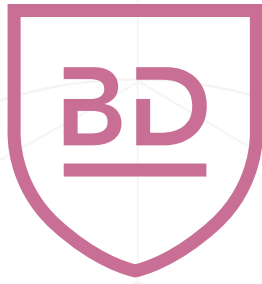


Senior Projects

2022–2023



BASIS AHWATUKEE



SENIOR PROJECTS

At this point in their senior year, BASIS Charter School students have completed a set of four BASIS Capstone classes to earn their BASIS Honors Diploma. In addition, many students are in the process of completing the prestigious College Board's AP Capstone Diploma™, a challenging, two-year sequence of AP Seminar™ and AP Research™, plus four other AP® Exams, all of which require extensive research, writing, and oral defense. The BASIS Diploma Senior Project marks the culmination of this hard work and perseverance.

Completed in the third trimester of a student's senior year, the Senior Project is unique, self-designed, and reflective of the students' varied academic interests and passions. Regardless of the discipline —business, art, humanities, science, engineering, social work, medicine, or law — each senior must develop and explore a research question. Creating an abstract that sets the tone of the research, participating seniors must submit a project proposal, and later, orally defend their methodologies.

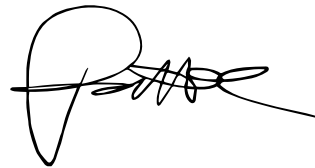
Under the guidance of an external advisor who is a professional in their field, as well as a faculty advisor from their school, students dedicate 10–15 hours per week to the completion of their Senior Project. To document their journey, students post weekly blog entries about their experiences, successes, and challenges as they explore their guiding question. This journaling provides a unique viewpoint on the student activities and adds a reflective layer to their research process.

Throughout the development of the Senior Project, BASIS Charter Schools support their seniors every step of the way as they develop investigative skills and their own individual scholarly pursuits. The project summaries in this publication clearly illustrate each senior's ability to apply the knowledge, and intellectual curiosity they have acquired in the classroom to professional research methods and learning. At the successful conclusion of this project, students are eligible for a BASIS Diploma with High Honors, the most distinguished accolade offered by BASIS Charter Schools.

Each member of the BASIS Charter Schools network commends our seniors for their dedication, and motivation, not only for completing this Senior Project, but for their commitment to the BASIS Charter School Curriculum. Congratulations to them on this powerful achievement, and our best wishes as they move forward on their educational journey.



Carolyn McGarvey
Chief Executive Officer
BASIS Ed AZ+



Patti Bezanson
Chief Executive Officer
BASIS Ed Texas

AFAREEN A.



THE ART OF THE INCENTIVE: THE EFFECTS OF MOTIVATORS, INCENTIVES, AND POSITIVE PSYCHOLOGY ON ELEMENTARY SCHOOL-AGED CHILDREN

SUMMARY: Motivators are everywhere and they keep our world running. Without a drive to do something, nothing would get done. Motivators are especially important in classrooms. Educational experiences are shaped by the motivators and incentives utilized by teachers to create a calm and thriving classroom environment. The way students stay motivated to learn becomes a huge part of their learning experience, and affects how they go on to perform in higher levels of education. Knowing how to motivate students is an important part of understanding child development. Using a variety of motivation techniques is also very beneficial for teachers, as classroom management is essentially half of teaching. As an intern at Dobson Academy Ball Charter Schools, a public charter school, I had the opportunity to see different motivators taking place in a real-life classroom. Using observation and surveys administered to students, I gained a better understanding of the impact that intrinsic and extrinsic motivators have on students. My research focused on the effects of different motivators on student performance, so that I could discover the most effective motivation techniques. I expected to find extrinsic motivation to be used more often and intrinsic motivation to be found depending on the individual or subject being taught in class. This is because intrinsic motivators such as positive psychology are harder to use and are rare in most school settings.

- **BASIS ADVISOR:** April Klundt • **ON-SITE MENTOR:** Doneitta Layeux
- **LOCATION:** Dobson Academy, Ball Charter Schools

LILA A.



THE ELEPHANT (AND THE DONKEY) IN THE ROOM: PARTISAN POLITICS IN THE SOCIAL SPHERE

SUMMARY: It is common knowledge that the government and politics exert a certain level of influence over our day-to-day lives. Whether it be the ingredients in our toothpaste or the cost of gasoline, the leaders we elect are regulating seemingly mundane aspects of our environment. However, in light of recent events, many have come to question the rights and responsibilities of the federal government and state governments. Should social issues such as a woman's right to an abortion, marriage, and safety in schools be in the hands of a select few, even when the majority disagrees with their choices? In my senior project, I explored the extent to which politics has invaded the social sphere. During my internship at One•n•Ten, a nonprofit organization dedicated to serving and assisting LGBTQ youth ages 14 to 24, I observed and assisted with programs at the youth center. This gave me the opportunity to survey participants regarding their experience with modern politics and how it has affected different aspects of their lives as queer individuals. Using this data, I furthered my research by exploring a variety of topics with similar implications. My research helped me determine whether politics has a place at the table when it comes to subjects that are beyond dispute, such as the right to privacy, the right to marriage, and the rights to life, liberty, and the pursuit of happiness.

- **BASIS ADVISOR:** Kerry Green • **ON-SITE MENTOR:** Gina Read • **LOCATION:** One.n.Ten

SUZAN A.



