Celebration of Undergraduate Scholarship
April 24, 2013
VALPARAISO UNIVERSITY
CELEBRATION OF UNDERGRADUATE SCHOLARSHIP

April 24, 2013
Harre Union Ballrooms

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<td>8:00 a.m. – 10:00 a.m.</td>
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<td>12:00 p.m. – 1:30 p.m.</td>
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Deans’ Choice Presentations
3:00 p.m. – 5:15 p.m.
Harre Union Ballroom C

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<td>3:00 p.m.</td>
<td>Mark Schwehn, Provost</td>
<td>Welcome</td>
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<td>3:10 p.m.</td>
<td>Cynthia Rutz, Director of the Celebration of Undergraduate Scholarship</td>
<td>Deans’ Choice Presentations Program</td>
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<td>3:15 p.m.</td>
<td>Rebecca Pietrzak (College of Arts and Sciences)</td>
<td>The Impact of Endurance Training vs. Non-Endurance Training on Blood Lactate Levels Post Seven-on-Seven Maximal Capacity Test</td>
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<tr>
<td>3:30 p.m.</td>
<td>Paul Rubio (Christ College)</td>
<td>Oak Woods Cemetery Confederate Monument: The Revelations about Pro-Confederate Commemoration of the American Civil War</td>
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<td>3:45 p.m.</td>
<td>William Scupham (College of Arts and Sciences)</td>
<td>An Army for the Revolution, a Revolution for the Army: The French Revolutionary Army, 1792-1797</td>
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<td>4:00 p.m.</td>
<td>Sarah Brunsvold (College of Engineering)</td>
<td>An Analysis of Sulfur Trioxide in Aggregates for Concrete Using an ASTM Standard for Portland Cement</td>
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<td>4:15 p.m.</td>
<td>Adam Dickey, Wang Hang (College of Arts and Sciences)</td>
<td>Release of Phosphorus from Sediment into Pore Water</td>
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<td>4:30 p.m.</td>
<td>Holly Buckman (College of Arts and Sciences)</td>
<td>Keep Calm and Carry On: An International Comparison of Stress in Law Enforcement</td>
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<td>4:45 p.m.</td>
<td>Stephanie Volz (College of Arts and Sciences)</td>
<td>Why So Special? The Israel Lobby, Human Rights, and United States Foreign Aid</td>
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<td>5:00 p.m.</td>
<td>Paige Snyder, Catherine Wingstrom, Carly Crave, Claire Simonpietri, Christina Lundy (College of Nursing)</td>
<td>Beyond the Volcanoes: A Community Partnership for Health in Rural Nicaragua</td>
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Overview of the Celebration of Undergraduate Scholarship

The Celebration of Undergraduate Scholarship (CUS) is a conference that allows undergraduate students to showcase their creative and/or scholarly work and research in a professional format. The Celebration began in 1998 as an idea from an interdisciplinary group of faculty who had attended national meetings on the role of undergraduate research in the college experience.

One of the many joys of completing a research project or creative endeavor is to share the results with others. In a typical year, the Valpo CUS brings together more than 150 students and 45 faculty sponsors to share their research experiences with the campus and local community. Students who have worked on class projects, senior projects and theses, or independent scholarship are encouraged to participate. At the conference, all students present their work in a poster or oral presentation format. In addition to poster and oral presentations, the Deans of Valparaiso University’s five undergraduate colleges select students to represent their colleges at the Deans’ Choice Presentations, and these students give oral presentations in an afternoon program.

Students and faculty are encouraged to read the poster presentations guidelines and oral presentation guidelines on the Undergraduate Research website (http://valpo.edu/research/) for guidance on the development of their presentations. Faculty sponsors also provide guidance and support for their students, both in developing the original research and in transmitting that research to a poster or oral format.

ADDITIONAL UNDERGRADUATE EXHIBITS AND AWARDS

**College of Engineering Design Expo**
Saturday, May 4, 2013
10:00 a.m. – 1:00 p.m.
Gellersen Center

**Department of Art**
**Student Art Exhibition**
April 17 – May 12, 2013
Brauer Museum of Art
Opening Reception, April 17 – 7:00 p.m.,
VUCA Lobby
Works selected by VU studio art faculty

**Christ College Student Scholarship Symposium Award Winners**

**Thursday, February 7, 2013**
*Tchaikovsky’s 4th Symphony: The Story that Lies Beneath*
By Chelsea Kiehl, sophomore

*Looking Behind the Allegory: The True Depiction of Race in X-Men*
By Danielle Mueller, senior

**Thursday, October 25, 2012**
*Kant’s Moral Theory as a Secular Foundation for Human Rights*
By Patrick Slattery, senior

*Stonewall Jackson and Religion: A Different Look*
By Nathan Kelly, sophomore
CHRIST COLLEGE

Innocence vs. Experience: A Conflict Revealed through Storytelling

Kate Guidera

Departmental Affiliation: English and Classics
Christ College

Philip Pullman’s *His Dark Materials* trilogy contains a critique of religion and theology that is unique insofar as it is directed not at Christianity as its primary audience, but instead to young readers of science fiction and fantasy. He criticizes the Church for its idealization of innocence and passivity, proposing instead that there is nothing to be lost in a fall from grace and everything to gain in a new world of experience in which one constantly engages in active understanding. The ongoing conflict between innocence and experience persists through the trilogy’s entirety. In this, Pullman's books react against C. S. Lewis’s Narnia series, wherein, according to Pullman, the importance of innocence is a central theme. Directing his trilogy to the same audiences as Lewis, Pullman insinuates that he too has a religious truth to share: that humanity is shaped by experience, and these experiences make people unique. Through experience people recognize the agency of which they are capable, that not everything is predetermined, that they have a responsibility to the world and to themselves. By utilizing a fantastic narrative, Pullman effectively communicates his human truths, for stories have been and always will be interpreted through the experience of the reader. Thus, Pullman draws the reader into the hard choices of experience and, by extension, into his polemic: that validating innocence in the world would eliminate much of human agency and choice. As Lyra, Pullman’s main character, learns the true nature of the worlds existing within this trilogy, so too does the reader. As Lyra grows into her experience, so too does the reader. With *His Dark Materials*, Pullman analyzes the nature of innocence and experience and concludes that experience is necessary in shaping the human condition.

Information about the Author:
Kate Guidera is a senior English and classics double major. She wrote this paper for a Christ College seminar "The Devil and the Problem of Evil."

Faculty Sponsor: Dr. Edward Upton

Student Contact: katherine.guidera@valpo.edu

It’s Time to Pick a Side: Why Remaining Neutral towards Media Representations of Women Isn’t Working

Jane Hurdish

Departmental Affiliation: Christ College

Media portrayals of women are often negative, and can have dire effects on female viewers, yet our society continues to allow these types of images. The American conception of free speech is what drives us to tolerate these images. In America, media representations are protected under the highly valued right to free speech. The general belief is that, in order to ensure the right to free speech for all, the law must remain neutral towards the content of speech, avoiding judgments on whether that content is good or bad. As a result, harmful representations of women remain in the public domain because producers are deemed to have the right to free speech. I would argue, though, that media representations of women extend beyond questions of "good" or "bad" to questions of right or wrong; beyond questions of mere opinion or preference to questions of justice. Ultimately, harmful media representations oppress women, a hard truth that is masked by our neutral stance towards free speech. Thus, to truly ensure women the same rights as men, we may have to abandon our current conception of justice, which promotes a kind of false, gender-biased "neutrality" in dealing with speech, for a different conception of justice: true freedom and equality for all.

Information about the Author:
Jane Hurdish is a social work major who is interested in social justice and advocating for vulnerable populations, including women. She has become particularly interested in how women fit into our society.

Faculty Sponsor: Dr. David Western

Student Contact: jane.hurdish@valpo.edu

Looking Beyond the Allegory: The True Depiction of Race in *X-Men*

Danielle Mueller

Departmental Affiliation: Political Science
Christ College

In 1963, the first issue of *X-Men* was published, introducing the Marvel Universe and the world to mutants, super-powered individuals born with
argue that the conception of retributive justice is an incomplete conception of justice to look to when seeking peace in post-conflict societies. The more appropriate way to conceptualize justice is as the restoration of right relationships. This conception of justice is known as restorative justice, and it is the more appropriate conception of justice to apply to post-conflict states.

Restorative justice restores the broken relationships among the members of the conflict. Because restorative justice restores the broken relationships that cause violence, it is better at achieving a just peace than purely retributive justice and is the more appropriate conception of justice to apply to post-conflict states.

Information about the Author:
This project was completed as an honors thesis in Prof. David Western's Justice Seminar in Christ College. As a political science major interested in international criminal justice, Danielle Mueller is interested in how the theoretical basis for different conceptions of justice affect how justice is carried out in post-conflict states as well as how these conceptions of justice promote peace.

Faculty Sponsor: Dr. David Western
Student Contact: danielle.mueller@valpo.edu

A Room Revisited: Dissonance in Virginia Woolf's Feminism from Essay to Novel
Lauren Nickodemus

Departmental Affiliation:
Christ College

Few texts have argued for the artistic rights of female authors as passionately as Virginia Woolf’s A Room of One’s Own, a provocative essay that joined the ranks of essential feminist texts by defending the ideal of an independent, creative working woman. Both Woolf’s arguments for the breaking of patriarchal norms and her artful fictional depiction of the damage done by patriarchy have inspired her categorization as an empowering feminist author. However, upon closer examination, the positive, almost utopian vision of self-sufficient women found in A Room is surprisingly absent from two of her best-known novels, To the Lighthouse and Mrs. Dalloway. The female characters portrayed therein, such as Lily Briscoe or Clarissa Dalloway, do not in fact strive for independence but rather fail to seize opportunities for social change, falling into obedience under traditional patriarchal control. Meanwhile, socially dictated feminine roles like Mrs. Ramsay’s are portrayed in an accepting if not fairly positive light, with no equally strong models of successful

Danielle Mueller

Departmental Affiliation: Political Science

A view has developed among peace and conflict scholars that peace cannot persist in post-conflict societies without also establishing justice. This means peace scholars and practitioners need to think about justice and use a conception of justice to guide their peacemaking actions. However, even though most people have an intuitive assumption that "justice" is an obvious and commonly understood concept, there are conflicting conceptions of justice. Many adopt a Kantian position on justice and assume it is synonymous with retribution. However, retribution is not the only conception of justice. In this project, I argue that the conception of retributive justice is an amazing powers. Feared and hated by the world they have sworn to protect, the mutant X-Men are often interpreted as representing a variety of marginalized groups. Modern scholarship generally focuses on the Bryan Singer film series and mutants as representative of homosexuals and Jews. Despite the validity of these modern readings, this focus has neglected the depiction of race in the original X-Men comics and has reduced the racial message of X-Men to a simple allegory in which mutants represent the oppressed minority, the X-Men represent civil rights activists, and humans represent the oppressive majority. However, a close reading of X-Men comics from the 1970s and 1980s indicates that the series’ depiction of racial and ethnic minority characters complicates this simple allegorical reading. Although the series seems to emphasize diversity through an ethnically diverse cast of characters, X-Men’s exclusion of minority characters that identify with their cultural backgrounds, along with its emphasis on the cultural backgrounds of the Caucasian characters, presents a problematic picture of race in which sameness is valued over the diversity the comic supposedly advocates.

