutes building a proper battery, which means that it contains galvanic and electrolytic cells. The battery will be made up of multiple cathodes and anodes and create enough voltage to power a light bulb. The species that will be oxidized and reduced are not yet determined but the battery will likely be based upon an alkali metal. The metals will be in water solutions containing salt and be connected via a salt bridge.

The second part of this project was to design and construct a photovoltaic panel. This panel needed to be of sufficient output that it could be an acceptable size, while also being relatively easy to construct, and also avoiding exotic materials. This panel would serve as the power source for the battery described above.

IL-6 is differentially expressed in Sprague-Dawley rat tissues in response to high fructose diets

Samantha Kauffman with Halterman, Julia PhD

Faculty Mentor: Halterman, Julia

The average American diet today contains an increasing amount of salt and high fructose corn syrup (CDC, 2017 & Kurtzblen, 2015). Individuals with an increased sensitivity to salt or fructose

can develop hypertension and metabolic syndrome. In this study, we aimed to determine how consumption of a high salt or high fructose diet alters tissue-specific expression of the IL-6 gene. The IL-6 gene produces interleukin six, a protein involved in inflammation. It has been implicated in a number of inflammation disease states, including susceptibility to diabetes mellitus (NCBI, 2017). We hypothesized that IL-6 expression would be altered in response to high salt and high fructose diets in some tissues. Fifty rats were put on a control, 4% NaCl, 8% NaCl, or 64% fructose diet for eight weeks. Sixteen tissue samples were harvested from each rat. From those samples, RNA was isolated and purified, and reverse transcription was then used to convert the purified RNA to cDNA. RT-PCR was used to measure expression of the IL-6 gene. IL-6 was significantly upregulated in the kidney cortex, bladder, blood, and brain in response to the 64% fructose diet. Based on these results we can conclude that IL-6 is differentially expressed in various tissue types in response to high salt and high fructose diets. (Supported by: The Thomas F. and Kate Miller Jeffress Memorial Trust, Bank of America, Trustee.)

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Variation in a CRH regulatory element in preterm and term infants

Samantha Kauffman with Dunn-Fletcher, Caitlin

Muglia, Lisa PhD

Huusko, Johanna PhD

Muglia, Louis MD PhD

Faculty Mentor: Kishbaugh, Tara

Although preterm birth complications are the leading cause of death of infants and children under five worldwide, the mechanisms causing preterm birth are not well understood (WHO, 2017). We examined the potential role of single nucleotide polymorphisms (SNPs) in the endogenous retroviral element THE1B in birth timing. THE1B is a long terminal repeat involved in the regulation of placental production of corticotropin releasing hormone (CRH). Elevated placental CRH levels are correlated with preterm birth (McLean et al, 1995). Placental DNA samples from both term and preterm infants of Finnish descent were amplified and sequenced. SNPs were then identified by manually searching for heterozygote peaks in sequence chromatograms. Two known SNPs, rs5030876 and rs7818110 were identified in both the case and control samples. However, no significant variation was found between the two groups.

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A comparison of dye-sensitized solar cells utilizing fruit pigments

Samantha Kauffman with Shumaker, Abigail

Faculty Mentor: Siderhurst, Matthew

We propose to use pigments from various fruits, such as raspberries, blueberries, and cactus pears, to make dye-sensitized solar cells. We will then compare how much current each solar cell produces when exposed to a lamp.

An analysis of soil health on the EMU campus

Justice Kiser with Bowen, Elliot

Mendoza, Cerrie

Hummel, Jack

Faculty Mentor: Yoder, Laurie

An appropriate nutrient management plan is important in preventing loss of essential nutrients in soil such as nitrogen and phosphorus. This project is aimed towards providing the necessary information on nutrient levels and depletion that the groundskeepers at EMU need to boost soil health in various locations. The goal is to find where there are low levels of Nitrogen and Phosphorus in the soil on the EMU campus, what is causing the low levels, and the possible solutions to the issue.

There are also concerns about over-fertilization, and knowing specific nutrient levels would help reduce pollution that is caused by applying too much fertilizer. The EMU campus is within the outer limit of the Chesapeake Bay watershed and preventing the introduction of pollutants is important. We expect to find a wide variation in nutrient levels throughout campus, reflecting that the management of these areas is done without data which probably leads to over or under-fertilizing in different areas. Multiple soil samples will be collected from 6-10 locations on the Eastern Mennonite University campus, via a soil probe. The samples will be sent to Virginia Tech for soil analysis on nutrient levels, pH, and cation exchange capacity (CEC). We will conduct tests on the samples to determine water content, organic matter, and nitrogen content as Virginia Tech does not test for these.

Copper Absorption in Radish Plants

Emily Lam with Mazariegos, Ryo

Faculty Mentor: Siderhurst, Matthew

The goal of this research project was to determine how copper affects the growth of radish plants, as well as if the amount of copper that was absorbed in the radish plants were at an edible range for human consumption. Research was done by growing radish plants and then calculating the amount of copper absorbed through the plants, as well as the soil.

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Making Biodiesel From Waste

Leah Lapp with Melissa, Kinkaid

Faculty Mentor: Siderhurst, Matthew

We use fuel every day in America, and have become dependent on it. It has therefore, become imperative that we learn how to create fuel from recycled products, so we do not run out of fuel sources. This project aims to recycle used cooking oil, that would otherwise have been thrown out, to create biodiesel.

A study of apoptotic pathways in Caenorhabditis elegans: is unc-53 involved?