EDUCATION IN THE PANDEMIC: THE DISPARATE IMPACT ON STUDENTS' ACADEMICS

SUMMARY: Attention-deficit/hyperactivity disorder (ADHD) is a neuropsychiatric disorder that affects children and adults by interfering with and decreasing the quality of social, educational, or work functioning. Students with ADHD face challenges such as the inability to concentrate on a task, prioritize problems, manage time properly, complete a task, or correctly cope with stress or frustration. Moreover, during the global pandemic, these students were forced to adapt to a new learning environment where learning shifted from being done in the classroom to at home, often with classes becoming asynchronous. Due to a lack of social interactions and visual cues, students, and those with ADHD especially, struggled to stay focused and engaged in online classes. This led to different educational, behavioral, and developmental setbacks for all students, not only those with ADHD, as students were unable to access the essential tools they needed in order to master the newly introduced materials. Through my internship, I collected data on the trends in academic performance of students prior, during, and after the pandemic and the new challenges teachers are facing in the classroom post-pandemic. I connected data to the general impact ADHD has on students' academics to identify specific difficulties students with ADHD encountered throughout quarantine. Furthermore, I determined the impact virtual learning has had on the academic performance of students with and without ADHD and how teachers can better support them as they transition to a post-pandemic classroom.

- **BASIS ADVISOR:** Candice Pennamon • **ON-SITE MENTOR:** Dr. Arash Esmaili Zaghi and Michael Vaccaro
- **LOCATION:** University of Connecticut

RONALD B.



MUSIC TO MY GEARS: A LOOK INTO MUSIC THERAPY FOR NEUROLOGICAL DISORDERS

SUMMARY: What if I told you your favorite music could literally give you peace of mind? With today's healthcare system targeting health problems such as coronavirus, cancer, and heart disease, neurodegenerative mental diseases (NDs) are struggling for the limelight. According to the National Library of Medicine, experts estimate that "a full 60 percent of the U.S. population lives with at least one neurological disorder, including Alzheimer's, Parkinson's, and schizophrenia." As America is one of the leading countries in life expectancy, the aging population is rising faster than medicine can support. Due to these concerning statistics, enhanced therapeutic techniques are being evaluated as possible improvements for traditional antipsychotic treatment as well as a new point of perspective for the future of healthcare. By using methods such as musical therapy in conjunction with brain imaging, physicians can harness musical empathy to mediate anxiety and promote recognition memory across patients. Exploring this research could drastically change the world of neurology and give a better quality of life for these vulnerable populations. Through clinical research, surveys, and playing instruments, I was able to evaluate the extent of musical treatment in neurology care and provide insight into the mental benefits of playing music for others. Additionally, I addressed what direction medicine should take for mental health and found out what is currently working and lacking in addressing neurological decline.

- **BASIS ADVISOR:** Jada Genter • **ON-SITE MENTOR:** Andrea Sciacca • **LOCATION:** Therapy Matters

CHRISTINA D.

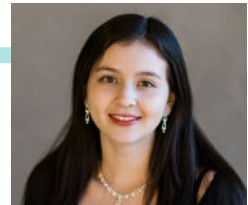


MARKETING: A STUDY IN CONSUMER-BASED ADVERTISING

SUMMARY: In recent years, social media has become the dominant way that people get their information about the world around them. Faster than ever, information is spread and consumed, and with it, marketing takes a whole new form. However, consumption of media varies drastically from age group to age group and platform to platform. Different age groups have preferences for their social media of choice and not everyone gets their information through the same platforms. Some platforms may have audiences of primarily women, and others have an even mix of both men and women. Due to this disparity, marketing to target specific consumer bases is more important than ever to avoid unnecessary losses from efforts thrown into a void. On a grander scale, marketing resources can easily be wasted on several other forms of media, such as billboards, TV ads, and others, if that type of media is rarely considered by the consumer. In this project, I researched how companies use different marketing approaches to target different audiences, how they combine these strategies into a larger, overarching policy, and how this policy maximizes company profits. To accomplish this, I worked with various marketing teams at Enterprise and observed their strategies and methods. I informally interviewed employees about their roles and strategies, and through careful observation, I began to understand how each group's roles intertwine to create a cohesive and effective policy.

• **BASIS ADVISOR:** Candice Pennamon • **ON-SITE MENTOR:** Lisa M. Ampil • **LOCATION:** Enterprise Holdings

KAYLEE F.



INCIDENCE AND ADULTS: AN INVESTIGATION OF THE OCCURRENCE OF TYPE-1 DIABETES IN ADULTS

SUMMARY: Approximately 1.45 million Americans suffer from type 1 diabetes (T1D). In 20 years, that number will nearly double. This is an issue because diabetes causes a range of health complications, including heart disease, strokes, neuropathy, and necrosis. As the child of a type 1 diabetic, I have witnessed my father go through numerous health complications. For example, my father underwent a heart stent due to a large blockage in his arteries. It hurts to see someone you love suffering, but as I grew up my dad always told me I would be the one to cure T1D and that gave me hope. I took this idea into my senior project. For my paper, I researched the possible causes and the cures that are in development. Through my site placement, I gathered more knowledge from my mentor who works as an endocrinologist and has extensive knowledge about T1D. I was also able to gain experience in a clinical setting and see what it is like in the life of an endocrinologist. I learned directly from patients about their condition and how it affects them. My mentor also has colleagues working in an academic setting, who were able to supply more information on current research. All of this gained knowledge has brought me one step closer to my lifelong goal of curing T1D.

• **BASIS ADVISOR:** Melissa Calderon • **ON-SITE MENTOR:** Dr. Naga Nalini Tirumalasetty
• **LOCATION:** Healthy Living Endocrinology

RACHEL G.



CONSERVATION STUDY: STRATEGIES FOR BIRDS IN ARIZONA BASED ON POPULATION, HEALTH, AND ENVIRONMENTAL FACTORS

SUMMARY: In 4th grade, I became obsessed with birds. I had always loved animals, but in middle school, I became increasingly intrigued with biology and the natural systems of the world. I rescued my first quail when I was in 8th grade. Since then, I have gotten involved with local conservation efforts. I volunteered with the Audubon Society, cleaning and maintaining a local hummingbird habitat. I currently volunteer at Liberty Wildlife, a local wildlife rescue organization, where I educate the public on the importance of native creatures in the desert ecosystem. After taking the AP Environmental Science course in 11th grade, I decided I wanted to pursue a career in environmental engineering. Over the years, slowly but surely, my love of animals has turned into a greater passion for defending them and the environment they help to sustain. North America has lost 29% of its bird population in the past 50 years, amounting to roughly 3 billion birds. But due to tireless repopulation and conservation efforts, many species have been brought back from the brink of extinction. What methods and strategies are used in conservation of a bird species, and how do these methods vary based on the strength of the population, the threats to its habitat, and other environmental pressures? In this project, I continued working with conservation organizations in Arizona and engaged in field work. This critical, hands-on experience allowed me to better understand the challenges faced in wildlife conservation as well as the strategies used to overcome them.