Information about the Author:
As a longtime fan of comics, Danielle Mueller was thrilled when she had the opportunity to study them in the spring of 2012 for a research paper in Prof. Jennifer Miller's Christ College seminar Speculative Fiction: Race, Ethnicity, and Difference.

Faculty Sponsor: Dr. Edward Upton
Student Contact: danielle.mueller@valpo.edu
working women to counter them. The range and setup of Woolf’s fictional characters provide examples curiously unlike the standard striven for in *A Room*, calling into question whether she considered it genuinely possible, and furthermore casting doubt on the classification of these novels as patently feminist. Building upon such considerations, this project argues that the social vision proposed in *A Room* is more a quixotic ideal than a workable goal for Woolf, and that the failures of her characters reflect her underlying pessimism about the likelihood of women overcoming oppression in practice. This demands a reconsideration of Woolf’s social philosophy, viewing her not as an optimistic and action-oriented feminist but as a critic of the fallibility of both men and women, who saw potential avenues for social improvement but did not confidently expect them to be fulfilled.

**Information about the Author:**
Lauren Nickodemus is a senior from Freeland, Michigan majoring in Spanish and minorig in French and humanities, with a Christ College scholar distinction. She will pursue a master's degree in publishing and creative writing this fall.

**Faculty Sponsor:** Dr. Edward Upton

**Student Contact:** lauren.nickodemus@valpo.edu

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**Wabi Sabi, Mono no Aware, and Ma: Tracing Traditional Japanese Aesthetics through Japanese History**

Lauren Prusinski

**Departmental Affiliation:**
Christ College

A nation originally built on Chinese tradition, Japan has gradually developed its own cultural standards and definitions of beauty. Japan has always focused on beauty in all realms of its culture: in its arts, such as poetry and calligraphy; rituals, such as the ancient tea ceremony; and in contemporary Japanese urban life, consumer goods and architecture. Japanese society has revolved around a keen awareness of nature as it relates to these aspects of life and has focused on this conscious sensibility of nature through aesthetics, including *wabi sabi*, a rustic and often desolate beauty, *mono no aware*, an awareness of a fleeting beauty, and *ma*, an empty or formless beauty. These aesthetics have permeated the Japanese culture from their roots in the Heian era at the end of the 8th century through contemporary Japan. With a keen eye for their surroundings, the Japanese have effectively melded ancient aesthetics with modern advancements, remaining deferential to their natural roots by highlighting rather than diminishing their eternal presence in society. Though urban development has extended its reach to the base of the Kyoto mountainside, the high number of temples and gardens scattered amidst its municipal areas still exemplifies Japan’s relationship with nature. Though advances in technology have made the Japanese less reliant on nature, the Japanese have maintained this appreciation for the role nature still plays in an industrial setting, recognizing that technology cannot eliminate nature, therefore creating a harmonious balance between human and nature.

**Information about the Author:**
Lauren Prusinski wanted to compose her Christ College honors thesis about "Urban Japan: Past and Present." A double major in biochemistry and Chinese and Japanese Studies, she will be pursuing a dual degree in the University System of Georgia’s MD/PhD program beginning in the summer of 2013.

**Faculty Sponsor:** Dr. Jeni Prough

**Student Contact:** lauren.prusinski@valpo.edu

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**Oak Woods Cemetery Confederate Monument: The Revelations about Pro-Confederate Commemoration of the American Civil War**

Paul Rubio

**Departmental Affiliation:**
Christ College

A monument to Confederate war dead in Oak Woods Cemetery on the South Side of Chicago may create the misconception that sympathetic Northerners were responsible for its construction. This essay demonstrates that it was actually pro-Confederate organizations of Southern emigrants who provided the primary contribution for the monument’s construction. Pro-Confederate organizations in the North formed in the spirit of late 19th century fraternal groups. These organizations provided a way for Southern emigrants to share their common yearning for the Southern way of life. They also worked to improve the image of the South’s role in the American Civil War, even as the North emphasized its victory less as time passed after the conflict. To this end, these groups shifted the focus away from what the Confederacy represented and onto the strong moral character of the Confederate private soldier, especially those who died in terrible prison conditions, like the 6,000 soldiers buried under the monument. With this emphasis, pro-Confederate groups were the main force that led to the
monument’s construction and eventual dedication in 1895.

Information about the Author:
Paul Rubio has been interested in history, particularly that of the United States, since fifth grade. Professor Graber’s American Civil War and Memory Seminar during the latter half of the second semester of his freshman year provided him with a great opportunity to do research into a period of American history.

Faculty Sponsor: Dr. Samuel Graber

Student Contact: paul.rubio@valpo.edu

Water Music: Metaphor and Marriage in George Eliot’s Middlemarch
Hannah Scupham

Departmental Affiliation: English
Christ College

In George Eliot’s novel, *Middlemarch: A Study of Provincial Life*, she examines the foibles and follies, the trials and tribulations of a rural community facing the uncertainties of a rapidly industrializing Britain. Provincial, however, is hardly the word that one should use to describe the romantic relationships that Eliot creates in her novel. Even less dull and dreary are the metaphoric images that Eliot’s narrator uses to describe, expand, and judge the connections between the two main couples in *Middlemarch*: William Ladislaw and Dorothea Brooke as well as Tertius Lydgate and Rosamond Vincy. When we explore the metaphors of *Middlemarch*, we can see the narrator’s deft grasp of entwining the abstract and the real. This paper examines how *Middlemarch’s* narrator uses similar images and metaphors of water and music to describe the development and depth of *Middlemarch’s* dissimilar romantic relationships. The metaphors in *Middlemarch* work on two levels: upon the characters and upon the reader. A discussion of the critical theory of metaphor, informed by Paul Ricoeur, explains how characters and readers use imagination to unite disparate objects in order to create truth. The perception of the individual warps this imaginative function, causing a disconnection between the truth of the object and its metaphoric representation. In *Middlemarch*, these flawed perceptions are the basis of the narrator’s criticism of the characters and their romantic relationships in the novel. However, the same criticism of perception can also be placed upon the reader. The reader’s task, I argue, is to interpret how *Middlemarch’s* narrator is using similar metaphors to portray two very dissimilar relationships. It is only after we recognize

and consciously address the problems of our own perception as readers that we can grasp *Middlemarch’s* vision of a true egalitarian marriage.

Information about the Author:
Hannah Scupham is a senior English and German major as well as a member of Christ College. She will be presenting this paper at the National Conference of Undergraduate Research this spring. She is currently planning on pursuing her love of literature in graduate school.

Faculty Sponsor: Dr. Sara Danger

Student Contact: hannah.scupham@valpo.edu

Morality and the Mind: A Discussion on Christian and Scientific Views Related to the Human Propensity to Sin
Jennifer Sechrist

Departmental Affiliation: Christ College

Following the theory of Sigmund Freud, modern psychological texts state that moral behavior stems from a socially constructed moral conscience. This conscience is created through parental influences and social cues that are internalized throughout maturation. Because what is socially accepted differs across cultures, there can be no real definition of morality from the psychological understanding because morals become relative to customs, time, and place. C.S. Lewis directly responds to this issue with modern psychological theory. Although criticizing them later, Lewis was knowledgeable, interested, and learned in these psychological texts. In *Mere Christianity*, Lewis states that a human’s ability for moral reasoning is innate within the mind; there is a common moral law that guides the decision between right and wrong. Because the knowledge of what is moral is inherent, each person has an equal conception. In addition to this internal moral conscience, Lewis’s delineation of his theological view of morality also addresses the importance of social influences on moral behavior. But, instead of society creating a moral conscience, the conscience takes into account the impact that each choice has on society. Even though Lewis criticizes the modern psychological definition, he is able to merge the ideas into his concept, creating a more complete and nuanced understanding of morality that can be accepted across cultures.
The Language of Human Rights: Applying the Communitarian Critique to Global Human Rights Language

Anna Wiersma

Departmental Affiliation: Political Science
Christ College

There is a well-known critique of human rights talk in America, often named “the communitarian critique of rights”; however, except for a few hints and moments in the authorship of communitarian thinkers, such as Mary Ann Glendon, this critique is rarely applied to global human rights. Indeed, thinkers like Michael J. Perry say that this critique simply cannot be applied to global human rights. I will argue that the application is there to be made. In her book, Rights Talk, Glendon argues that Americans have particularly harmful rights rhetoric when compared to the rhetoric of other nations. The characteristics of American rights rhetoric that Glendon takes issue with the most are summarized by her as follows: “The exaggerated absoluteness of our American rights rhetoric…a near-silence concerning responsibility, and a tendency to envision the rights-bearer as a lone autonomous individual.” In this presentation, I demonstrate how these concepts apply at the global level and are thus intrinsic to rights language as a whole. I do this by demonstrating how the characteristics of trumping, entitlement, and individual protection are intrinsic to rights language itself, comparing the Universal Declaration of Human Rights to the African Charter on Human and People’s Rights and examining the current structure through which rights are asserted and claimed.

Information about the Author:
Anna Wiersma is a senior international economics and cultural affairs major from Holland, Michigan. She will be attending George Washington University, Johns Hopkins University, or the American University of Paris next year to pursue a M.A. in international development.

Faculty Sponsor: Dr. Edward Upton
Student Contact: jennifer.sechrist@valpo.edu

Diversity and Abundance of Aquatic Macroinvertebrates Associated with Different Benthic Substrates in the East Branch of the Little Calumet River

Halina Hopkins, Ali Olson

Departmental Affiliation: Biology
College of Arts and Sciences

As part of an ongoing study of the effect of removing logjams to open the East Branch of the Little Calumet River for recreational purposes, we worked with park staff at the Indiana Dunes National Lakeshore on a study of the abundance and diversity of aquatic macroinvertebrates. We used a quantitative sampling technique to obtain samples of macroinvertebrates from five substrates in reaches of the river above and below four focal logjams. Diversity as measured by the Shannon-Weiner index varied with river substrate (sand=1.467, root wad=1.854, wood=1.64). Sand had the lowest average number of macroinvertebrates (92, as compared to 191 in root wad and 140 in wood). We found that Ephemoptera were especially abundant on woody debris, Amphipoda and Diptera were abundant in root wads, and Coleoptera were least abundant in sand. Overall, sand was the least productive substrate, while root wads and woody debris were generally more productive. Our data will provide initial baseline values to detect potential changes resulting from logjam removal. This research project provides the national park with data important to the management of tributary streams within their jurisdiction.

Information about the Authors:
Ali Olson is a senior geography major with a Native American studies minor and has worked as a water quality intern at the Indiana Dunes National Lakeshore. Halina Hopkins is a senior biology, environmental science, and humanities major with experience in biological fieldwork. They both are seeking jobs in fieldwork or education related to environmental conservation.