Caroline Lehman

Faculty Mentor: Schmidt, Kristopher

Cancer has threatened human health for millennia, and its incidence continues to rise. It is driven by uncontrolled cell growth, which can be a result of dysfunctional apoptosis. Apoptosis can be studied easily in *Caenorhabditis elegans*, whose life cycles and reproductive cycles are much shorter and faster, making them more suited to research. This study seeks to understand the involvement of the gene *unc-53* (uncoordinated-53) in apoptotic engulfment pathways in *Caenorhabditis elegans*. Based on the involvement of *unc-53* with the cytoskeleton, as well as its interaction with *abi-1* (Abelson interactor-1) and *unc-73*, two genes involved in apoptotic engulfment pathways, answering the question of whether *unc-53* is involved as well will be valuable to our understanding of the genetic pathways involved in apoptosis. Because apoptosis is subject to genetic redundancy, the effects of mutations in *unc-53* alone and alongside mutations in *ced-1* (*C. elegans* death-1), a gene which may be genetically redundant with *unc-53*, will be examined to determine whether *unc-53* functions in apoptosis. Some preliminary data on button cells and gonad formation has been recorded for the control groups, comprised of mutant *ced-1* and wildtype strains of *C. elegans*, but additional data on *unc-53* mutants as well as various *unc-53/ced-1* double mutants will be collected. The control data appears as expected based on other experimental results and our understanding of how *ced-1* functions, indicating that the methods used produce reasonable data. The answers that would be gained from this project could make way for future research that could deepen our understanding of the genes and mutations involved in apoptosis and cancer.

Air Popcorn Popper Disassembly Project

Collin Longenecker with Troyer, Andrew

Faculty Mentor: King, Daniel

The purpose of this project was to get an electronic object, take it apart, figure out how it works, and then put it back together. The object in this project was a hot air popcorn popper. By reverse engineering the popcorn popper the internal functions of the device were discovered and understood. This method is widely used in the field of engineering to be able to gain knowledge from existing products. The design of this particular hot air popcorn popper was patented in 1985 by National Presto Industries, Inc. The device was first taken out of its packaging and plugged in to make sure that the device was functioning. Pictures were taken to document how the device should look when put back together. The hot air popcorn popper was taken apart from the outside in, taking pictures along the way. The parts were all analyzed and their function was determined and documented. The popper was then put back together by using the pictures. After reassembly, the device was still functional. This project resulted in an

understanding of an electronic device. An understanding of the energy flow, the physical design, and the proper use of this product.

Solar Powered Golf Cart

Collin Longenecker with Troyer, Andrew

Sauder, Karissa

Zimmerman, Aaron

Beiler, Ethan

Faculty Mentor: Tian, Esther

In our current society it has become clear that alternate forms of energy are a necessity. Eastern Mennonite University has recognized this issue and has several sustainable initiatives throughout the campus. In an attempt to aid in this initiative, the club searched for high consumers of energy and identified the energy that golf carts use could come from a renewable source. To change the energy source from non renewable to renewable, Engineers for a Sustainable World saw the opportunity to attach a solar panel to the roof of an existing electric golf cart. The vision of Engineers for a Sustainable World was to create a solar powered golf cart that could harness the solar energy and deliver that energy into the batteries of the golf cart. The solar golf cart would serve as a way to promote sustainability and and the power savings would be displayed for educational purposes. The conversion of the golf cart has not been finalized. Some revisions to the current design are still required for an practical product. These changes will be completed by March 17th. The charge controller monitors the the input of the solar panel and the output to the batteries, and this data will be recorded via bluetooth every day. Creating this sustainable solar powered golf cart allowed the students in ESW an opportunity to practice basic design research and implementation. A solar paneled golf cart advocates for sustainability and ingenuity, something that Eastern Mennonite University is looking to emphasize in the student body.

Effects of Copper on Phytoremediation in Sweet Corn

Hannah Lorsung with McCants, Xavier

Faculty Mentor: Siderhurst, Matthew

The purpose of this experiment is to test the effects of copper on phytoremediation in sweet corn. To compare the effects of copper, the soil where the corn was grown was contaminated with different concentrations of copper.

Albumin Drug Binding: Competitive Binding of Benzoic and Salicylic Acid

Dan Lutz

Faculty Mentor: Cessna, Steve

Albumin is the most abundant protein in the blood plasma and has been studied more than any other protein due to its binding properties. Many drugs bind to albumin to be carried throughout the blood stream. One of these classes are benzoic acid derivatives like salicylic and acetylsalicylic acid. It is the goal of this research to study benzoic acid binding to bovine serum albumin alongside salicylic acid in order to determine whether there is competitive binding occurring. This will be done using fluorescence and spectroscopy in a buffer solution to determine the different binding constants and properties.

Phosphate Conditions in Black's Run

Dan Lutz with Silva, Xander

Faculty Mentor: Yoder, Laurie

In this lab, phosphate levels will be tested from the EMU pond and various points along Black's Run over the course of a month. Phosphate levels in the Shenandoah Valley have been consistently high, and one goal would be to determine if there are changes based on rainfall and water levels. The pond also has a riparian buffer below it to keep phosphates out of the stream, and the testing will be a good indication of how well the buffer is working. Along with phosphates, conductivity will also be tested due to its ease and insight on rainwater effects.

Statistical Analysis on the Effect of Tommy John Surgeries on the Average Fast Ball Velocity

Dan Lutz with Tomlin, Nate

Segner, Kayla

Faculty Mentor: Byer, Owen

Baseball can be an extremely dangerous sport, especially when playing at a high level throwing the baseball repetitively at high velocities. Often times surgeries are required like the Tommy John surgery. The goal of this lab is to identify any statistical difference between fast ball pitch speed after and before Tommy John surgery. Data will be collected on pitchers' average fast ball speed from the internet and compiled into two sets of data whether the pitcher has had Tommy John surgery or not. Then, various statistical tests will be run to determine if there are effects related to this surgery.