• **BASIS ADVISOR:** Heather Weiler • **ON-SITE MENTOR:** • **LOCATION:** Liberty Wildlife and Arizona Audobon Society

ELENI H.

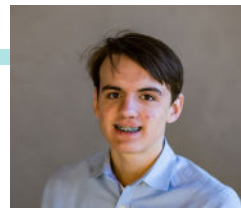


STEM VS. NON-STEM: THE GREAT SCHISM OF HIGHER ACADEMIA AND BEYOND

SUMMARY: Taking the world of academia by surprise, the recent domination of STEM subject areas has altered future job markets, and will continue to do so. The subject areas' favorability continues to amass various kinds of typically underrepresented demographics (via cultural, social, or gendered norms), leaving many wondering what makes this sector of study so enticing, and how this influx of STEM workers will alter future job employment. To better understand whether professions may prosper or become outdated, my senior project focuses on predicting future job patterns in and around the STEM fields by better understanding the reasons for employee entrance in the first place. I observed the relationship that Arizona State University's faculty and students have with STEM to understand what factors best influenced them to make this choice. I also examined how their collective decision to enter the field could impact the later job climate. I collaborated with experts in the field, as well as modern-day educators at ASU, through personal observation and historic census data to uncover how recent decisions by workers have played a larger role in employment trends within and surrounding STEM.

• **BASIS ADVISOR:** Kerry Green • **ON-SITE MENTOR:** Suzan Allaham
• **LOCATION:** Arizona State University, Ira A. Fulton School of Engineering

SPENCER H.

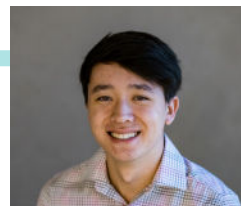


THE LAST FRONTIER? A THOROUGH PREDICTION OF THE FUTURE OF FILM AND TELEVISION IN THE STREAMING AGE

SUMMARY: Audiovisual production, or feature-length films and television series, are in a period of unprecedented change. Streaming has revolutionized distribution, and the Academy Awards have recently awarded an Apple TV+ exclusive film Best Picture, a major first for both organizations. Streaming platforms are developing new ways of sustaining the massive amounts of movies and TV series that must be produced a year, while also balancing stable production with attractive offers for creative talent. As a result, creatives have a lot of choice, with so many services available to distribute their audiovisual art. This project weighs the potential success of film and television against one another, asking which medium is more profitable and spurs more creativity. At Intel, I assembled a comprehensive analysis of production, both in terms of looking at professional opinions from those familiar with the matter, as well as public, quantitative data that accurately reflects the current state of production. This project helped me understand the current state of production in the digital era, and how the industry has adapted to fit this new economic landscape. After creating a thorough analysis of where the industry is currently, I produced a short-term prediction, using all of the available information I had gathered.

• **BASIS ADVISOR:** Dyson Ellis • **ON-SITE MENTOR:** Susan Beardslee • **LOCATION:** Intel

TREVOR H.



UNEMPLOYMENT IN GEN Z AND MILLENIALS: PREVENTION STRATEGIES FOR BETTER HIRING AND RETENTION

SUMMARY: Finding and keeping strong employees is an ongoing issue that perhaps impacts younger workers the most. This is partly due to a lack of experience, but also because they lack the resources to find and maintain a job. People will create LinkedIn, Indeed, or Glassdoor accounts, but still will not be able to find success. It has been proven that the unemployment rate of people ages 16 to 24 is 9.7 percent, despite using technology the most compared to older generations. This in part is due to the skill mismatch younger people have, and employers not being able to provide for these skills. But how can this be changed? How can we encourage young people to join the workforce? What can young people do to join? In my project, I worked with my site mentor to create a website better suited to these skill mismatches. In this journey, I learned how to make a website and was able to provide insight into what younger people prefer. In addition to the website, I posted blogs about the website, learning to take into account user feedback. This project taught me about website making as well as how companies seek out employees.

• **BASIS ADVISOR:** Tara Goldhammer • **ON-SITE MENTOR:** Allison Pogas • **LOCATION:** Xperience

YUN SEO H.



BANG! ON A BILLBOARD! UNDERSTANDING MARKETING STRATEGIES AND MOTIVATIONS OF SPORTS TEAMS

SUMMARY: Sports are nothing without fans. Fans are essential to a sports team's success. For example, fans can buy jerseys to support their favorite players or show up to games to cheer for the team. But the most important thing a sports team needs is its connection to its fans. With the boom of social media and the internet, teams have entire departments dedicated to working on the team's social platform and interacting with fans. Today, we see media coordinators asking the players a variety of questions to get an insight of what life is like for these players. My objective at Science of Sport was to understand the marketing goals of the organization and how they enhance the work of professional sports teams. Using these objectives, there are several questions I asked during my internship: "What are the different marketing motivations of professional sports teams and their importance to the success of the brand?" and "How can we apply these marketing strategies in other companies?" We can see a lot of marketing trying to educate the public, scaring the people with numbers and statistics. For example, vaping ads use numbers and fear-based ads to create a sense of dread. But maybe marketing can be used to educate without the scare tactics. Sports marketing creates a sense of community and a generally positive atmosphere. Taking examples and applying them to Science of Sport's goal, I aimed to create a more positive sport marketing environment and motivate kids to explore their interests.