Faculty Sponsor: Dr. Laurie Eberhardt
Student Contact: halina.hopkins@valpo.edu
Method for Instant *Saccharomyces cerevisiae* Kill of Samples

Melissa Kohner, Sara Dick

*Departmental Affiliation*: Biology
College of Arts and Sciences

It is essential when studying the circadian rhythm in cells to be able to effectively stop them in time. In this experiment, we tested what would be the most successful killing agent on *Saccharomyces cerevisiae*. Six different agents were tested at different concentrations and amounts. After the *S. cerevisiae* was added to the test tube containing the agent, it was streaked on a plate after 5 and 10 minutes. The plates were incubated and then checked for growth. Ethanol was the most efficient killing agent. After an effective killing agent is determined, it can be used in further experiments measuring Gapdehydrogenase activity using a colorimetric assay to examine the circadian rhythm in *Saccharomyces cerevisiae*. Gapdehydrogenase results will also be presented.

*Information about the Authors:*
Melissa Kohner is a senior biology major with minors in chemistry and history. She is headed to Kentucky College of Osteopathic Medicine after graduation. This is her second year working with Dr. Dick.

*Faculty Sponsor*: Dr. Sara Dick

*Student Contact*: melissa.kohner@valpo.edu

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The Effects of Tarp Wrapping on Blow Fly Oviposition during Decomposition of Pigs

Natasha Lobosky, Jordan Stein

*Departmental Affiliation*: Biology
College of Arts and Sciences

The effects of blow fly oviposition on 12 young, recently deceased pigs were studied during a one month period in the fall semester of 2012. This project follows similar techniques that Dr. Bugajski used during her research project at Purdue. Using tarp-wrapped bodies as the sole variable, bare pigs were held as the control. The data that were collected included the presence or absence of larvae or adult flies, daily temperatures, samples of both larvae and adult flies, and the start and end of maggot migration. The samples of larvae and adult flies were later identified in the lab and separated based on species. The data suggested that the presence of a tarp wrapped around a deceased pig delayed the oviposition of eggs. A t-test showed that there was a statistical difference in the timing of oviposition between the control and variable. Pig tissue behaves similarly to human tissue during the decomposition stages and it is an affordable and accessible material. Looking ahead, the data from this project can be used by forensic professionals when determining necessary factors of a crime scene involving a body altered in a similar way.

*Information about the Authors:*
Natasha Lobosky is a senior biology and chemistry double major on the pre-med track. She plans to attend medical school in order to become a forensic pathologist. Jordain Stein is a senior biology major with two minors in chemistry and classical civilizations. In the future, she plans to attend graduate school in pursuit of becoming a physician assistant.

*Faculty Sponsor*: Dr. Kristi Bugajski

*Student Contact*: natasha.lobosky@valpo.edu

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Molecular Hospitality: An Examination of the Interactions between Brooker’s Merocyanine and Modified Cyclodextrins

Benjamin Averill

*Departmental Affiliation*: Chemistry
College of Arts and Sciences

The equilibrium of a guest molecule binding to a host occurs through weak molecular interactions instead of through the formation of chemical bonds. A cyclodextrin (CD) is used as the host molecule due to its basket-like shape which is beneficial to complex formation with the guest molecule, Brooker’s merocyanine (BM), which fits well within beta-CD. BM is a highly conjugated dye that can exhibit a charge, allowing for a variety of the weak molecular interactions involved with complex formation, such as hydrogen bonds, to be studied. This project focuses on the effect of different modifications to the CD on the binding constant of BM with a CD host. The binding constant can be determined using the Benesi-Hildebrand equation to process data collected using UV-Vis and fluorescence spectroscopy. The determination of binding constants for multiple different CD modifications, including beta-CD, hydroxypropyl-beta-CD, and triacetyl-beta-CD, will allow for a comparison of how these modifications affect the degree of binding as well as whether or not hydrogen bonding is an important factor in the binding of this host-guest system. A better
understanding of the factors that affect binding in host-guest systems will allow for better predictions of their behavior under different conditions.

**Information about the Author:**
Ben Averill is a junior chemistry major with an interest in food chemistry. Apart from research and classes, Ben is also involved in VU Science Olympiad, Chemistry Club, Luce Band, and Gamma Theta Upsilon.

**Faculty Sponsor:** Dr. Jennifer Holt

**Student Contact:** benjamin.averill@valpo.edu

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**Investigations of the Application of Black Carbon for the Retention and Stabilization of Nonylphenol in Soil**

Kelly Belisle, Laura Mattson, Caitlin Soley

**Departmental Affiliation:** Chemistry College of Arts and Sciences

We used black carbon (BC) to absorb and stabilize nonylphenol (NP) that was present in soil samples. BC is an efficient material for absorbing and stabilizing hydrophobic organic compounds because this material has a high absorption capacity and strongly binds organic molecules. Thus, black carbon has the ability to retain NP in the soil minimizing loss to runoff while providing microbes with longer times (up to several hundred years) to metabolize the NP to less hazardous compounds. NP is both an endocrine-disrupter and a toxic pollutant. It also serves as a model compound for the study of stabilization of organic compounds in soil. In our studies, we spiked multiple soil samples with known amounts of NP and then incubated them to mimic NP-contaminated soil. Variable amounts of NP were then added to aliquots of the various soil samples and the samples were again incubated to mimic natural conditions, allowing the NP to be absorbed to the BC. The NP absorbed by the BC was then extracted from the BC and the resulting solution was analyzed utilizing solid-phase extraction (SPE) with “Magic Chemosorber” (MC) in conjunction with high-performance liquid chromatography (HPLC) to determine the amount of NP. Our results showed a correlation of increased NP concentration as BC levels were increased. These results indicated that BC was fixing the NP. We also observed variable absorption efficiency depending on the amount of NP in the soil and the amount of BC added, suggesting that there is an optimum amount of BC to use depending on the amount of NP present in the soil. These tests are being repeated to improve reproducibility and to obtain data that will be used to develop and fit models for predicting the absorption characteristics of the BC.

**Information about the Authors:**
Before this fellowship occurred in China, Kelly Belisle, Laura Mattson, and Caitlin Soley studied water quality in the Dune Park area.

**Faculty Sponsor:** Dr. Jon Schoer

**Student Contact:** kelly.belisle@valpo.edu

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**Electrochemical Studies of Solar Thermal, Decoupled, Electrolysis Processes for Hydrogen Production**

Evan Beyers, Jordan Otto, Robert Palumbo, Jon Schoer

**Departmental Affiliation:** Chemistry College of Arts and Sciences

We present the latest experimental findings of our concept for a solar thermal electrolytic process for the production of hydrogen from water within the context of our previous work. In our process, a metal oxide is reduced in air with concentrated solar energy. The reduced metal oxide then serves as an anode or solute for the production of hydrogen in aqueous acidic or basic solution. During the electrolysis of water at 1 bar, hydrogen evolves at the cathode while the reduced metal oxide returns to its original oxidation state, thus closing the hydrogen production cycle. The potential required is substantially less than the theoretical 1.23 V necessary when hydrogen and oxygen evolve at 1 bar and 298 K in the absence of the metal oxide. Ideal sunlight-to-hydrogen thermal efficiencies were established for three metal oxide systems: Fe$_3$O$_4$, Co$_3$O$_4$, and Mn$_3$O$_4$. The ideal efficiencies include radiation heat loss from the solar thermal step and are as high as or higher than corresponding ideal values reported in the literature. Our experimental study for the iron oxide system confirmed that the electrolytic oxidation and thermal reduction steps of the metal oxide occur in a laboratory scale environment. Unfortunately, some of the Fe$^{3+}$ product for the magnetite system stays in solution when the electrolysis is done in a strong acid. The research described here begins to establish the fraction of metal oxide remaining in solution and how best to increase the amount in a solid phase by controlling: 1) the electrolyte’s pH; 2) the electrolyte’s temperature; and 3) the degree to which the electrolyte is saturated with Fe$^{3+}$. 
As global climate change becomes an increasing problem, it is important to understand the effects that it may cause. One possible set of effects are changes in solubility of various pollutants in aqueous systems. Phosphorus (P) and nitrogen are two important nutrients that become pollutants when present at elevated concentrations. Phosphorus is particularly worrisome because it is generally the nutrient that limits plant growth. It also binds to particles and is difficult to eliminate from aqueous systems. In collaboration with researchers at Zhejiang University, we determined the total amount of phosphorus released from six different types of wetland sediment into pore water as a function of temperature. Sediment samples were obtained from six different wetland areas of eastern China and experiments were setup outdoors. To simulate two different climate scenarios, the temperature of control samples were allowed to fluctuate in unison with the outside temperatures, while the other set of samples was maintained at 5°C above the outdoor temperature to mimic the anticipated temperature effect of global climate change. The amount of phosphorus released from the sediment by the two groups of samples differed only slightly. However, there were greater differences in the amount and range of P released by the different types of soils. Our results suggest that an increase of 5°C in temperature will likely cause only a modest change in P in pore water of wetland sediments. Our results indicate that the amount of phosphorus released is much more strongly dependent on the type of soil present. This suggests that there are areas that will be more affected by the temperature increase than others. As a result, as global climate change continues, careful attention will need to be paid to the types of sediment present in wetland environments to determine the severity of the increased temperature on the availability of P in wetlands.

Information about the Authors:
Adam Dickey became interested in this project because of its importance to the studies currently taking place at the Zhejiang University in China.

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Water Quality Monitoring of the Little Calumet East Branch Watershed

Nicholas H. Feller, Melissa Dorton

Departmental Affiliation: Chemistry and Civil Engineering
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The Little Calumet East Branch (LCEB) is a 10-digit hydrologic unit code (HUC) watershed that ultimately discharges into Lake Michigan. The watershed begins in unincorporated LaPorte County and discharges west through unincorporated Porter County, converges with the West Branch of the Little Calumet River, and finally discharges into Lake Michigan via the Burns Ditch Waterway. A water quality monitoring study was performed in the summer of 2012 as part of the watershed management process led by a not-for-profit organization, Save the Dunes. Save the Dunes’ Great Lakes Innovative Stewardship through Education Network (GLISTEN) liaisons initiated weekly monitoring at eleven LCEB sites for nine weeks during the summer 2012 recreational period. The Indiana Department of Environmental Management (IDEM) conducted monthly monitoring of 48 sites in the LCEB including the sites monitored by the GLISTEN liaisons. Parameters measured for in the watershed included nitrogen, pH, phosphorus, dissolved oxygen, conductivity, water flow, and Escherichia coli.

Information about the Author:
Nicholas Feller is a junior civil engineering student. He is on the executive board of the American Society of Civil Engineers and Phi Sigma Kappa fraternity. He also performs in Valparaiso University’s Symphony Orchestra. Melissa Dorton is a senior chemistry student at the University of Indiana Northwest.
Searching for a New Epoxide Precursor in TMM Cycloaddition Reactions

Christopher Miko

In order to explore the feasibility of Pd(0)-catalyzed trimethylenemethane (TMM) cycloaddition reactions with epoxides, the precursor trimethyl-(2-oxiranyl-2-propenyl)-silane (1) was synthesized in a three-step process from propargyl alcohol and reacted with dimethyl malonate, with Pd(PPh3)4 acting as a catalyst, in both THF and toluene. This reaction was performed to examine whether the π-allyl Palladium complex forms and whether the epoxide ring opens. NMR spectra show support for π-allyl Palladium complex formation, the epoxide ring opening, and the presence of the expected product, although the solvent used may affect which product forms. Efforts to characterize the product(s) are ongoing.