Monitoring Nutrients in waterways surrounding Bergton Virginia

Ethan Mathews

Faculty Mentor: Laurie Yoder

I will take 10 – 20 samples of water from different bodies of water that are in the same watershed that contains the German River and Crab Run, as well as the town of Bergton. These samples will come from areas in the Mountains close to the source of the two bodies of water listed previously. After I take these samples I will measure them for concentrations of nitrates and phosphates to determine the health of the watershed.

Pearly Whites and Self-Care Unite

Danielle McCormick with Braithwaite, Lauren

Alexander, Dixie

Breidigan, Rachel

Faculty Mentor: Emswiler, Jan

Elementary aged students are at a crucial time in their lives where their current health habits can influence their overall health in the future. Our community project involved establishing a partnership with Smithland Elementary School to assess the health care needs of the students. The overall goal for our project was to provide proper education for the student body regarding those needs. Within the elementary school, our group has partnered with the school registered nurse, Teri Bosley. During our initial meeting with Mrs. Bosley, she identified two major needs that the students have. She stated that there is a need for increased personal hygiene and dental care among the students. To retrieve evidence regarding these two needs, we performed an informant interview, participant observation, gathered secondary analysis of existing data, and generated a survey to identify the baseline knowledge of students regarding these topics.

The participant observation concluded there was an evident need for basic hygiene knowledge based on the unkempt appearance of multiple students within the school. Research data concluded there is a disparity in education when it comes to elementary students and developing an effective self-care routine. Our group is in the process of gathering the data from the surveys to construct lesson plans for the students. We plan to present two different teaching plans (about twenty minutes in length): the first to the second and third graders regarding proper oral hygiene and the second to the fourth and fifth graders about body changes related to puberty and the development of a self-care routine. The teaching will take place within students classroom and include a brief lecture along with interactive learning activities. An evaluation at the end of each lesson will be performed by assessing student knowledge and comparing this to the baseline knowledge identified within the initial student surveys.

Publishing Genome-Quality Data for Amphibians and Reptiles in Virginia

Cerrie Mendoza with Berkey, Abigail

Bell, Rayna

McLeod, David

Steffensen, Gregory

Mulcahy, Daniel

McDiarmid, Roy

Gotte, Steve

Hyman, Oliver

Faculty Mentor: Yoder, Jim

Collecting amphibians and reptile specimens has been used by museums for taxonomy research throughout the past century. This project involved collecting specimens of various salamander species that appear to be endemic to parts of Virginia in order to add reference data to their original descriptions. Partners in this collaborative project include the Smithsonian National Museum of Natural History (SNMNH), United States Geological Survey, Global Genome Initiative, Eastern Mennonite University and James Madison University. The purpose of this pilot project was collecting, cataloging and preserving specimens throughout the western mountainous region of Virginia. The project also involved sequencing DNA to be added to the genetic database “BoLD” as well as testing for the “Bd” and “Bsal” chytrid fungus that attacks both frogs and salamanders. Overall, 56 salamander specimens were collected from 9 species, sequenced and published on the SNMNH database, thus making them available to other researchers. The findings may be useful in establishing population genetics, phylogenetic traits, and geographical range of type specimens as well as having genetic information from these endemic salamander populations available for future research. The testing for the Bd and Bsal chytrid fungus is still ongoing in cooperation with James Madison University.

Phytoremediation

Jacob Merica with Vanamburg, Nick

Faculty Mentor: Siderhurst, Matthew

We will be looking at how the concentration of copper in soil effects our plants growth.

Copper Concentrations in Tomatoes

Caleb Oakes with Abudiab, Zeid

Faculty Mentor: Siderhurst, Matthew

The purpose of the experiment is to measure the level of copper concentrations among four different samples and the effect it has on the growth of tomato plants. Three different amounts of copper were measured out and mixed in with four samples of soil each, making twelve samples in total with ranging levels of copper concentration among three groups. Four samples of just soil and no copper was used as a control group. Up to 16 tomato seeds were planted in each sample consisting of 16 samples in total.

Life

Madalynn Payne

Faculty Mentor: Showalter, Daniel

Life is an interactive poem written on a canvas. Each observer is invited to view, touch, and listen to the separate components to get the full experience. When a line of the poem is touched, a piece of the song is played. I compiled the project (the poem, the song, and the computer program that connects the two) during EMU's Student Kairos Place retreat. A video of the project me interacting with Life can be found on the Student Kairos Place website: <https://emu.edu/writing-program/student-kairos-place>. This project was inspired by my final project for the computer programming course Python, where I wrote a program that turned my classmates into a piano. Life is a piece of art that combines my interests: music, math/computer programming, and art.

Basil and Dill Phytoremediation of Copper

Adam Peachey with Dula, Maya

Faculty Mentor: Siderhurst, Matthew

The purpose of our experiment is to determine if growing dill and basil in 200 mg Cu per kg of soil affects the smell of dill and basil as compared to basil and dill grown in the same amount of soil without copper. The smell will be determined by an electronic nose which is able to determine if there is a significant difference in what constitutes the smell between basil and dill with copper in the soil and those without. Our results might lead to a broader suggestion of whether the presence of copper affects the "usability" of herbs because high copper concentrations can be toxic.