• **BASIS ADVISOR:** Francisco Secci Martinez • **ON-SITE MENTOR:** Meghan Marriott • **LOCATION:** Science of Sports

AKHILESH J.



BOUNCING BACK: HOW ATHLETES SUCCESSFULLY RECOVER FROM INJURY

SUMMARY: Athletes at all levels suffer serious injuries, ranging from tears in ligaments to broken bones. The way that these injuries affect athletes has long been a topic of discussion, and my project dives into the details of how the recovery process affects their performance when they return. The main driving factor in an athlete's complete recovery is the rehabilitation process. In rehabilitation, athletes focus on regaining motion and strength which was lost from the injury. By comparing the different processes used and the effects each has on the post-injury performance of the athlete, I aimed to find a correlation between recovery methods and performance. I believe this research can change the way sports injuries are managed in recovery, helping boost the athlete to their peak. Through analyzing these trends, more can be done to promote proper rehabilitation practices, allowing athletes to both play and live better. Working at Foothills Sports Medicine and Physical Therapy with physical therapists specializing in rehabilitation of athletes, I was able to learn more about the intricacies of the recovery process. I observed and recorded the different steps that athletes push themselves through to reach their goals. This research can be helpful for all athletes struggling with an injury. By examining the injury recovery process, the most effective recovery methods can be pinpointed for the aid of everyone.

• **BASIS ADVISOR:** Aimee Maddeford • **ON-SITE MENTOR:** Ted Carter
• **LOCATION:** Foothills Sports Medicine Physical Therapy

DOHYUN K.

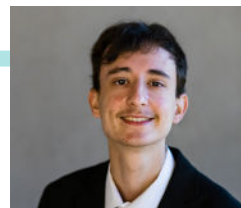


TO SE(E-) OR NOT TO SEE: VISUALIZING THE “INVISIBLE” QUANTUM PROCESSES VIA CODES

SUMMARY: We often look at the world through a macroscopic lens, but what about the world that exists microscopically? There exists a world of electrons at the quanta level invisible to the naked eye. Experiments studying these electrons have been ongoing for decades, first conducted by Heinrich Hertz and Wilhelm Hallwachs in 1887 to confirm Albert Einstein’s revolutionary hypothesis of the localized nature of light quanta. Einstein’s hypothesis introduced the photoelectric effect, one of the most fundamental processes used for probing atoms, molecules, and condensed matter. Studying the photoelectric effect allows us to utilize photoelectron spectroscopy, photon detection, and electron sources to advance our understanding of the composition of materials, better photon detection, and stronger electron beams. This ultimately brings multidisciplinary benefits, including better understanding in medical applications, energy storage, basic chemistry, and more. In my project, I helped Dr. Siddharth Karkare and his team at Arizona State University in enhancing the 3-D energy momentum analyzer model which they have developed to study the photoemission of electrons. Specifically, I was involved in debugging and analyzing the MATLAB software program that measures the time and position of electron samples that have hit the analyzer’s detectors. This enabled me to gain deeper insight into the role this software system plays in visualizing the “invisible” microscopic materials. Studying the microscopic world can bring macroscopic benefits. By enhancing this software system that studies the photoelectric processes, my goal was to contribute to the progress of technology—and eventually society—one code at a time.

- **BASIS ADVISOR:** Don Whiteside • **ON-SITE MENTOR:** Dr. Siddharth Karkare
- **LOCATION:** Arizona State University, Department of Physics

ADRIAN L.



RESPECT THE DRIP: COMPARING WATER CONSUMPTION BETWEEN TRADITIONAL AND VERTICAL FARMING

SUMMARY: Agriculture is the single greatest user of water in the United States, which accounts for 80 percent of water consumed in the U.S. Due to an ongoing 20-year drought in the Southwest, traditional farms have had to compete with each other and with cities for access to water. When I learned about Homer Farms, a local startup company that converts food waste into fertilizer and bioenergy to grow organic food in vertical farms, I was surprised to find that their system may consume 95% less fresh water than traditional farms. During my internship there, I grew two varieties of lettuce in their vertical system, measuring the volume of all water used from the initial sowing of seeds to the final product. Using this data, I then compared water consumption between vertical and conventional methods of growing these varieties of lettuce. This comparison is particularly important as similar commercial-scale vertical farms rarely publish this type of data. Through direct experience at a vertical farm, I was able to better understand hydroponic systems and their effect on water consumption as well as other factors affecting the practicality of vertical farming. Additionally, by exploring this relatively untapped niche of research, I was able to make more direct comparisons between vertical farming and the heavily studied practice of open-field farming.

- **BASIS ADVISOR:** Don Whiteside • **ON-SITE MENTOR:** Zihao Chen • **LOCATION:** Homer Farms Inc.

ALEXANDRA L.



THE CLARITY AND SIMILARITY OF THERAPIES: COMPARING THE DIFFERENT THERAPIES ADDRESSING AUTISM SPECTRUM DISORDER

SUMMARY: My brother was diagnosed with autism when he was four. My mission was to make my brother's life easier socially in any way I could. I have been an advocate for not only my brother, but also anyone with a developmental disability. Having a brother with autism has opened my eyes to the need for clarity in the world, both about autism and about being an advocate for those that may not be able to express their thoughts and feelings as quickly as me. My brother, without even knowing it, has taught me lessons I will never forget about treating people with kindness, respect, and advocacy. Through occupational and speech therapy, my brother has greatly improved his social, speech, and reception skills. In my project, my goal was to answer or give clarity to the following questions. Many different therapies help combat challenges children with autism have, yet what is the effect of the combination of these therapies on patients? What is the difference in progress between a patient involved in one therapy, compared to multiple? And finally, what are the similarities between physical, occupational, speech, and feeding therapy? Through shadowing therapy sessions, reading notes, and interviewing the loved ones of patients, I worked with SLPAs, therapists, and others at Desert Valley Pediatric Therapy to compare the effectiveness of single and combination therapies on children with autism.