Information about the Author:
Christopher Miko is a senior physics and chemistry major at Valpo. He plans on going to graduate school for physics and will begin serving on active duty in the U.S. Air Force after graduating.

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Comparisons of Blog Engagement in the Professional World

Emily Doherty, Nathalie Martinez, Jan-Erik Scheibner

The central idea of our project is focusing on the effects that companies have on the public through blog engagement. Companies we researched want to produce a blog in which the internal and external public can comment and produce their own opinions. We researched the comparisons between smaller businesses and larger corporations. We will be comparing Designer Desserts and Kernel Kones to Google and Apple. The importance of blogging is that while not as many people blog, social media is usually included on these blogs in order to gain better engagement for the public to voice their concerns and give feedback. Theoretically, blogging is not used as much as other tools such as social media to gain knowledge of the company. In order to collect data, we will have to analyze the companies we have chosen based on their reputation with the public and how often they use blogging to engage with the public, by going on their websites to find their blog posts. We have found that larger companies have a better blog engagement system because they have the specialized staff to maintain their blogs and keep up with the feedback responses. There is a growing need for companies to blog in a better way to engage with their followers.

Information about the Authors:
Nathalie Martinez, Jan-Erik Scheibner, and Emily Doherty realize that blogging is a fundamental aspect of working in the communications field.

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Social Media Usage: A Comparison of Public Relations/Journalism and Marketing/Management Students

Molly Gramza, Helen Dolley, Jabril Baker

Research indicates that students use social media for more social reasons than professional reasons. To test the assumptions in the literature, this study examined key disciplines having a professional connection to undergraduate studies. The findings focus on the key social media platforms utilized in professions as presently used by students.

Information about the Authors:
Molly Gramza is a junior public relations major who plans on pursuing a career in the field of event planning. Helen Dolley is a junior marketing major who plans on pursuing a master’s degree in business. Jabril Baker is a senior marketing major who plans on pursuing a marketing position with the Bears.

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Talking Business on Twitter

Murphy Maes, Alizabeth Taubert, Shea Hennessy

Departmental Affiliation: Communication
College of Arts and Sciences

In 2013, creating healthy relationships with your publics is imperative for growth and maintaining already loyal constituents. Twitter has become a concise, yet direct way to communicate with your followers. There are five key findings on how Twitter affects organizations. Personal dialogue is key; it makes the followers feel more personable and more likely to engage in conversation. The digital media age is a world in which most information we receive is through internet and social media vehicles. With Twitter, communicating with the public while gaining visible exposure is quite simple. “In reality, few organizations reach a high level of interactivity. Few websites go beyond providing content for constituents and providing a mechanism for feedback.” In order to find data, the website instituteforpr.org is used. This site shares case studies on how people use Twitter for their organizations. Through the four-week study and observing other opinions regarding the power of the internet, using Twitter can boost your public reputation as well as bring in growth. In conclusion, we hope to share information on how organizations can make their organization better by “Talking Business on Twitter.”

Information about the Authors:
All three of the authors are second semester juniors in the Department of Communication. Murphy Maes and Alizabeth Taubert both have an academic focus in the PR field while Shea Hennessy is studying general communication and photography.

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Nonprofit Organizations Improving Public Relations through an Analysis of Public Perceptions

Keely Naughton, Kayla McClain, Kennan Carnegie

Departmental Affiliation: Communication
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Hilltop Neighborhood Child Care Center is a critical support system for low-income families. The internal perceptions and the external perceptions need to be identified to better serve the organization and the community (its publics). This organization-public relations (OPR) emphasis through interviews, surveys, and focus groups will be the basis of an organizational strategic plan and a public relations campaign.

Information about the Authors:
Keeley Naughton is a junior sports management major and public relations minor. This summer, Keeley will be interning for a nonprofit organization that encourages sports and activities for intercity youth. Kayla McClain is a senior public relations and Spanish major. Kayla is currently the intern at Valparaiso University’s Office of Alumni Relations where she has helped jump start a social media campaign.

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Integrated Communication: Perceptions among the Fields of Marketing, Public Relations, and Journalism

Becca Mercola, Alec Johnson, Rachel Abbinante

Departmental Affiliation: Communication
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The literature indicates the importance of the public relations, marketing, and journalism disciplines being aware of the professional demands of each area. An analysis of student perceptions from each discipline about the other disciplines reveals the need to do more of an integrated approach in the teaching domain. A research instrument surveyed classes in public relations/journalism and marketing/management in the College of Business and the Communication Department.

Information about the Authors:
Becca Mercola is a junior marketing major with a public relations minor looking to pursue a career in the marketing field. Rachel Abbinante is a junior public relations and theatre major who is looking for an internship in PR. Alec Johnson is a senior individualized sports journalism major looking for a career in sports journalism.

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Using Public Relations Analysis to Study the Role of Perception of a Student Organization (OPR)

Shiho Suzuki, Nour Ulayyet, Lisa Borosh

Departmental Affiliation: Communication College of Arts and Sciences

Organization-public relationship (OPR) is a central focus for those working in public relations. The literature indicates that OPR is the key indicator of the effectiveness for an organization. To apply this knowledge to a student organization on campus seemed particularly important when an organization has an international focus, especially for undergraduates. Thus, the research on the VISA student organization with key student publics served as the primary means for gaining insight into the perceptions or the perceived image of an internal organization.

Information about the Authors:
Shiho Suzuki is a public relations major who is from Japan. She is interested in working in PR in the U.S. after graduation this May. Lisa Borosh is a student in public relations with a variety of interests in PR. She is currently a member of PRSSA. Nour Ulayyet, from Syria, is an active public relations practitioner in the area of fundraising. Nour completed a campaign recently for fundraising and is proud of its success.

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A PR Case: Understanding Public Perception from a Perspective of Lakeshore Public Media through Research

Johnathon Taylor, Lauren Robinson, Sarah Dooms

Departmental Affiliation: Communication College of Arts and Sciences

The perception of an organization by its publics is a critical component for establishing a relationship. To identify an organization's relationship with publics, the perception of Lakeshore Public Media was examined through three platforms: television, radio, and its interactive website. Noting that the educated public are the most serious followers of public media, the sample from the membership list of the public media provided contacts to the most dedicated group. The general public was composed of a sample from those who utilize the county library system. The first sample had already expressed its commitment through a membership donation. The general public, although probably more educated with a library membership, reflect an uncommitted population that are likely to be seen as promising candidates if there are not serious intervening variables to establishing a relationship. Comparing and contrasting the two sample groups established the importance of identifying and addressing the perception of a relationship between an organization and its publics.

Information about the Authors:
Sara Dooms is a senior majoring in public relations who is an active member of the Public Relations Student Society of America. Lauren Robinson is interested in both public relations and television. She is also on the PRSSA Spark student agency team for the Anti-Tobacco Campaign. Johnathon Taylor is a television and radio major.

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Cultural Profits: How Museums Communicate through Nonprofit Public Relations

Erika Wagner

Departmental Affiliation: Communication College of Arts and Sciences

Public relations is an obscure or unfamiliar field to the average American. Often confused with marketing and advertising, most people associate PR with large corporations trying to manipulate the media. What people don't realize is that PR is all around us, fulfilling a great variety of functions and influencing many publics, not the least of which includes nonprofit PR. Although not at the forefront of the public's image of PR, nonprofit public relations is a totally different animal typically including a small budget and lots of hands-on work. My research includes a foundation of nonprofit PR and how it differs from the corporate setting, and then builds to focus on museums as a specific nonprofit institution. Through both articles on the subject and a collection of interviews with museum PR professionals ranging from small local museums to a large national museum, I have identified goals and methods of museum PR as a reflection of the larger and ever-expanding sector of nonprofit public relations. As a rapidly growing field, research on nonprofit PR is in its fledgling stages and therefore it is important to identify and highlight these key concepts such as cultural worth, free media maximization, and nonprofit networking.
A Linear Regression Analysis for Understanding High School Grade Point Average (GPA)

Christine Warner

Departmental Affiliation: Economics
College of Arts and Sciences

This project analyzes different aspects that may contribute to the grade point average (GPA) of high school students. GPA is important because it is one of the fundamental measures of student success. I gathered data on 206 individuals from the Bureau of Labor Statistics’ National Longitudinal Survey of Youth 1997-2010. I selected variables for the regression analysis from categories including general motivation for success and optimism; use of time; other academic measures; and health habits and lifestyle. Using SPSS to run the regressions, I found that variables that I believed most related to GPA – such as amount of sleep, time spent studying, and number of absences – were not found to be significant. A student’s SAT score was the only variable directly related to school that was significant in the regression. On the other hand, the variables for whether a student spends regular time in prayer and whether they consider themselves organized show a significant impact on GPA. Individual identity variables of race and gender were significant as well.

Information about the Author:
Christine Warner is an actuarial science major with a statistics minor. She would like to work as an actuary for an insurance company in the future.

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Measuring Determinants of Investor Confidence through Time: A Regression Analysis

Paul Yox

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This project explores variables that may affect investor confidence in the stock market. Understanding what drives investor confidence in markets can be useful for both institutions and individuals when considering how to react to and cope with the increasing financial volatility of modern financial markets. The hypothesis that economic variables are determinants of investor confidence is tested using a multivariate regression model spanning 1989-present. The measure of investor confidence employed is based on a survey conducted by Yale professor Dr. Robert Shiller. This paper demonstrates that at a basic level, measures such as company earnings and P/E ratio are more significant predictors of markets in the long term, while measures of consumer sentiment and number of initial public offerings are more significant in the short term. This research suggests therefore that more intangible measures such as consumer sentiment are useful predictors in the short run, but exhibit a declining effect as the investing horizon is lengthened.

Information about the Author:
Paul Yox is a finance and economics major and member of Christ College. He is the Indiana State President of Phi Beta Lambda, a national business organization, local chapter president of the Financial Management Association, and treasurer of his fraternity Phi Sigma Kappa.

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How Students Learn Best: An Analysis of Demonstrations, Labs, and Scenario-Based Teaching

Heather Albertson

Departmental Affiliation: Education
College of Arts and Sciences

The purpose of this study is to analyze how students learn best and to discover the methods in which they like to learn new information. Students often find learning in science classrooms difficult or uninteresting. My goal as a future science teacher is
to stimulate students so that they are interested in learning the processes and findings of science. There are a myriad of ways that researchers and science teachers think that students can be engaged, such as demonstrations, labs, and scenario-based teaching. I would like to survey students, mainly freshmen in introductory classes, and ask them if they prefer to learn by demonstrations, labs, or scenario-based teaching. I am hoping this information will benefit me in my future classroom so that I may connect with as many of my students as possible and elevate students' knowledge of science.

Information about the Author:
Heather Albertson strongly believes that students in high school science often get lost in the content that teachers cover and therefore miss important opportunities to make connections to the real world through science. As a future educator, she would like to be able to connect with every student while bridging connections to the real world using demonstrations, labs, and scenario-based teaching to draw them in.