Mathematical Modeling of Influenza

Gabriel Raber

Faculty Mentor: Yoder, Jim

The purpose of this experiment is to analyze the different strains of influenza using the SIR model in the mathematical modeling software Epimodel. As a disease that is highly prevalent in the world population, the statistical variables of influenza are well known and thus can be used in modeling software to help determine what effect specific public health policies would have on the infection rate of the disease. While this would not lower the death rate, virulence, of influenza, fewer people would die as fewer would be infected. Analyzing the different effects on the infection rate of the disease would aid policy makers in deciding which policies against influenza would be most effective, while considering cost and public acceptance. As it is unlikely

that there would be broad policy change from year to year based upon which strain of influenza is causing the outbreak, only a single policy will be recommended.

Ozone Concentrations in Harrisonburg Areas Throughout the Day

Gabriel Raber

Faculty Mentor: Yoder, Laurie

The purpose of this experiment is to determine the ozone concentrations around Harrisonburg at various times of day. Three locations will be tested: Downtown Harrisonburg, the EMU campus, and just outside of Harrisonburg; at four separate times of day: 8 am, 12 pm, 4pm, and 8pm. This will be done by bubbling air through an iodide solution and then adding starch indicator. The ozone oxidizes the iodide to I₃⁻ which then reacts with the starch to increase absorption of light. By using a spectrometer alongside an iodide-starch standard, the ozone concentration is determined. The different areas and times will then be compared to determine when and where ozone concentration is most likely to be a health hazard and if it is already a health hazard. The procedure for this experiment is based upon the procedure from A Simple Method for Measuring Ground-Level Ozone in the Atmosphere (Knudsen et al., 2005).

Knudsen, G. A., Seeley, S. K., Seeley, J. V., Bull, A. W., Fehir, R. J., & Cornwall, S. (2005). A Simple Method for Measuring Ground-Level Ozone in the Atmosphere. *Journal of Chemical Education*, 82(2), 282. doi:10.1021/ed082p282

Effect of copper in Lactuca sativa's photosynthesis rate.

Emilio Ramirez Fajardo with Sungu, Kevin

Faculty Mentor: Siderhurst, Matthew

Soil contamination with heavy metals is a tangible issue that affects many communities in the US. Measurements to fix this problem can be expensive and lengthy. Therefore, scientists have developed a cleaner, more affordable solution to deal with this danger, phytoremediation. Phytoremediation is the

use of living plants for removal, degradation, or containment of pollutants in soils. For this experiment we are going to use *Lactuca sativa* (Lettuce) in a case-control study to determine if Cu has any effect on this plant's photosynthesis rate. Our experimental group was treated with 0.038 grams of copper; we are aiming to identify significant differences in rate of photosynthesis between the

control and the experimental group.

Using the Optimism Coefficient Criterion in the Game of Farkle

Sarah Beth Ranck with Mullet, Luke

Faculty Mentor: King, Daniel

This project offers a possible optimal or "winning" strategy for the game of Farkle. Farkle is a "test your luck" dice game usually played with six six-sided dice. The game is played by at least two players who take turns throwing the dice. Our task was to determine whether a player should choose to roll again or bank their current score and develop a method of play that minimizes the number of turns required to reach 10,000 points. After analyzing some previous expected value models and considering other potential modeling criteria using presented in our Math Modeling course, we decided an Optimism Coefficient Criterion would offer both an

effective strategy and be unique from previous models. We then created a model using this criterion and tested our model using Python Code to determine the optimal coefficient of optimism.

Tilt-shift lens adapter

Karissa Sauder with Zimmerman, Aaron

Faculty Mentor: Tian, Esther

The purpose of this project was to produce a lens adapter that would tilt the focal plane of a camera shot. This structure can create interesting and new photography that cannot be taken otherwise, such as creating a miniaturization effect. The adapter was to be made into a cone-like form that was tilted 8-10 degrees and would attach between a specific camera body and lens. We worked in collaboration with the photography department to replicate the exact dimensions they needed in order for it to attach to both parts correctly. In order to do this, we needed to know what kind of camera body and lens that they wanted to use this lens adapter on. We were given an older lens (ZENANON-PE f/2.8 75mm) that they wanted to attach to a newer camera (Sony A7). The idea was that we would take precise measurements of both parts and then design the adapter on Autodesk, but unfortunately that didn't work out as well as we would've liked. We are continuing to test alternative ways to complete this task and the project is coming close to complete. Once the adapter is printed, we hope to see what this adapter can do and take photos with it.

360 degree LED Wand

Joshua Schlabach with Bieler, Ethan

Mathias, Logan

Faculty Mentor: Tian, Esther

This lab was done to make a communication device that is eye catching and innovative. It was also done to learn about coding and electronics. A rotating row of LEDs was constructed and coded to project words for an audience. The project was largely successful and projected words clearly. Our hypothesis was more of an intention, which was to make an innovative eye catching communication device that projects words. We succeeded in this and made a fully functional word projector.

Usage of 'propaganda' over time in Modern American English

Caleb Schrock-Hurst

Faculty Mentor: Balasch, Sonia

The purpose of this study is to identify changes in the occurrence of the word 'propaganda' in American English. Being a word with strong negative connotations, usage of 'propaganda' is very marked, and, as hypothesized, usage of less harsh and more informal synonyms like 'fake news' have become much more common in the past few years. Drawing primarily on the Corpus of Contemporary American English, it can be concluded that usage of 'propaganda' is currently on another uptick, but that its usage is not currently above previous highs, and that the term 'fake news,' a recently frequently used synonym for 'propaganda,' came into use in early 2000s and its use will likely continue to grow.