- **BASIS ADVISOR:** Paige Receveur • **ON-SITE MENTOR:** Angie Parnell
- **LOCATION:** Desert Valley Pediatric Therapy

HANNAH M.



ART ON THE BRAIN: EXPLORING THE RELATIONSHIP BETWEEN VISUAL ART AND PSYCHOLOGY

SUMMARY: Humans have an almost innate desire to create and appreciate art. Art often manages to convey emotions better than words and speaks to people on a very deep, personal level. This project examines the psychological connection between humans and visual art. I wanted to understand how we are linked to the art we create and what that connection reveals about how our brain works. To do so, I investigated how people use visual art as a way to deal with mental health symptoms and disorders. I conducted interviews and analyzed secondary research sources on neuro-aesthetics and art therapy treatments. My site placement, St. Vincent de Paul, provides services and resources for unhoused and impoverished individuals. By volunteering for them and guiding kids through the art activities at their Dream Center, I was able to see and understand how creating visual art can help people deal with difficult circumstances. Through observation, interviews, volunteer work at St. Vincent, and investigation of secondary research sources, I explored visual art's connection to psychology. My goal was to raise awareness of the current and potential benefits of visual art in psychological research practices.

- **BASIS ADVISOR:** Francisco Secci Martinez • **ON-SITE MENTOR:** Morgan Dircks and Monica Hakala
- **LOCATION:** St. Vincent de Paul

SHAYAN M.



RESIDENTIAL ENERGY EFFICIENCY: EXAMINING THE ENVIRONMENTAL AND FINANCIAL ASPECTS OF ENERGY-EFFICIENT HOUSING

SUMMARY: Residential infrastructure is crucial to running our society. Homes and other residential buildings that support our infrastructure need to be fueled by some form of energy, and this has been the case for decades upon decades. But how does this impact the environment? Most of the energy that fuels residential infrastructure comes from non-renewable sources, which can cause toxic fumes and emit great amounts of greenhouse gases that can damage our environment greatly. Energy-efficient practices in residential buildings aim to reduce or optimize energy usage in homes and other residences by adopting certain techniques in building and in maintaining residential infrastructure. This can involve the application of energy-efficient appliances, the usage of renewable energy sources, or using alternative materials or methods in the construction of the home itself. In my project, I examined the various mechanisms through which a home can become more energy efficient. I explored the financial aspects of this as well, looking at the different benefits state and federal governments provide for people who employ energy-efficient techniques. I also looked at pricing and overall expenses regarding energy-efficient practices. My goal was to discover many benefits that people may gain from choosing to employ energy efficiency, not only for the environment but also from financial re-compensation programs and other monetary benefits that may be provided.

- **BASIS ADVISOR:** Mike Lemons • **ON-SITE MENTOR:** Azam Hossain
- **LOCATION:** University of the District of Columbia

TIFFANY M.



GOING VIRAL: RESEARCHING OUTBREAK RESPONSE PROCESSES AND WAYS TO REFINE THOSE PROCESSES

SUMMARY: Approximately 1.1 million people in the U.S. have died of COVID in the past three years. Previously, approximately 15,000 people in the U.S. died of the 2009 H1N1 outbreak. Approximately 700,000 people in the U.S. have died due to HIV/AIDS. These viruses drastically altered American lives and lifestyles. Most recently, COVID-19 led to the shutdown of businesses, schools, and health centers, causing rippling problems in society. Living in a post-pandemic world, it's easy to analyze and find issues with how the U.S. responded to the recent COVID pandemic. But how can these response systems be perfected? The goal of my research project was to study and analyze how the U.S. addressed the COVID pandemic, focusing on the effects of governmental intervention, and find ways to identify weaknesses to refine those processes. For my project, I researched the U.S. government's response to COVID, including vaccine and testing development, testing processes, quarantine policy, and more. I applied that knowledge and worked with professionals in the field to study how government intervention can be improved. Finally, I was able to determine the mistakes made in the initial COVID response process, and identify ways those responses could be strengthened and refined to prepare for potential future viral outbreaks.

- **BASIS ADVISOR:** Victoria Godlove • **ON-SITE MENTOR:** Dr. Yushim Kim
- **LOCATION:** Arizona State University, School of Public Affairs

SOPHIA N.



SINGING THE BABY BLUES: UNDERSTANDING POSTPARTUM MENTAL HEALTH

SUMMARY: According to the MGH Center for Women's Mental Health, about 85% of women experience some type of mood disturbance during the postpartum period. Whether it is a slight change or a complete alteration of mood that affects one's ability to carry out simple tasks, postpartum mood disturbances affect a majority of women who have entered the postpartum period. This topic is generally overlooked when looking at the postpartum period and people often forget the life-altering experience a mother has endured. How can we make these resources more accessible to women? How can we encourage women to seek out these resources and ensure their needs are met? At the Postpartum Support International Arizona Charter, I worked to spread the word on resources for women who were struggling with a change in mood postpartum. Through interviews and surveys, I worked closely with women who had experienced a form of postpartum mood disturbance and gained first-hand insight from these powerful women. My hope was to shed light on a topic that is often neglected and emphasize the importance of a support system for women during the postpartum period. Postpartum depression is more common than people generally think and removing the stigma and judgment surrounding the topic will allow women to feel as though there is a support system that is willing to stand with them. Behind every newborn, there is a mother who is dedicating her life to raising a child, which is no easy task.

- **BASIS ADVISOR:** Aisha Nichols • **ON-SITE MENTOR:** Elizabeth Wood
- **LOCATION:** Postpartum Support International

JAMES O.