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How Increased Motivation Levels Can Lead to Increased Cardiovascular Endurance and Muscular Strength

Derrick Alvarez

Departmental Affiliation: Kinesiology and Education College of Arts and Sciences

The purpose of physical education programs in schools across the nation is to make students who pass the class into “physically educated” students; hence, the name of the class. A physically educated student possesses a set of characteristics developed by repeated exposure to effective physical education environments. One of the most important qualities a physically educated student possesses is that they “value physical activity and its contributions to a healthy lifestyle.” However, when high school students on the brink of adulthood do not possess attitudes that value regular physical activity, the goal of the physical education class becomes harder to reach. Through differentiation of physical education curriculum, teachers can increase levels of student autonomy, therefore increasing their motivation to participate in regular physical activity. A NASPE questionnaire can be administered to the class in order to gather a baseline reading of their motivation levels before a strength and conditioning unit begins.

After both the educator and the students have completed the differentiated curriculum and physical activities, the questionnaire can be administered again. By comparing the results of the post-instruction motivational questionnaire and the recorded progress of each student on individual fitness logs, the effectiveness of the differentiated curriculum may be assessed.

Information about the Author:
Derrick Alvarez, a senior physical education-teacher education major, firmly believes that a sound body equals a sound mind. This research is very important to Derrick as a future physical education teacher and athletic trainer because it will help to develop different teaching strategies designed to increase and maintain student motivation levels.

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Strategies to Alleviate Test and Mathematics Anxiety

Clara Brandt

Departmental Affiliation: Education College of Arts and Sciences

The purpose of this study is to determine the effectiveness of two anxiety-reducing techniques in a seventh grade Tier 2 (average) mathematics classroom. Based on the work of Ford, Ford, Boxer, and Armstrong (2012), one of the techniques will be the use of humor. The other technique is the use of visualization (see Shobe, Brewin, & Carmack, 2005). Two classes will be used in the study, and the study will be broken into two rounds. In the first round, Class A will be introduced to the technique of humor, and Class B will be a control group. In the second round, Class B will be introduced to the technique of visualization and Class A will be the control group. Effectiveness of the techniques will be evaluated through the scores of the students' unit assessments. Students will take Likert scale evaluations throughout the study to provide qualitative data. Ultimately, this study seeks to determine whether either of the anxiety-reducing strategies actually lowered anxiety, was effective, or affected students' academic performance.

Information about the Author:
Clara Brandt is a senior middle-level education major. She plans to teach middle school math or science in the state of Washington after graduation.
This study is being conducted in conjunction with her student teaching seminars.

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**Group Work: Effects of Previous Peer Interactions**

Claire Jacobs

**Departmental Affiliation:** Education  
College of Arts and Sciences

The research conducted through a student survey will provide insight as to whether or not past peer interactions through group work have tainted or influenced students' feelings towards group work today. A survey will be administered to seventh grade middle school students from two local schools in Northwest Indiana. The purpose of this research study is to help shape the way educators understand student feelings towards group work before assigning peers together and expecting results or products.

**Information about the Author:**  
Claire Jacobs, a middle-level education major, chose the topic because of her past experiences in the classroom as a student forced into group activities. She is in her third year at Valparaiso University and plans on continuing this action research project during her professional semester.

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**The Usefulness of Scientific Field Trips: What are High School Students’ Attitudes towards Them?**

Aaron Wayne Willis

**Departmental Affiliation:** Education  
College of Arts and Sciences

The purpose of this study is to analyze students’ attitudes toward scientific field trips. This study will evaluate whether students have a positive, negative, or neutral attitude toward going on these scientific field trips. Also, using this questionnaire, the data collected from four dimensions – the learning aspect, the social aspect, the adventure aspect, and the environmental aspect – will help measure the students’ attitude toward scientific field trips. This study will encompass a questionnaire being passed out to multiple high school students from various grades and learning levels (regular, honors, AP, and IB). I will be unable to test one group myself because Chesterton High School is on block scheduling; I will therefore have a faculty member assist me in administering the test to that group of students.

**Information about the Author:**  
Aaron Willis is a junior biology and secondary education major from South Bend, IN. His school district rarely sponsored scientific field trips and when they did, many students complained about going.
Do Classroom Teaching Methods Incorporate All Types of Learning Styles?

Samuel Zucker

Departmental Affiliation: Education
College of Arts and Sciences

An individual’s learning style is a natural pattern of processing or acquiring knowledge. Three types of learning styles that were studied are visual, auditory, and kinesthetic (tactile). An individual’s ability to acquire knowledge depends upon the style of instruction received by the teacher. The purpose of this project was to examine whether the teaching methods used in a high school biology classroom take into account different types of student learning styles. Student teaching in a biology class has given the author the opportunity to study the learning needs of the students. The participants were given a questionnaire during class asking each student to answer questions that would reflect their preferred style of learning. The students were also asked what methods were used during instruction that satisfied their learning style needs or caused them to struggle. The author then analyzed the data from the questionnaire to determine if the students felt their learning needs were met.

Information about the Author:
Samuel Zucker is better at essay and fill-in-the-blank questions than multiple choice questions. Since he is planning on being a teacher, he wanted to investigate the types of learning styles and how knowledge is taught so he will be a more effective teacher.

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The Politics of Film Adaptation in Zola’s La Bête Humaine

Reillie Acks

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College of Arts and Sciences

In 1890, Emile Zola published a book called La Bête Humaine. The novel is essentially a psychological thriller whose story features three very dynamic characters: a train station master Roubaud, his wife Séverine, and her lover Jacques Lantier. The conflict that ensues is one of murder and deceit – and the motivations of the characters are similarly unclear and compromised. Therefore, this story can potentially be interpreted in multiple ways, providing important political commentary for their receiving audiences. It follows that when a series of film adaptations re-created the story on screen, they did so in drastically different ways. Two particular adaptations did this especially effectively: La Bête Humaine (1938), a French film directed by Jean Renoir; and Human Desire (1954), a film directed in Chicago by Austrian director Fritz Lang. Although both films are based on the same novel, each has marked differences from the novel and from one another. Both representations of the novel are informed by the political climate of their respective time periods. Renoir’s adaptation was influenced by the destruction and corruption of WWII in France, while Lang’s shows clear traces of the effects of McCarthyism in the United States.

Information about the Author:
Reillie Acks is majoring in French, economics, and mathematics. She first wrote this paper for her Senior Seminar French class which focused on film adaptations of French literature. Since she wants to use French studies for her future career goals, she is very intrigued by the idea of the translatability and communicability of languages and ideas in any medium.

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Medieval Redemption for Modern Times: Representations of Sacrifice in Perceval le Gallois and The Fisher King

Tabitha Gerardot

Departmental Affiliation: Foreign Languages and Literatures
College of Arts and Sciences

Chretien de Troyes' medieval novel Perceval ou le Conte du graal tells the story of young Perceval’s journey to knighthood and an understanding of selflessness and redemption. However, the tale was left unfinished, giving rise to numerous continuations, both medieval and modern. The film adaptations Perceval le Gallois, by French director Eric Rohmer, and The Fisher King, by Terry Gilliam, continue the rich tradition of Perceval with their own
conclusions. While the films use different artistic styles and entirely different plots, they both solve the story with a tale of redemption. While Rohmer’s adaptation is extremely faithful to the original text, he finishes the story with Perceval sacrificing himself in a reenactment of the Passion of Christ. Gilliam, however, presents a conclusion where the only solution to the fragmented and chaotic lives of the characters is love (both romantic and platonic). Ultimately, the conclusions to these adaptations suggest that their Perceval characters are in need of redemption through sacrifice. While it may seem strange to compare two 20th century films with a 12th century novel, the authors of these stories struggle with the same universal condition of unhappiness found in selfishness, thereby transcending their separation in time.

Information about the Author:
Tabitha Gerardot took a French senior seminar in which the students compared French films with their original works of literature. A French and Spanish major, she loved studying the French language in these pieces of art.

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The Use of Intercultural Competency and Culture-Bound Syndromes in Mental Health Services for Latino Americans

Tina Siganporia

Departmental Affiliation: Foreign Languages and Literatures
College of Arts and Sciences

By 2050, it is estimated that 97 million people or one-fourth of the U.S. population will be of Latino descent. Yet, often mental health therapists have inherently Western approaches to treatment that may not effectively aid culturally diverse groups. This presentation is a literature review of successful therapies for treating Latino Americans. It investigates empirical studies that have been peer reviewed and are published in scholarly journals. The findings indicate two essential concepts: intercultural competence and culture-bound syndromes for Latino American mental health services. Intercultural competence includes recognizing how migratory and acculturative stress may play a role in a person’s mental condition. It implies that the therapist should realize how another society has distinctive values, such as the importance of collectivism or maintaining masculinity and femininity. Also, intercultural competency demonstrates that no culture is monolithic; cultures have group differences within and are nuanced. Included in the Diagnostic and Statistical Manual of Mental Disorders (Text-Revision) is the model of culture-bound syndromes. These are diseases that are widespread in a specific culture but are unfamiliar to those outside of the culture. For treatment of Latino Americans, therapists should be able to diagnose culture-bound syndromes such as coraje, susto, and nervios.

Information about the Author:
As a psychology major, Tina Siganporia is interested in cross-cultural aspects of the field and is empathetic towards ethnic minorities because she is a “first generation” American. Someday, she would like to be able to practice therapy in Spanish and use culturally competent methods of treatment. She completed this project for her Spanish for the Service Professionals class.

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An Examination of the Occurrence of Divorce and Social and Demographic Factors within Chicago

Louise Hahn

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

This research looks at the occurrence of divorce among Cook County-Chicago census tracts from data gathered from the 2006-2010 American Community Survey (ACS) of the U.S. Census Bureau. Previous research has looked at various factors believed to affect the divorce rate of a country, in particular the economic development, average educational attainment, and participation of women in the labor force. These past studies have often found a significant and positive correlation between divorce and a country’s economic development, educational attainment, and participation of women in the labor force. However, these studies have mostly focused on cross-national boundaries, thus allowing for greater disregard for cultural norms and differences across countries. This study, then, examines divorce as it is found within a diverse city (known historically for its segregation) of a single nation. Occurrence of divorce is mapped along with various demographic information such as race, income level, educational attainment, and nativity, and then spatially analyzed.
Information about the Author:
Louise Hahn became interested in divorce after considering the possibility of marriage as a next step after graduating from college. In an effort to avoid divorce, the author attempted to learn about some of the factors which contribute to divorce and see how these factors correspond to divorce in her city of origin.

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A GIS Analysis of Environmental Justice in Lake and Porter Counties

Halina Hopkins

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Starting with the publication in 1987 of the United Church of Christ Racial Justice Commission Report "Toxic Wastes and Race in the United States," environmental justice research addresses the geospatial relation between environmental hazards and the social characteristics of the communities hosting toxic sites. Geographic Information Systems (GIS) allows environmental justice researchers to consider questions involving public policy, health effects, risk analysis, and more nuanced considerations of race, income, and injustice. This project is an analysis of environmental justice in two counties in northwest Indiana: Lake County, which contains the city of Gary; and Porter County, an adjacent county with no major cities. I investigated the relationship between environmental hazards and wealth in these two counties. I addressed this question by using GIS to map population block data from the 2010 U.S. Census (using housing values, median income, and county revenue as indicators of wealth) against the locations of toxic release facilities from the U.S. Environmental Protection Agency's Toxic Release Inventory (TRI). I developed a set of maps showing the spatial relationship between TRI density and economic status.