Implementation of Portable Electronic Devices in School Nurse Offices

Julie Schutte

Faculty Mentor: Yoder, Laura

Problem/Background: Within the Warwick School District a new Electronic Health Record was implemented three years ago. The school nurses only have access to this EHR through desktop computers. The lack of portable electronic devices hinders school nurses from point of service data entry, efficient problem solving during meetings, and quick verification of electronic health records to answer student and staff questions. The purpose of this quality improvement project was to advance the quality and efficiency of nursing care for students (4200 public school students) through the implementation of portable electronic devices for school nurses within the six district buildings.

Method/Strategies: The project used informal questioning and a short survey based on the Technology Assessment Model (TAM) to assess the attitude and readiness of the six district school nurses toward the implementation of portable electronic devices. Documentation of preliminary and post implementation minutes-to- input of screening and meeting data using the Electronic Health Record (EHR) was also measured. Nurse specific Apple based laptop and iPad training took place prior and during the implementation. The project manager acted as a liaison between the nursing department and the Information Technology department (IT).

Results: The nurses informally expressed a readiness and desire to switch to the mobile devices stating they felt unprofessional in meetings with pencil and paper, and noting the potential to be more efficient with the Portable Electronic Medical Record (PEMR). This result echoed the conclusions of the TAM –based survey which showed that 4 of the 5 respondents agreed that they were confident to implement the device while the 5th was strongly confident.

Comparative data of entry measurements between the PEMRs and desktop computers revealed that the amount of time to input screening results dropped

from 5 minutes per student using a desktop to 1 minute per student using a laptop. Cost is also a factor when implementing iPads and laptops. The desktops in our district were leased and returned every three years for \$225. The laptops were leased- to-buy and were utilized in the district on a 7-8 year cycle, starting with the staff, then students, and finally resold to the community. Intangible benefits included the IT skill set, reduction of procedures/staff, and standardization of devices in the district.

Implications: A laptop and iPad were successfully implemented in each school nurse's office. The acquisition of the portable devices was facilitated at this specific time because the lease of the all the nurse's desktops was at the end of their rental cycle. Otherwise, funding would have had to be obtained through an alternate source. Possible next steps after this project include continued monitoring of students to ensure increased face time and continuing education for the nurses in new applications and software. Future research is needed specific to school nurse implementation/use of portable devices documenting increased efficiency/face time with students, possibly specific to nurses

with multiple buildings.

Measuring the copper absorbance capacity of catnip compared to radishes via AA Spectroscopy or BCA Analysis

Kayley Scottlind with Brubaker, Chelsea

Nielson, Jonathan

Faculty Mentor: Siderhurst, Matthew

The purpose of this experiment is to determine which of two plant types more effectively filters copper out of copper-contaminated soil, as well as to explain how the characteristics specific to the better copper absorber allow it to carry out this purpose. The results of this experiment could help determine which plant types are more effective decontaminators of polluted habitats or ecosystems; this information could potentially be used to detoxify polluted environments and create more fertile ecosystems worldwide. In this experiment, 3 copper-contaminated soil samples for each plant type will be compared to 3 control samples for the same species, and to the copper-contaminated samples for the other plant species. Plants will be grown in the same location, and given the same amount of water for 6 weeks. After each plant reaches maturation, copper concentration will be calculated using at least one of two methods: BCA reaction analysis or AA Spectroscopy. The resulting concentrations from each sample will then be compared to those of the copper-free control samples to determine which plant, if either, is a more effective filter of copper.

Dice Master

Kayla Segner with Sargent, Noah

Nelson, Tyjuan

Faculty Mentor: Tian, Esther

The construction of this project was tasked to group of students in an introductions to engineering class to create a robot arm. The goal was to create a arm that would swing back and forth at 120 degrees and rotate a cup at the end at 180 degrees, to shake and drop the die. Research was conducted as to different design types, servo sizes, and code types. Several designs and codes were created and tested such as different swing speeds and different sized cups. Then the designs were printed and constructed using screws, superglue, and wire. The end result was a working dice roller that completed its task with efficiency.

Photoremediation of Copper with Pea and Radish seeds

Daniil Shapovalov with Shapovalov, Daniil

Deltoro, Javier

Faculty Mentor: Siderhurst, Matthew

The purpose of this experiment was to determine if peas and/ or radishes would work in decreasing the concentration of copper in soil.

What is this, Like, All About? A Corpus Linguistics Study on the Historical and Contemporary Use of the Word "Like"

Abigail Shelly

Faculty Mentor: Balasch, Sonia

This study traces the etymology and modern usage of the word "like" through corpus analysis. The author then uses these analyses to guide independent research on native and non-native English speakers' use of "like."

The modern usage of the word “like” is compared in its variety of accepted functions with examples from Merriam Webster Dictionary, the Corpus of Contemporary American English (COCA), and the Michigan Corpus of American Spoken English (MICASE). COCA provides evidence on the increasing use of “like” along with data on collocations, which support the notion of its use as a quotative expression, as indicated in Tagliamonte & D’Arcy (2004).

The independent research, using MICASE as the primary data component, showed that native speakers used “like” in a function that is considered standard by Contemporary American English (CAE) in only 10% of the cases, compared to 66.7% of standard use observed among non-native speakers. This study provides grounds for questioning if the dynamic nature of language - as evidenced in the functioning of “like” in natural language - should be considered when setting standards for teaching English as a second language.

Corpora

Corpus of Contemporary American English, <https://corpus.byu.edu/coca/>

Michigan Corpus of American Spoken English,
<https://quod.lib.umich.edu/cgi/c/corpus/corpus?c=micase&cc=micase&type=simple&q1=like&gender>

References

Tagliamonte, Sali; D’arcy, Alex. (2004). He’s like, she’s like: the quotative system in canadian youth. *Journal of Sociolinguistics*, August 4, 2004: 493-514.