POLITICAL RELIGION AND THE TWILIGHT OF THE RELIGIOUS AGE: A STUDY OF POLITICS AND RELIGION IN THE LATE HOLY ROMAN EMPIRE

SUMMARY: "Those who do not know history are doomed to repeat it," as George Santyana once said. This quote indicates why history is important—it can tell us about how people dealt with important issues in the past and what worked for them. History tells us of how our world emerged and provides cautionary tales. It tells us what to avoid. For my project, I explored two very important aspects of life—religion and politics—and how they have historically been intertwined. I explored how religion (specifically religious splits) affected politics in the Holy Roman Empire (modern Germany, Austria, the Czech Republic, and the Benelux) during the Early Modern Period, from 1517 to 1815. This was a period of great change, as the religious unity of the Middle Ages was shattered by the Reformation, which ushered in a new era of warfare across all of Europe. This period also saw the emergence of new ideas that are still relevant today, including nationalism and standing armies. I wanted to explore how closely these two things were tied together, and I did this by working with Professor Lazer to write a research paper on the subject. I gathered the information that I needed before writing the paper, which allowed me to form a cohesive argument on this topic.

- **BASIS ADVISOR:** Caroline Cundiff • **ON-SITE MENTOR:** Dr. Stephen Lazer
- **LOCATION:** Arizona State University, SHPRS

MIA P.



REPRESENTATION OF MENTAL HEALTH IN POPULAR MEDIA: HOW PORTRAYALS OF MENTAL HEALTH DISORDERS CAN BE IMPROVED

SUMMARY: Representation matters—from races and cultures to genders and sexualities. Everyone knows this. However, an underrepresented category goes beyond what can be seen on the surface, and that is mental health. For this project, I analyzed multiple depictions of mental health and illnesses from different forms of popular media, including television shows, movies, and video games. To do this, I worked with Dr. Katherine Brazaitis, who is a psychologist that specializes in personality disorders and has a shared interest in how different conditions are represented in film and TV. For the first half of my project, I overlooked the DSM-5 with her to understand the criteria for diagnosing mental illnesses. Then, I picked and analyzed pieces of media that contained representation of mental health. I only looked over canon/official depictions, as confirmed by the original creator(s) of a piece of media. If a character's mental illness was up-to-interpretation or based on a fictional disorder, they were not considered for the analyses. By the end of this project, I was able to better understand the importance of positive representation of mental health and put forth ideas for how portrayals can be improved to be more accurate and less stigmatizing.

- **BASIS ADVISOR:** Jada Genter • **ON-SITE MENTOR:** Dr. Katherine Brazaitis
- **LOCATION:** Mountain View Mental Health, LLC

ABIGAIL R.



GOING WITH THE FLOW: EXPLORING THE INJUSTICES IN WOMEN'S HEALTHCARE

SUMMARY: Every person is brought up with the understanding that humankind has four basic needs. We need food, shelter, air, and clothing. However, humankind is anything but basic, with women seeming to have a complexity all their own. Which leads to the question, "What other needs are not being met?" Millions of women across the United States are left without resources that are vital to their health and well-being—whether that be tangible items such as feminine products or the knowledge of how to take care of their own body. One of the main reasons for this lack of resources as well as for the current gender disparities in healthcare is the general public's tendency to avoid the subject of women's health, especially topics such as menstrual cycles. Highlighting women's health topics that aren't typically talked about will help ignite necessary change in ensuring that all women receive the care that they deserve in today's modern healthcare system. To discover common misconceptions regarding women's health and raise awareness for pressing issues such as period poverty, I worked with ASU Student Health Outreach for Wellness and Women4Women Tempe, where I was able to gain insights on how to make both women's health products and knowledge more accessible. My hope is that through taking a deep dive into both the causes and effects of gender gaps in healthcare, I will be able to spread awareness on the myriad of health struggles and barriers women face every day.

- **BASIS ADVISOR:** Melissa Lachvayder • **ON-SITE MENTOR:** Kay Wright
- **LOCATION:** Women4Women

ANDREA R.



BETTER SOONER THAN LATER: AN INVESTIGATION INTO THE EARLY INTERVENTION OF PHYSICAL THERAPY IN DOWN SYNDROME

SUMMARY: Down Syndrome (DS) is a developmental disorder that affects 1 in every 700 children born nationwide (Mai et al. 1420). Despite its classification as the "most common chromosomal abnormality" (Ruiz-Gonzales et al. 1041), there are few facilities to improve quality of life. Though DS is identified at birth, this disorder is allowed to progress with little action taken against it until roughly 2 years of age. By this point, the most immediate medical issues arising because of DS would have been treated and the child would be medically stable to be approved for treatment to improve quality of life, namely physical therapy (PT) to treat imbalance, one of DS' most prevalent symptoms. My internship will be at the ASU Peter Lab, which is currently conducting a clinical trial of Babble Boot Camp, a form of early PT intervention, starting at as young as six months. The treatment includes exercises that will not interfere with concurrent medical treatment, and will also be performed by parents, which would expectantly reduce prices of PT, as there is no longer a need to pay a professional to perform the same exercises. Through my internship, I also collaborated with my on-site mentor to write a paper on the stress levels and quality of life of parents with DS-diagnosed children enrolled in the program focusing on an analysis of the impact of the stress on their daily lives and a narrowing-down of a specific 'section' of life this stress is focused in.

• **BASIS ADVISOR:** Kelly Estes • **ON-SITE MENTOR:** Dr. Beate Peter • **LOCATION:** Peter Lab at Arizona State University

AVIGHNA R.