Information about the Author:
Halina Hopkins is a senior majoring in biology, environmental science, and humanities. This project was the culmination of her advanced GIS class.

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The Effects of Obesity, Eating Habits, and Lack of Physical Activity Leading to Heart Disease

Natalie Jarrett

Departmental Affiliation: Geography and Meteorology
College of Arts and Sciences

Obesity has become a major problem throughout the United States. By the year 2030, a projection report has estimated that all 50 states could have obesity rates above 44 percent. Throughout the spring semester, I have been working on a project using the mapping program ArcGIS to show the greatest areas for obesity within Cook County, Illinois. The project deliverables will be in the form of a map of Cook County that will determine areas of highest obesity. The map will show fast food restaurants, parks, and income level. Once the map is completed, it will be determined whether highest areas of obesity are due to many fast food areas and lack of parks and recreation facilities and whether income level plays a factor in higher obesity rates.

Information about the Author:
Natalie Jarrett is a senior environmental science major. She became interested in this topic while watching the news and seeing the staggering increase in obesity across America.

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Investigation of Idabel, Oklahoma Ozone Concentration Pre- and Post-Frontal Passage

Alexander Kotsakis, Veronica Fall

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Fifty-eight ozone profiles from Oklahoma State University's Kiamichi Forestry Research Station in Idabel, OK have been collected over the last three years. This has been made possible through funding from the Texas Commission for Environmental Quality. The data has provided an opportunity to see what was happening meteorologically that affected ozone concentrations. With ozone being the primary cause of short and long-term respiratory issues, the impact of weather on air quality is something that is still being researched. Ozone pre-cursor emitters such as Dallas, Oklahoma City, Longview, and Texarkana surround Idabel. Meteorological conditions such as
Changes in Indiana Water Usage Rates Related to Population from 1990-2005, Using GIS Analysis

Alexandra Olson

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Water is arguably our most important resource and the issue of its sustainability arises with our ever expanding population. The U.S. Geological Survey (USGS) has five accessible data sets on their website regarding the water usage rates of each county in Indiana from 1985 to 2005. It does not provide any comparison among these years or display any maps regarding this data. Because this analysis is missing, I will focus on the correlation between water usage rates and population averages in each county of Indiana during the same years. I will then create a series of maps that display this data. My methodology for this research begins with an investigation into the problem, gathering of data records from USGS and the U.S Census Bureau, the creation of the maps, and finally an analysis of the results. The results will then provide information regarding the correlation between water usage rates and population per county for the state of Indiana as well as various maps that can highlight the changes that have occurred.

Information about the Author:
Alexandra Olson is a senior at Valparaiso University majoring in geography, and she is interested in today’s environmental issues. She has held an internship at the Indiana Dunes National Lakeshore working with water quality and has increasingly gained interest in water resources.

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Climate Change and Politics: A Connection between Congressional Voting and Our Warming Planet Using GIS

Kelsie Rudolph

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While climate change is widely accepted by the scientific community, it is not as accepted in the political world. Recently, there was an amendment to a bill put to a vote in the House of Representatives to accept that climate change is occurring and has anthropogenic causes. This amendment did not pass. This project aims to find a connection between the voting record of the representatives and the average temperature change over the last 50 years in their districts. Data from the Library of Congress, as well as NOAA will be analyzed using GIS methods. It is hypothesized that there will be a positive connection between voting for the amendment and an increase in average temperature.

Information about the Author:
Kelsie Rudolph is a senior environmental science major graduating this May. She became interested in this project through her advanced GIS course, as well as her interest in climate change and policy in the United States. After graduation, she hopes to find a job in the environmental field.

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Information about the Authors:
Alexander Kotsakis is from Palatine, Illinois while Veronica Fall is from Wauconda, Illinois. Both will graduate in May 2013 with a B.S. in meteorology. Alex and Veronica both plan to attend graduate school, where Veronica will pursue research related to climate change and policy while Alex may continue research with air-quality and low-level ozone concentrations.

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Enhancing Interest in STEM at NW Indiana Middle and High Schools through Balloon Launches and Tracking

Mark Spychala, Raymond Finzel

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Our vision with this project is to develop and implement a research project led by undergraduates from Valparaiso University (VU) that would involve the participation of local middle and high school students in innovative balloon payloads. Under the guidance of Dr. Gary Morris, two VU undergraduate students will develop their designs, then present and test their system at local schools to help instill excitement about STEM in curious young minds. All students (college, middle, and high school) gain knowledge, experience, and confidence in STEM-related areas. The primary goal of this project is to provide competency-building education and research opportunities that develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, in industry, and in higher education. Assessments will be administered to participants in balloon workshops to determine their interest in STEM careers both prior to and following each event. This data will be analyzed by the participating VU students and presented in a final report.

Information about the Authors:
Raymond Finzel is a senior computer science major with a desire to build software that aids the scientific community. Raymond is currently seeking employment in software engineering, but someday hopes to become an expert in the field of robotics. Mark Spychala is a senior meteorology major who loves field work and hopes that the next generation of high school students will love it as much as he does.

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Watts Up with That: Comparing Wind Farms in Texas and California while Explaining Why Farm Quantity Does Not Overcome Wind Quality

Alexandra Thompson

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Since the 1980s, California has been the leader in wind energy for the United States. In 2004, wind energy produced 1.5 percent of the state’s electricity. That is 4,258 x 108 kilowatt hours per year. The California wind farms producing the most energy are located in three regions: Altamont Pass, Tehachapi, and San Gorgonio. Research for California will be focused on the southern part of the state – the regions of Tehachapi and San Gorgonio. Presently, California has five major wind farms. This project will examine the major wind farms in both Texas and California. California was in the number one spot for wind energy production in the United States until 2006, when Texas took the lead. Texas is currently the number one wind energy producer in the United States with major wind farms in its central and eastern regions. In 2010, wind energy produced 12 percent of the electricity in Texas. In 2011, Texas created 1,039 x 104 kilowatt hours per year of energy. Roscoe Wind farm, the largest in Texas, produced 800,000 kilowatt hours per year alone. This is enough to power approximately 265,000 homes. Texas currently has 32 major wind farms. Major wind farms will be defined as farms with wind turbines producing more than 120,000 kilowatt hours per year.

Information about the Author:
Alexandra Thompson is a senior geoscience major from Saint Louis, Missouri. After studying meteorology for three years, this is a fantastic way to incorporate weather and sustainability.

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Portraits on the Wall

Ellen Croll

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The focus of “Portraits on the Wall” is discovering the history behind two family heirlooms. Through online archival and ancestry websites, a tentative history of the portraits was found. Once a more clear background was established, a complete line of descent was created starting with the current generations of the family and traced back to one generation previous to the portraits. While searching for answers about the subjects of the portraits, an abundance of family history was unearthed. Everything from local politicians, to Supreme Court
cases against step-mothers, successful business owners, to friends of presidents. While investigating the subjects in the portraits, other family events are explored on the journey through eight generations of family history. The main source of information outside of family knowledge was ancestry.com. Through this website, pictures, censuses, marriage licenses, and birth and death records were found to provide additional resources. “The Ewing Genealogy” and bartondatabase.info are both compilations of family histories that intertwined with the descendents of the portraits, making them both extremely valuable sources. Additionally, other family heirlooms including photographs, books, and newspaper clippings were used.

Information about the Author:
Ellen Croll is a sophomore psychology major hoping to become a family counselor. She chose this project because learning about the portraits and her family history is something that she has always been interested in, but have never had the opportunity to explore.

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Divine Rejection and Its Damn Consequences

Alexander Harris

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My family is steeped in Lutheranism. My grandfather on my mother’s side is a Lutheran pastor. On my father’s side, half is very Lutheran and the other has spurned Lutheranism due to a well-meaning pastor refusing my sickly great-grandmother communion because of her denomination. I have looked at the incident that caused my family to split by talking with my grandmother and by researching the Lutheran faith practices of the time. Because I am interested in following my grandfather into the ministry, I want to know how to avoid causing families from turning away because of faith issues. I used several academic articles that speak to the matter as well as going to the source of contention – the Bible. Even though the practice of closed communion (only admitting members of your own congregation and the group of churches with whom it is affiliated) has good intentions, many believe the biblical basis on which it is founded does not fully support the practice, and the results do not always further the mission of the church. Sometimes it goes so far as turning a devout family into a torn group of people who do not know what they believe.

Information about the Author:
Alexander Harris is currently following in his grandfather’s steps to become a pastor in the Lutheran Church-Missouri Synod (LCMS). The issue of closed communion has caused contention in his family’s past and has been a key issue in his relationship with his fiancé who is currently a member of the Wisconsin Evangelical Lutheran Synod (WELS).

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The Decline of The Knights Templar in Medieval Times

Elizabeth Keller

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The Knights Templar had risen to be one of the most feared and powerful societies in the 1100s. Their fame and fortune were unlike any other “religious” society of the time, which drew much unwanted attention and scrutiny their way. Eventually, they were ostracized and disbanded because of their unrighteousness, lack of charitable contribution, and ruthlessness when it came to debt owed. I conclude that their eventual disbandment was not because of their unrighteousness on the whole, but mostly because the Pope and other powerful men owed them too much money. They were disbanded only 200 years after their creation, but their lore and mystery remains even today.

Information about the Author:
Elizabeth Keller is a history major hoping to get her PhD in history with a concentration in secret societies. Family members have been members of the Knights Templar, and intrigue arose when her grandfather told stories of his and his predecessors’ involvement.

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Butchered Butcher
Melissa Kohner

Departmental Affiliation: History
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In this paper, I explore the murder of Christian H. Schindeldecker and how the police were able to find and prosecute the murderer, Edward Gottschalk. I recount the actions of Chief of Police John O’Connor and his men as they follow the clues and with a little luck connect the dots of the mysterious murder. Thirteen days after Schindeldecker was murdered, Gottschalk was arraigned for murder. Solving the murder of Christian Schindeldecker was one of the best cases of detective work ever done in Minnesota. Following the firsthand account of Chief Deputy Sheriff Frank Robert Jr., court papers, and contemporary newspapers, the unfurling of the case was done.

Information about the Author:
Melissa Kohner is a senior biology major with minors in chemistry and history. She is headed to Kentucky College of Osteopathic Medicine after graduation.

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In the Land of Beer, Brats, and Bootlegging: A Personal Account of Milwaukee History
Marissa Schmidt

Departmental Affiliation: History
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In all of the United States, one may be challenged to find a city that even today has remained quite as German as Milwaukee. Why is this? Within the boundaries of this paper, I have sought to answer this question by exploring one specific branch of my family tree, the Froehlichs. Their experiences in coming to Milwaukee from Germany and raising many generations there, directly mirror the stories of thousands of other German immigrants at the time. Together, these immigrants built a very tight-knit and unique American community that successfully blended some of the best elements of German culture and heritage with the idealism of America. Though the community makeup of Milwaukee has become much more diverse since the late 1800s, its German foundations still remain at the forefront of what makes it such a culturally interesting and valuable city today. To thoroughly explore such a topic, I have used a variety of different sources. First and foremost, I have used the memories of my grandma, Joy Feustel. Her interviews with me have been invaluable in adding to my research for this project. I have also used the Froehlich family tree and countless books on German history within Milwaukee.