Phytoremediation of Copper Contamination: Using Sunflowers in Sustainability

Addison Shenk with Raber, Alex

Barns, Haley

Faculty Mentor: Siderhurst, Matthew

The purpose of this project is to test how effective sunflowers are in the phytoremediation process, which is a cleanup technique for removing contaminants in soils. Copper is a common element in soil that affects plant growth. A small amount of copper can assist plant growth, but excess concentrations will adversely affect most plants. For this experiment we have begun testing various copper concentrations, ranging from 0-200 mg/kg of soil, in twelve individual pots each containing several sunflower seeds. After eight weeks, we plan to test the concentration of copper left over to determine if the sunflower is an effective plant in cleaning up the soil. In addition, we are observing how the various levels of copper affect the plant growth in terms of height and number of leaves.

References:

Bharti S, Banerjee TK. 2012. Phytoremediation of the coal mine effluent.

Ecotoxicology and Environmental Safety. 81: 36-42

Analyzing protection of albumin from hydrogen peroxide induced degradation and oxidation by blueberries

Jonah Short-Miller

Faculty Mentor: Cessna, Stephen

Production and prevalence of hydrogen peroxide (H₂O₂) in the cell is an accepted fact of cellular respiration and function. However, elevated rates of H₂O₂ are characteristic of cancerous tumor cells and other cell-damaging phenomena, including protein degradation and oxidation. It has been found that small changes can be made to proteins by reactive oxygen species which lead to protein aggregation and oxidation. Aggregation of this nature can lead to proteins falling out of solution and forming a precipitate. Antioxidants serve to reduce the impact of these reactive oxygen species on proteins and other important cellular components. Antioxidants, such as Vitamin C, play important roles in reducing cellular damage done by reactive oxygen species by removing the species from the cell. Research specifically into blueberries and other similar berries found that, for blueberries, a wide variety of antioxidant compounds exist separate from Vitamin C. Compounds such as these, like flavonoids, bind to human serum albumin and prevent oxidation. Native gel electrophoresis and fluorescence spectrophotometry will be utilized to measure the effects of protective abilities of antioxidants on human serum albumin, in samples with and without Vitamin C or blueberries. The gels will reveal information about fragmentation, while the fluorescence spectrophotometer will measure aggregation of the albumin. The purpose of gathering this information is to investigate the potential antioxidative effects of blueberries on human serum albumin. These findings will be specifically presented and interpreted relative to the effects of known antioxidant Vitamin C.

Living in Harmony: Crossing Cultural Barriers with Music

Stephanie Slabach Brubaker with Mirarchi, Taylor

Sturm, Rachel

Walker, Thomas

Faculty Mentor: Emswiler, Jan

According to Church World Service (CWS), Harrisonburg, Virginia has been a designated refugee resettlement city since 1988 when refugees first started coming from Eastern Europe (CWS, 2018). Today, Harrisonburg continues to welcome refugees and, in 2013, 260 refugees from over 15 different countries settled in Harrisonburg, 16% of all refugees settling in Virginia (VDSS, 2013). When relocating to a new country, refugees face many barriers to integrating into the United States like learning English, building new relationships, maintaining one's own culture, and finding ways to restore lives shattered by violence and injustice. Laura Douglass, the former Director of Music at Asbury United Methodist Church, created the Family Music Project as a way to bring refugee families into relationship with local families through music, a mode of communication that everyone can understand.

Four EMU nursing students formed a partnership with the Family Music Project to engage in their mission and to help with a need of the project. Through participant observation, a windshield survey, informant interviews with participants and Laura, and a review of secondary data, we identified several needs. These included funding and networking to grow and reach more participants. In order to fulfill these needs, we are currently laying a foundation and planning a benefit concert to both raise funds and awareness about the Family Music Project. In

addition to the fundraiser we will be assisting Laura in writing grants to bring in more funds. An evaluation of our efforts will be conducted.

The role of unc-53, aex-3, and nid-1 in axon guidance during neurodevelopment in C. elegans

Marchelle Smucker

Faculty Mentor: Schmidt, Kristopher

The role of unc-53, aex-3, and nid-1 in axon guidance during neurodevelopment in C. elegans

The development of the nervous system is a delicate process that is crucial to the function and fitness of complex organisms. Given the importance of nervous system function its development is controlled through by multiple genetically redundant pathways. In this project, C. elegans is used as a model system to observe contributions of three different genes in neurodevelopment, focusing specifically on whether they function in separate or similar genetic pathways. Previous research has shown that aex-3 and nid-1 genes, when missing or mutated cause defects in axon guidance (Bhat & Hutter 2016). Additionally, unc-53 is known to cause similar defects (Stringham & Schmidt 2009). These defects can be observed microscopically by crossing fluorescent markers into the mutated strains. Defects include axons taking indirect paths to their usual destinations, having a new destination altogether, or otherwise deviating from that of wild-type organisms. Severity of the penetrance of the mutation will be scored by counting the average number of defects in the organisms. To observe interaction these genes may have on one another, we will create double-mutant strains. By doing so, it will be able to be determined whether the genes work mechanistically in the same pathway or individually. For example, if two genes work on the same pathway, a double-mutant would not significantly increase the number of defects because the pathway is already “broken” by the first mutation. Bhat & Hutter already showed that double-mutants of nid-1 and aex-3 have significantly increased defects than either mutation alone (2016). This project will explore the double-mutants of aex-3; unc-53 and aex-3; nid-1 by performing crosses between these strains and observing the resulting occurrences of defects as in the first part of the project.