IMPACT OF PUBLIC HEALTH POLICY: ASSESSING THE BARRIERS IN ACCESS TO HEALTHCARE IN RURAL ARIZONA

SUMMARY: Disparities in access to healthcare have become an increasingly large problem in the American public health field. An essential aspect of ensuring good public health is eradicating the many barriers to healthcare access by creating individualized health solutions for specific vulnerable populations. My project specifically assesses the barriers in access to healthcare for low-income, rural populations in Arizona. What is a common barrier across the board for rural populations in Arizona? What public policy actions are being taken to address those barriers and what real-world implications do those policies have on the demographic population? This project answers those questions, assessing the barriers in access to healthcare for Arizona populations and the impact of public policy decisions on their health outcomes. Interning under Ms. Ann Wallack, I was able to sit in on the Health and Human Services' committee meetings as public health policy decisions were being discussed, taking notes on the primary issues that are facing rural Arizona. I learned about specific policies being implemented to address these problems. I then interviewed a selection of legislators to better understand the nuances of the barriers to healthcare access in Legislative District 4 and how the policies they hope to implement will ideally improve health outcomes for that population. I also investigated how past policy decisions have affected health outcomes.

• **BASIS ADVISOR:** Victoria Godlove • **ON-SITE MENTOR:** Anne Wallack • **LOCATION:** Capitol Watchdogs

ALEX S.



OPTIMIZATION OF PRODUCT PACKAGING: A SUSTAINABLE FUTURE FROM A TECHNOLOGICAL STANDPOINT

SUMMARY: Paper and cardboard are the main contributors to municipal solid waste (MSW) or “trash.” With the world increasingly shifting to digital and online platforms, where you can have your groceries delivered to your house or order an Amazon package to be at your doorstep the next day, there has been a significant increase in waste that these packages create. This is the problem I examined at my internship with Intel. Intel ships millions of boxes a year internationally through Dalsey Hillblom Lynn (DHL), the largest international shipping company. And each year Intel has been losing millions of dollars from shipping packages that are not optimized for the product, waste, and DHL standards. DHL charges by the greater of two factors, the actual weight versus the total dimensional weight. If a package reaches a higher threshold in dimensional weight (the volume of the box), but weighs less and reaches a lower threshold in the actual weight of the package, DHL will invoice by the total dimensional weight, and vice versa. This demonstrates that this package is not optimized for the amount of product it is shipping, thus creating more waste and costs than needed. Intel has been shipping these inefficient box configurations for decades, costing them millions in cost of the materials and shipping. During my internship, I tested new configurations of optimized boxes that will potentially decrease these costs dramatically, and thus facilitate less waste.

• **BASIS ADVISOR:** Jennifer Murillo • **ON-SITE MENTOR:** John Beatty • **LOCATION:** Intel Corporation

IAN S.



POPULARITY PREDICTIONS: USING THE PRESENCE OF ONLINE GAMING DISCOURSE TO ASSESS ITS RELATIVE POPULARITY BY PLAYER COUNT

SUMMARY: Video game popularity is a quantitative data point that is often hard to predict with accuracy unless the distributor of the game releases the information themselves. Finding the current number of players or total hours of playtime for a given game can be very difficult, as there is not much that one can do to get their hands on this data. One of the very few pieces of information that does have a close connection to a game's popularity and is accessible to everyone is online discussion of a video game on forum sites, video sharing platforms, and social media. However, this information is very hard to evaluate. In my project, I developed a statistical model that can analyze such data and convert it into an accurate prediction of what the popularity of a video game is. This model could be used to predict the popularity of future games or the popularity of games that do not have their player data readily available. I conducted my research with the help of staff at UAT (University of Advancing Technology) because of their high level of computer programming and mathematical knowledge, both of which were needed for my project. Using their help and the previous research of others, I created my own model to evaluate this statistic, using similar components to what was used in prior research, while also trying to avoid the potential errors that others have encountered. Finally, I measured the model's validity using existing data on Steam.

• **BASIS ADVISOR:** Matt Winter • **ON-SITE MENTOR:** Derrick Clark
• **LOCATION:** University of Advancing Technology

YANA S.



UNDERSTANDING SERVICE DOGS: A LOOK INTO SERVICE DOGS' TRAINING, BEHAVIOR, AND IMPACT ON HUMANITY

SUMMARY: Service dogs have gone through rigorous training and have helped countless people for decades. They are entrusted with human lives and are relied upon to make life-and-death decisions. What training do they go through to prepare them for these life-altering decisions? How do they affect the people that they help and protect? What is the science behind a service dog's incredible capabilities? These are the questions that I aimed to answer with my project through observation and research. At the Canine Companions training center, I worked closely alongside people who are responsible for training service animals, and also learned from the individuals that need them. I worked with the service animals to gauge their level of training and see the amount and type of work involved in the process. A further aspect of service canines that I looked into was the science behind their capabilities. I spoke with and interviewed experts to discuss exactly how it is possible for service dogs to have such a diverse, developed set of skills. I hope my project will shed light on the intricacies involved in training and having a service dog, as well as the complex behavioral aspects involved. It is important to open people's eyes to the incredible importance of service animals and to encourage further resources to be explored and used in this field.

• **BASIS ADVISOR:** Paige Receveur • **ON-SITE MENTOR:** Rhonda Faul • **LOCATION:** Canine Companions

YENENEH S.

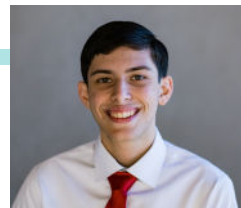


PAPER VS. TECHNOLOGY: A LOOK INTO PRINT AND DIGITAL MARKETING TECHNIQUES

SUMMARY: As a consumer living in a global world surrounded by various marketing techniques, one tends to wonder what is the most effective approach. Is it digital marketing with search engine optimization or social media? Or is it print marketing with newspaper advertisements and QR codes to grasp consumer attention? While marketing may not be a topic that crosses the average person's mind daily, it still affects just about every living person's day-to-day life, whether it's noticed or not. For example, Google Shopping ads account for 76% of retail search ad spend. The research I conducted for this project is about as hands-on as it gets. Through the internship I was selected for, I applied digital marketing techniques to companies owned by my on-site mentor. By finding areas within those businesses to fix and utilizing the skills I've gained through my research, I was able to engage in real-time marketing to see the differences between the effect of the digital marketing tactics at hand compared to methods of print media, such as newspapers, business cards, or billboards. With this research, I hope to enrich both my knowledge and the general public's knowledge on just how significant a role marketing plays in our lives.