Information about the Author:
Marissa Schmidt is a history/Spanish double major with a minor in American-Indian studies. She hopes to one day pursue her PhD in history, but for now, she is looking forward to a summer internship in the Anthropology Department of the Milwaukee Public Museum and to spending the next academic year studying abroad in Granada, Spain.

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An Army for the Revolution, a Revolution for the Army: The French Revolutionary Army, 1792-1797
William Scupham

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There is a common myth about the average French soldier at the time of the French Revolution that presents him as a reckless, heroic citizen-soldier, swept to victory by the power of revolutionary fervor. This myth obscures some important realities of French military life. The French military was often characterized not by fantastic victories, but rather by an early incompetence. Indeed, this inability threatened to destroy France on many occasions. This essay attempts to reconcile the myth and reality by exploring what motivated common Frenchmen to fight and win wars. Demographic, political, tactical, and organizational analysis of the French Revolutionary Army reveals how the military was a transitional organization caught between the monarchical model and the nascent democratic ideology. The military saw a growth in its wider “Frenchness” as men from all of France volunteered. Many of the operations of the army were carried out with the French conception of democracy and national identity in mind. At the same time, the older influences anchored the army, enabling the revolutionary spirit to survive. One finds an army struggling to reconcile its old monarchical roots in organization, equipment, manpower, and even
battlefield tactics with the new revolutionary French identity.

Information about the Author:
William Scupham is a junior history and political science double major with a penchant for military history. This paper is to be published in Primary Source, an undergraduate journal printed by Indiana University.

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War, Railroads, and the West: The Lost Story of J.R. Scupham
William Scupham

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The Scupham family currently spread across Indiana and Illinois is fairly well established and confident in its past. From the earliest familial records – dating only to the Civil War – a lone figure emerged: William C. Scupham, private in the Union Army, 1st Illinois Light Artillery. However, in looking through the regimental roll for the 1st Illinois, one finds, somewhat shockingly, another soldier with the same last name: John R. or J.R. Scupham. William’s story is well known – his stay at Andersonville prison is well documented – but who was this shadowy J.R.? Even more compelling is that his name was scrawled across the entire country. From Chicago to Missouri and Vicksburg to California, J.R. flashes out from military rolls, court cases, land holdings, and newspaper clippings. The rediscovery of John R. Scupham tells a story that could have only have happened in the exciting, tumultuous decades of the late 19th-century. It is a story of immigration, war, railroads, mining, and the American West; a truly American story that helps one to understand how individual men and women were able to shape this country by their own remarkable actions.

Information about the Author:
William Scupham is a junior history and political science double major with a penchant for military history. He also loves uncovering any sort of historical mystery and working with historical newspapers, two factors that influenced the writing of this paper.

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Scandal in Scotland
Abigail Smith

Departmental Affiliation: History
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This paper examines the life and scandals of William Smith, born in Dyce, Scotland in 1882. In addition to the mystery surrounding the date of his own marriage and the birth of his first child, is Smith’s dalliance with his wife's sister and the resulting illegitimate child. Amidst these stories and others, the paper describes life in Scotland in the 19th and early 20th century and analyzes potential reasons for emigration with the help of Marjory Harper's work, Emigration from Scotland between the Wars: Opportunity or Exile? The paper also follows the path of Smith's descendants and their experiences as immigrants and travelers, particularly Smith's youngest son Ronald. This work relies heavily on primary documents, including letters, pictures, and certificates as well as the oral history of Nancy Kilkenny, granddaughter of William Smith, and her recollections both of her own experiences and stories passed down by the family. The stories of Smith and his relatives reveal the intimate trials of a family's emigration from Scotland to the United States at the turn of the 20th century.

Information about the Author:
William Smith is Abigail Smith’s great grandfather, so the topic of this paper is a very personal one. Abigail is a senior history major with a Spanish and classics minor, and she is also a Christ College Scholar. Her plans after graduation are to pursue a M.A. in American History.

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The Effects of Chronic Lower Back Pain on Muscle Activation and Range of Motion
Gina Lange, Laura Richards

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The purpose of this study was twofold: first, to examine the muscle activation of lower back muscles during various trunk positions in persons with and without chronic lower back pain (CLBP); second, to examine the relationship between perceived levels of pain and muscle activation and range of motion. Five subjects with CLBP and five subjects without CLBP volunteered to participate. Using an Electromyogram
(EMG) the muscle activity of the ten subjects were recorded during three different trunk positions—standing neutrally, standing with 30 degrees flexion, and standing with maximum hyperextension of the trunk. The subject’s perceived pain in each position was recorded. Several hypotheses include: 1) subjects without CLBP would show more muscle activation during each of the three positions; 2) there would be negative correlation of perceived pain to muscle activation; 3) there would be a negative correlation between perceived pain and range of motion; and 4) there would be a positive correlation between muscle activation and range of motion. At this time data collection and analysis continues. From this study the authors hope to gain insight into the relationship among three variables: muscle activation as measured by EMG, the body’s responses to pain, and lower back range of motion.

Information about the Authors:
Gina Lange is an exercise science major, with minors in human biology and psychology. She is planning on attending graduate school to earn a doctorate in physical therapy. Laura Richards is a double major in exercise science and nursing. She also has a minor in both human biology and psychology.

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The Impact of Endurance Training vs. Non-Endurance Training on Blood Lactate Levels Post Seven-on-Seven Maximal Capacity Test (SSMCT)
Rebecca L. Pietrzak

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Competitive swimming involves repeated maximal-effort races, which require the body to have a superior buffering system and rate of recuperation. A buildup of lactate can hinder the body's ability to perform during subsequent races. However, proper training may enhance the body's buffering system and recuperation. This study aimed to discover: (1) the impact of endurance vs. non-endurance training on blood lactate levels post-SSMCT; (2) whether the swimmers' training regimens improved sprint times. Participants in this study included 37 collegiate swimmers. Body composition and resting measurements were collected at the beginning of a practice pre-/mid-/post-season. Blood lactate samples and 100-yard sprint times were recorded at these practices after completing the SSMCT. Data were analyzed using student t-tests. Results indicated that non-endurance training initially reduced blood lactate accumulation, while endurance training continually reduced accumulation throughout the season. Swim times during the SSMCT decreased among both groups of swimmers from pre- to post-season. There were no significant differences between the effect of the two regiments on blood lactate levels post-SSMCT and average performance times. Both regimens increased the body's ability to buffer lactate and perform anaerobically. This suggested that the current training programs are sufficient at reducing blood lactate accumulation and enhancing subsequent performances.

Information about the Author:
As an exercise science major, Rebecca Pietrzak is interested in how exercise physiologically affects the body. Also, as a former high school athlete, optimizing seasonal training programs interests her.

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Optimizing the Allocation of Vaccines in the Presence of Multiple Strains of the Influenza Virus
Ana Eveler, Tayler Grashel, Abby Kenyon, Jessica Richardson

Departmental Affiliation: Mathematics and Computer Science
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During the annual flu season, multiple strains of the influenza virus are often present within a population. It is a significant challenge for health care administrators to determine the most effective allocation of two different vaccines to combat the various strains when treating the public. We employ a mathematical model, a system of differential equations, to find a strategy for vaccinating a population in order to minimize the number of infected individuals. We consider various strengths of transmission of the disease, availability of vaccine doses, vaccination rates, and other model parameters. This research may lead to more effective health care policies for vaccine administration.

Information about the Authors:
Ana Eveler is a music education major and mathematics minor who shows great interest in applied mathematics. Tayler Grashel is a psychology and chemistry major with human biology and mathematical minors. Abby Kenyon is a meteorology and math double major. Jessica Richardson is an
Simulation Modeling and Analysis of Coal Shipping Operations

Raymond Finzel, Timothy Goodrich, Graeme Roberts

*Departmental Affiliation:* Mathematics and Computer Science
*College of Arts and Sciences*

Computer simulations are increasingly powerful and realistic models for complex real-world scenarios, and our project applies this technology to model a coal transportation case study. Given a baseline scenario of fourteen carriers transporting coal from three U.S. locations to four international locations, we optimize operations in terms of product flow, time required for shipments, and total operation costs. Implementing the case study’s factors into modular code, we introduce several potential changes to current operations and develop specific scenarios. Further, in analyzing these scenarios we test for robustness and sensitivity, by changing values such as demand and bad weather occurrences, and noting how well the model responds. We ultimately gain a better intuition of the factors at play, identify optimizations, and develop a more efficient configuration. Also, we note several areas of potential improvement and suggest several directions for future work. Finally, taking advantage of modern graphical software, we present the optimized scenario in an animated interface, including a 3D view of the model and real-time data charts. While delving into complex data to reach the desired results, our model is accessible to a broad audience and presents an intriguing glimpse into the future of computational modeling.

*Information about the Authors:*
Raymond Finzel is a senior computer science major and is involved in VU’s chapter of the Association for Computing Machinery. He hopes to work with robotics and adaptive algorithms after graduation. Timothy Goodrich is a junior computer science and mathematics double major and a member of Christ College. He hopes to continue his study of both fields in graduate school. Graeme Roberts is a junior computer science major and also a cadet in the Air Force ROTC crosstown program via Detachment 225 Notre Dame.

Sorting Permutations with Finite-Depth Stacks

Timothy Goodrich, Will Olson, Ruyue Yuan

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*College of Arts and Sciences*

Sorting organizes information for optimal usage, and our work examines the mathematics behind sorting with stacks. In 1968, Donald Knuth showed that a permutation is sortable in an infinite-depth stack if and only if it avoids the pattern 231; Knuth also enumerated these permutations. Twenty-five years later, Julian West extended these ideas to permutations sortable with 2 consecutive stacks. We continue this work by limiting the stack(s) to a finite depth. In particular, we completely characterize permutations sortable through a single finite-depth stack and derive a handy enumeration formula. We also apply our pattern characterization and enumeration techniques to permutations that are sortable after k-passes through a finite-depth stack.

*Information about the Authors:*
Timothy Goodrich is a junior computer science and mathematics double major who hopes to pursue interdisciplinary work between these fields in graduate school. He is also a tutor for the Academic Success Center. Will Olson is a sophomore mathematics and political science double major; he also works as an Ambassador in Admissions and is involved in the Phi Kappa Psi fraternity. Ruyue (Julia) Yuan is a sophomore mathematics major with interests in research and theoretical mathematics and hopes to pursue a doctoral degree in mathematics. She also plays violin in the Valparaiso University Symphony Orchestra and tutors for the Academic Success Center. All three are members of Christ College.

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Investigating Prerequisite Grade Requirements in the Calculus Sequence

Michelle Kleckner, Lexi Paradine, Katie Merkling, Mindy Capaldi

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College of Arts and Sciences

The Valparaiso University Mathematics and Computer Science Department has been debating a shift from a D- to a C- in the calculus sequence prerequisite grade requirement. We first researched policies at other colleges and universities. Next, we gathered data on students’ self-predicted grades by distributing pre- and post-semester surveys and measuring the accuracy of the results in comparison to the actual grade data. Using the surveys, we also associated students’ expectations with their majors. In the end, we investigated whether or not prerequisite grades can predict subsequent course performance. Statistical analysis of the past four years of math student data determined that a student who received a C or lower in the prerequisite class generally would not improve in the subsequent course.