Paper Airplane Optimization with the Taguchi Method

Ben Stutzman with Engle, Austin

Faculty Mentor: King, Daniel

Everyday decisions are often made subjectively, but an objective decision-making strategy is often beneficial to the design process. To help engineers make the best decisions, several objective optimization strategies are available. One such method of optimization is called the Taguchi method, which allows simultaneous testing of several variables in a reduced number of trials to achieve results that can easily be generalized. In this project, the Taguchi method was used to manipulate four variables and select an optimal design for a paper airplane.

The variables that can be manipulated to improve a design are called control factors; this experiment used paper size, folding orientation, shape design, and added weight. Each control factor was assigned three levels—for example, the levels for paper size were ½ sheet, 1 sheet, or 2 sheets taped together. To test all the possible combinations of four control factors with three levels each would require the construction of $3^4 = 81$ airplanes. However, the Taguchi method

uses a technique called fractional factorial design to condense the number of airplanes to just 9, while still allowing independent analysis of each control factor.

Similarly, noise factors, or environmental variables that can't be controlled in the design, were incorporated. The noise factors used in this project were launch angle, throw force, and hold location. Following this method, nine paper airplanes were built and tested with four noise factor combinations, and the distances thrown were averaged to optimize each control factor. Finally, a virtual model of the theoretical best airplane was created and analyzed with Flow Design software, and then adjusted to increase its flight distance.

Although paper airplanes are a very specific and seemingly impractical application of the Taguchi method, they demonstrate how control factors can be optimized effectively to select the best possible design without testing hundreds of scenarios.

Caffeine Effects on the Cognitive Memory of Sleep Deprived Mice

Becca Tate

Faculty Mentor: Yoder, Jim

Today's society is experiencing an increase in sleep deprivation and insufficient sleep has been shown to affect people's mood, mobility, and cognitive memory. To counter these effects, the stimulant caffeine is often consumed. The objective of this experiment is to determine if caffeine is effective at counteracting the effects of sleep deprivation on cognitive memory in mice. Mice will be sleep deprived via a shaker table shaking every 10 minutes for 10 seconds, every hour for 14 days. A total of three groups of mice will be used: 1) not sleep deprived, 2) sleep deprived and 3) sleep deprived and injected with caffeine. Cognitive memory will be tested by using a Morris Water Maze. This type of maze consists of a 5ft diameter pool of water with a clear platform placed in the pool. The mice will be trained to swim to the platform from anywhere in the pool using outside cues twice a day for two weeks. All three groups of mice will be trained with the same maze using the same procedure. To determine how their cognitive memory is affected by sleep deprivation and caffeine, the time to reach specific benchmarks will be recorded. These benchmarks are remaining on the platform for 15 seconds, not swimming around the edge of the pool, finding the platform without assistance, and the time to find the platform. These benchmarks should reflect any effect of the treatment on the speed of the mouse's cognitive memory. Results from this study may help in determining the usefulness of caffeine to counteract the effects of lack of sleep.

Water Quality of Lake Shenandoah based on pH, dissolved oxygen, and biochemical oxygen demand.

Mauricio Triminio

Faculty Mentor: Yoder, Laurie

The purpose of this experiment is to investigate whether the water quality of Lake Shenandoah located in Rockingham County, Virginia is acceptable or not based on pH, dissolved oxygen, and biochemical oxygen demand. This experiment is of significant importance as it would help the public be informed of the water quality in the lake. Such information could further contribute to implementations being made to address issues that might arise in the future due to contamination by external sources, thus, improving the water quality for humans and animals.

An Analysis of the Bioaccumulation of Copper in Mint

Matthew Troyer with Peachy-Stoner, Reuben

Schlabach, Joshua

Faculty Mentor: Siderhurst, Matthew

Mint was tested for its ability and usefulness in phytoremediation efforts. Mint was grown in soil with different concentrations of copper sulfate, then the phytoremediation capacity was tested by determining the copper concentration of mint samples through spectrometry. The usefulness of mint in particular was determined by how effective it was at phytoremediation and whether the resulting mint could still be considered safe to eat by FDA health standards.

Improving Mental Health Knowledge in Parents of Children Homes in Nepal

Pratiksha Tyson with Yoder, Laura

Faculty Mentor: Don Tyson

Background

Mental health carries a significant stigma in Nepal and this stigma has made it challenging for people to seek support when needed. The lack of access and support has made it especially challenging for orphan and abandoned children with a traumatic past to receive care.

Objective

To assess children-home parents' knowledge, skills and attitudes regarding mental health and to evaluate if training on mental health provides any positive changes.

Method

A pre- and post-questionnaire was used to assess the knowledge, skills and attitudes of the parents before and after the training. The parents involved were working for the children-home organization and were directly involved in providing care to the orphan and abandoned children.

Result

Among the six parents that participated in the project all of them believed that the two hour training provided them with basic knowledge regarding mental health, and all but one parent felt comfortable providing support to the children with mental illness in their respective homes.

Conclusion

Mental health awareness is necessary in Nepal as people do not have a basic understanding and have significant misconceptions, which can create challenges in providing support to the people that are struggling with mental health issues. The parents that directly impact a child's life can benefit from education and training about mental health.

Harvesting Oil from Algae: Comparing Biofuel Yield of Freshwater and Saltwater Algae

Amanda Williams with Mendoza, Cerrie

Lutz, Dan

Haggard, Lydia

Faculty Mentor: Siderhurst, Matt

This project will seek to compare the difference in yield of biofuel from saltwater algae and freshwater algae. Growing algae as biofuel is a novel, sustainable solution to reducing carbon emissions. We will accomplish this by growing two types of algae and extracting oils from them to create biofuels. After comparing the yield of the two algae, we also hope to determine what type of algae creates oils which are better for biofuel by comparing strength and longevity of the oil produced. Factors that will be taken into consideration, when trying to determine what type of algae would be better to use as a biofuel source will include ease of care and growth rate of the algae.