• **BASIS ADVISOR:** Omar Soussi • **ON-SITE MENTOR:** Ted Araya • **LOCATION:** Franchise Marketing

ZUBIN S.



BEAUTY ISN'T PIGSKIN DEEP: AN ANALYSIS OF THE EFFECTS OF THE 2018 TRANSFER PORTAL ON COLLEGIATE FOOTBALL

SUMMARY: In 2018, the NCAA implemented a new rule called the transfer portal into the world of college football. The transfer portal is an online portal designed to give power to students and allow them to transition between colleges more easily. However, this ended up having adverse effects on the competitiveness of college football. It not only affected the transitions between Division 1 colleges, but also high school recruitment and the recruitment of lower-level collegiate athletes such as junior college athletes. Because this hurts the competitiveness, and therefore the product the NCAA produces on the field, they are losing money and viewers. This is highly concerning because college football pays for many of the other college sports, but more importantly gives many young men scholarships and chances to pursue their education. As part of my project, I talked to athletes, coaches, and athletic advisors to see exactly how athletes and schools could best use the transfer portal. I also found solutions for athletes, colleges, and the NCAA to deal with the problematic effects of the transfer portal to help keep the beauty in the pigskin that so many Americans love.

• **BASIS ADVISOR:** Omar Soussi • **ON-SITE MENTOR:** Josh Tata • **LOCATION:** Dean College

ERIKA T.



A MIRROR, A WINDOW, A SLIDING DOOR: HOW LIBRARIES ARE COMBATting CENSORSHIP AND INACCESSIBILITY IN LOCAL COMMUNITIES

SUMMARY: Rudine Sims Bishop uses the analogy of “mirrors, windows, and sliding doors” to emphasize the role and importance of literature in the world. In other words, we should see ourselves reflected in the literature, we can observe other human experiences as if looking through a window, and we are able to step into the perspectives and lives of other people through reading, like walking through a doorway leading from one room to another. Since 2020, book bannings and censorship efforts have put libraries across the nation in uncomfortable positions. If these movements and legislations were to be carried out in any capacity, the ability for literary works anywhere in the country to fully act as our windows, our mirrors, and our sliding glass doors would be effectively dashed, and whatever controlled narrative that arises in an area as a result of selective book banning would harm communities everywhere. School libraries especially have taken hard hits, not only in efforts to remove books from their shelves but also in violating students' right to privacy on what they check out from their school libraries. Libraries are no stranger to efforts like these, and the librarians inside work harder and harder to make sure that the rights of the library and every patron are protected. By working with multiple libraries in the Phoenix Public Library system, specifically the Ocotillo, South Mountain Community Library, and Ironwood branches, I was able to see first hand how libraries have adapted both to their community's needs and to this increasing trend looming over the promise of intellectual freedom that libraries work tirelessly to fulfill.

• **BASIS ADVISOR:** Haley Ward • **ON-SITE MENTOR:** Sean P. George
• **LOCATION:** South Mountain Community Library

GEE T.



A MATERIAL GIRL LIVING IN A MATERIAL WORLD: A THOROUGH INVESTIGATION INTO THE MATERIALS ASPECT OF SEMICONDUCTOR DEVICES

SUMMARY: With the introduction of semiconductor devices, the world has changed. Semiconductors have created an enhanced standard of living, and improvements in this field have the effect of advancing electronics, household items, defense systems, and even space exploration. Thus, many have termed semiconductors as the “new oil” of the 21st century, as they’ve become necessary for the modern world to function. After all, they’re everywhere: light switches, phones, computer systems, vehicles, refrigerators, healthcare devices, artificial intelligence, satellites, military defense, and more. Semiconductors are amongst the most technologically important materials in existence today, as the vast majority of all electronic devices involve some semiconductor-based materials. With an increase in demand and indispensability for semiconductors, it’s no surprise that increasing efficiency and lowering production costs are increasingly relevant and important challenges today. There is always a constant need to find faster and more reliable methods and materials, and the recent CHIPS and Science Act showcases these needs, as it funds semiconductor research with tens of billions of dollars to bolster U.S. semiconductor research and development. With all the machinery and methods necessary to make even a single chip, my goal for this project was to observe how differences in the quantum structure of a semiconductor can result in large changes that can be observed numerically. Working with ASU professors, I completed tasks and delved into research by using supercomputers, completing computation jobs and visualizing output. I was excited to take this first step to find improvements to this current real-world issue.

- **BASIS ADVISOR:** Doug Eubanks • **ON-SITE MENTOR:** Dr. David Ferry, Gil Speyer
- **LOCATION:** Arizona State University

KEVIN W.



WHERE DID MY BATTERY GO? LOOKING INTO BATTERY LIFE AND EFFICIENCY

SUMMARY: In a world where someone's daily life revolves around the usage of technology, the storage and usage of electricity is at the forefront when it comes to looking into the future. As the world shifts more towards electric vehicles (EV), batteries have begun to play a bigger role in the development of newer technology and the improvement of older technology. As newer batteries began to rise to the surface, problems regarding these new batteries have made many reluctant to make the change to EVs. This has led to controversy over the necessity of these new inventions, but that does not mean the benefits could outweigh the costs in the future. With the rise of importance in batteries, the field surrounding them has also begun to become more complex. This field expansion means that a few months is not nearly enough time to dig into every detail that this field can provide, so I narrowed down my research to looking at car batteries and their different components. Through my internship, I was able to learn about the foundations of a car battery and analyzed the effects of different designs. My goal was to learn as much as I could during these months and to share the information I learned with everyone else.

- **BASIS ADVISOR:** Cristina Conway • **ON-SITE MENTOR:** Donald Karner • **LOCATION:** Electric Applications Inc.



Ahwatukee

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