Habitat Suitability Index for Flatfish in Delaware Inland Bays: Using GIS to map where *Paralichthys dentatus* (summer flounder) and *Trinectes maculatus* (hogchoker) are most likely to be found in the Indian River and Rehoboth Bays

Amanda Williams

Faculty Mentor: Yoder, Jim

The Indian River Bay and Rehoboth Bay comprise most the inland bays in Delaware and are a central destination for residential and tourist recreational activities. Flatfish angling is the most popular recreational activity in these bays. *Paralichthys dentatus* (summer flounder) and *Trinectes maculatus* (hogchoker) two types of flatfish, are the most sought after flatfish, and population sizes continually fluctuate with high water temperatures, low dissolved oxygen (DO), and low salinity. This project sought to map where summer flounder and hogchoker are most likely to be found in the Indian River and Rehoboth Bays, based off temperature, DO, and salinity. Data was collected from online data sources, which include the Delaware Citizen's Science Program, and a University of Delaware student's thesis project. The data was then mapped using Arc Geographic Information Systems (ArcGIS) software and a habitat suitability index (HSI) was made showing where these two flatfish are most likely to be found. Results find that water temperature increases with increasing distance from the ocean, and DO and salinity levels remain consistent throughout the bays. The HSI shows that the inland bays are not optimal habitat for flounder or hogchoker, but still are able to sustain populations. Results suggest that further research is necessary to make stronger data-trend claims, and that data on the water quality of the Rehoboth and Indian River Bays should be more accessible to the public.

Where is the best place to buy fish in Harrisonburg: A comparison of tank cleanliness between commercial pet stores and local pet stores.

Amanda Williams with Triminio-Herrera, Mario

Lapp, Leah

Faculty Mentor: Byer, Owen

Leaving dead fish in tanks has the potential to cause living fish to become infected with a bacteria or parasite and contract a disease (Practical Fishkeeping, 2016). Quick removal of dead fish, however protects living fish from being exposed to these risks and creates a cleaner tank. We would like to compare the cleanliness of fish tanks between commercially owned pet stores and locally owned pet stores. In our study, we are observing tank cleanliness by collecting data to create a ratio of dead fish per total fish at each store. Our population is fish in Harrisonburg pet stores- specifically fish in Petco, Petsmart, Sylvia's Pet Shop, and Nerdy Dog's Pet Shop. Each group member will visit Petco, Petsmart, Sylvia's and Nerdy Dog's two times, on different days of the week and at different times of the day, over a period of two non-consecutive weeks. This

will account for the pet stores different cleaning schedules or shifts that may vary from day to day or time to time. We hypothesize that commercial pet stores will have a greater number of dead-fish/total-fish than local pet stores.

E-health Literacy of International Students attending Eastern Mennonite University: A Preliminary Study

Jingchuan Wu

Faculty Mentor: Koop, Gregory

The internet becomes more and more popular for information acquisition online. The development of the internet has even helped people access to medical consultation. Although this development could have great potential to increase new comers' (international student) health status, whether the international student have sufficient competency to use online information for health purpose remains questionable. By assessment with E-health literacy scale, we could gain insights into their willingness and competency to use the internet to assess information in the medical field. The study was designed to explore the international student in the Eastern Mennonite University and to investigate the factors which associated with overall E-health literacy.

Acid Rain Deposition

Ayhubrhan Yifru with Coffie, Phoebe

Faculty Mentor: Yoder, Laurie

The purpose of this research is to measure the acidity of rain in the city of Harrisonburg and Rockingham county by measuring the concentrations of nitrate and sulfate along with pH. Using an ion-exchange column, rain precipitates were collected. Concentrations of nitrate and sulfate ions extracted from the column were determined by turbidimetric method and colorimetry. A second method using pH probe was also used to determine the acidity of the rain sample. The results of this research could be used to take further precaution on human activities that account for pollutants emission that results in acidic rain.

Efficacy of diabetes control and education administered by health promoter-practitioners – a program assessment.

Maria Yoder with Nisly, Jeanette

Faculty Mentor: Hershberger, Ann

Isolated, rural, and impoverished communities around the world face barriers to access governmental and private health care. In some areas, community health workers (CHWs) have been used in place of the public or private healthcare system to care for their respective communities and break down cultural boundaries. The Concern America program follows the CHW model for rural communities in the Petén region of Guatemala, except they train Health Promoter-Practitioners (HPPs) to prescribe medication without licensed physician involvement. The most common chronic diseases treated by HPPs are diabetes and hypertension. A1C, blood pressure, and neuropathy of diabetic patients in control will be measured in this study to evaluate the care given by these HPPs to determine if additional interventions are warranted. The quality of health education taught by HPPs will be measured through an oral quiz and observation. Patient demographic information, quiz scores, distance from clinic, and

appointment frequency will be correlated with diabetes control measures to determine which groups could be treated more effectively.

Sound sensitive LED light strip.

Aaron Zimmerman with Sauder, Karissa

Faculty Mentor: Tian, Esther

Our task was to create our own project that incorporated all the things we learned throughout our engineering design class including circuitry and programming. One requirement was that we use an Arduino board to control our project. This would also incorporate the coding aspect of the project. We ended up choosing to do some light programming. Our proposal was to have a strip of LEDs that would pick up sounds and light up accordingly. The final idea was to have the Arduino pick up the volume of whatever music was playing and transfer that information to the LEDs so that the lights would brighten according to how loud the music was. We also then wrote a loop that allowed the LEDs to change color while flashing.