Information about the Authors:
Michelle Kleckner is a junior math and secondary education double major and is also pursuing a physics and humanities double minor. Katie Merkling is a freshman math and secondary education double major. Lexi Paradine is a junior math and secondary education double major.

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A Study of Two Newly-Discovered Eclipsing Binary Systems

Austin Bain

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I have observed three newly-discovered variable stars using the 16-inch telescope and CCD at the Valparaiso University Observatory. Of these three variables, two have been verified as binary star systems, where one of the stars passes in front of the other. The third is found to be a pulsating variable, which varies due to a change in its size and temperature. One of the goals of this project has been to further refine the periods of these three variables. From my new data and some previous observations at the Valparaiso University Observatory, I have been able to determine that the brightness of the three systems has varied from 13-55 percent. I have improved upon the determination of the periods of these variables. For the two binary systems, the periods are 0.52 and 1.21 days. For the pulsating variable, the period is 0.32 days. I have formed light curves for each star showing the change of brightness over one cycle. For the two binaries, the light curves are being analyzed to determine the relative sizes and differences in temperature of the two stars in each system. All of this is a part of my senior research project in physics and astronomy.

Information about the Author:
Austin Bain is a senior physics major from Monrovia, Indiana. He has worked with Professor Bruce Hrivnak during the summer and school year as an undergraduate research assistant. He plans on pursuing a master’s degree in aerospace engineering upon completion of his bachelor’s in physics.

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Dispersion of Radon-222 Gas in Air

Erin Beckmeyer

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Radon-222 is a heavy radioactive gas with a half-life of 3.8 days, often found in basements and other enclosed, underground spaces. It is produced by decaying deposits of uranium-238, and presents a significant health risk to those who encounter it in their homes and places of work. The only gas in the uranium decay chain, radon atoms work their way through layers of soil, usually to dissipate harmlessly into the atmosphere. In buildings, however, the gas accumulates and causes dangerous environmental radiation. Much work has been done to measure the transmission of the gas through water and solid materials, but very little is known about its behavior once it enters into the air of a contained space, besides larger scale statistical data. In this project, I will study how radon gas disperses horizontally and vertically over time in air and formulate a model for this dispersion. The model will benefit those working against the radon problem by providing a more efficient algorithm for evaluating radon’s presence in a space and for locating its points of entry.

Information about the Author:
Erin Beckmeyer is a senior student studying physics and philosophy, with plans to someday attend
seminary and enter the ministry. She discovered an interest in radon after seeing previous students' presentations of research on the subject.

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A Measurement of the Hyperpolarizability of Carbon Tetrachloride by ESHG at 614.5 nm

Wesley Cheek

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The second hyperpolarizability (\(\gamma\)) of carbon tetrachloride was measured by gas-phase electric-field-induced second-harmonic generation (ESHG). Periodic phase matching was used in order to enhance the ESHG by gases illuminated by a cw argon-ion laser operating at 514.5 nm. Using nitrogen as a reference gas, \(\gamma_{\text{CCl}_4}\) can be calculated by means of the ratio \(\gamma_{\text{CCl}_4}/\gamma_{\text{N}_2}\) determined to be 18.3 ± 0.7.

Information about the Author:
Wesley Cheek is a senior physics major. This past summer in an REU program, he worked under Dr. David Shelton at the University of Nevada in Las Vegas. Along with another student from UNLV, they were led to measure a non-linear optical response of gaseous CCl\(_4\).

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Neutral Pion Background Analysis at STAR

Adam Clark

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The STAR detector at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory takes measurements of polarized proton collisions which can then be used to extract cross sections and spin asymmetries. The Endcap Electromagnetic Calorimeter (EEMC) in STAR allows measurements of electromagnetic particles in the forward direction, \(1 < \eta < 2\). The EEMC will be used to determine the neutral pion (\(\pi^0\)) cross section and the double longitudinal spin asymmetry (ALL) which gives us information about the gluon contribution to the proton’s spin. The \(\pi^0\) cross section is an important supporting measurement to verify our signal reconstruction and the background characterization for the \(\pi^0\) asymmetry. In order to measure the \(\pi^0\) cross section and asymmetry, the backgrounds must be well understood (such as those from photon conversions and reconstruction errors where one photon reconstructs as two clusters). Efforts toward the \(\pi^0\) cross section and asymmetry measurements and, specifically, those to understand \(\pi^0\) backgrounds are discussed.

Information about the Author:
Adam Clark is a sophomore physics and mathematics double major. Adam, originally from New Lenox, Illinois, was selected for a summer internship position at Valpo to work on this project. His future goals include attending graduate school to pursue a Ph.D. in nuclear physics.

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Stability of the Gains of the STAR Endcap Calorimeter from 2006 to 2011

Kayla Kutz

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The Solenoid Tracker at RHIC (STAR) experiment, based at Brookhaven National Laboratory’s Relativistic Heavy Ion Collider (RHIC), uses polarized-proton collisions to investigate sea quark and gluon contributions to the fundamental proton property called “spin.” The STAR detector’s Endcap Electromagnetic Calorimeter (EEMC) measures the energy of particles produced by those collisions using a lead-scintillator sampling calorimeter, consisting of several layers that include pre-shower, shower maximum, tower, and post-shower detectors. In these detectors, the energy gains, which convert a measured pulse into an energy deposition, have been determined using data taken from the years 2006, 2009, and 2011. Changes in the gains over time may result from known high voltage changes or deterioration of the detector, such as from radiation damage. A comparison of the gains from the three years will be presented.

Information about the Author:
Kayla Kutz is a senior physics and secondary education double major planning to either begin a career teaching high school physics or pursuing a
An Event-by-Event Comparison of Clustering Algorithms for Photon Detection in the STAR Endcap Calorimeter

William J. Pochron

Departmental Affiliation: Physics/Astronomy
College of Arts and Sciences

The STAR detector at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory uses polarized proton collisions to determine the origin of the proton spin, using measurements such as neutral pion ($\pi^0$) asymmetries. The Endcap Electromagnetic Calorimeter (EEMC) in the STAR detector is especially useful for detecting photons from $\pi^0$ decays at forward angles. This latter measurement is obtained from the Shower Maximum Detector (SMD) in the EEMC where narrow crossed scintillator strips measure the energy deposited in them and can be used to identify the location of the photon shower. The electromagnetic shower most often deposits energy in a small number of adjacent strips that collectively form a “cluster.” This work has focused on a qualitative and quantitative comparison of two different clustering algorithms that were developed to reliably identify $\pi^0$ events and to effectively discriminate against background cluster selection that produces false $\pi^0$ signals. This comparative analysis will be presented and the strengths and weaknesses of the algorithms will be discussed.

Information about the Author:
Billy is a senior physics major, mathematics and military leadership double minor from New Lenox, Illinois. After graduation, Billy is headed to Laughlin Air Force Base, Texas to attend undergraduate pilot training.

Faculty Sponsor: Dr. Shirvel Stanislaus
Student Contact: billy.pochron@valpo.edu

Generating a ‘Clean’ $\pi^0$ Spectrum in STAR

William J. Pochron

Departmental Affiliation: Physics and Astronomy
College of Arts and Sciences

The STAR detector at Brookhaven National Laboratory’s Relativistic Heavy Ion Collider uses polarized proton collisions to investigate the origin of the proton spin, using measurements such as neutral pion ($\pi^0$) asymmetries. STAR’s Endcap Electromagnetic Calorimeter (EEMC) is especially useful for detecting photons from $\pi^0$ decays at forward-angle scattering from $\approx15$ to $\approx40$ degrees above the beam direction. We identify $\pi^0$’s by constructing invariant mass spectra from these photons. Large background contributions are present in these spectra and distort the true value of the $\pi^0$ invariant mass. By applying constraints (cuts) on parameters such as the opening angle of the photons in the reconstructed pair, decay vertex position, photon energy, and energy asymmetry, I have been able to produce a ‘clean’ $\pi^0$ spectrum with little background using the data from 2006. In the future, a ‘clean’ $\pi^0$ invariant mass spectrum can provide an avenue to calibrate the EEMC against the known pion mass. This method combined with our current calibration methodologies could improve understanding of the EEMC response, critical to our ability to investigate $\pi^0$ spin asymmetries. The results, along with a comparison to simulated Monte Carlo data, will be presented.

Information about the Author:
Billy Pochron is a senior physics major from New Lenox, Illinois. Outside his work, Billy is anticipating being commissioned as a second lieutenant in the Air Force and will be stationed at Laughlin Air Force Base, Texas for pilot training.

Faculty Sponsor: Dr. Shirvel Stanislaus
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Testing the Klein-Nishina Model for Compton Scattering of 0.662 MeV Photons with a Focus on Lower Scattering Angles

Joel Rogers

Departmental Affiliation: Physics and Astronomy
College of Arts and Sciences

The Thomson and Klein-Nishina equations for obtaining the differential cross section by Compton scattering of photons from free electrons in aluminum will be tested using 0.662 MeV photons from a Cesium-137 source. A NaI detector will be used to count the number of photons scattering from the target as a function of the scattering angle. A previous experiment carried out by VU student Josh
Vredevoogd showed good agreement with the Klein-Nishina theory for angles greater than 45 but discrepancies with angles less than 45 degrees. This experiment will concentrate on testing the Klein-Nishina theory at angles less than 45 degrees.

Information about the Author:
This research is an extended project of an experiment performed in Physics 345 and is an application of nuclear physics. Joel Rogers has found nuclear physics to be his favorite course taken here at Valpo and wanted to choose a senior research project related to this field.

Faculty Sponsor: Dr. Shirvel Stanislaus
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A Study of Light Variability in Dying Stars

Hannah Rotter, Aaron Seider, Austin Bain

Departmental Affiliation: Physics and Astronomy
College of Arts and Sciences

In this research project, we observed and analyzed the light variability in a class of dying stars that are in the stage between Red Giant and White Dwarf in the evolution of stars like the Sun. Our observations were carried out during the summer and fall of 2012 at the Valparaiso Observatory. Thirty-two of these objects were observed in total. We analyzed a subset of 18 of these and found that they all varied in visual brightness by 10-70 percent. Periods for the variability were found for 8 out of 18 objects, and they range from 27 to 125 days, based on five years of observations. These variations are due to the pulsation of the stars. The goal is to find the amplitude and period of the variations; these can be used to investigate the internal structure of stars. This research was supported by a grant from the National Science Foundation.

Information about the Authors:
Hannah Rotter is a sophomore physics major from Grafton, Wisconsin. She plans on going to graduate school to get her PhD in astrophysics after she graduates with her bachelor’s degree in physics. Aaron Seider is a sophomore physics major with plans to continue on to graduate school and do research. His main interest lies in physics, but he has always had a fascination with the night sky, which is how he became interested in astronomy. Austin Bain is a senior physics major from Monrovia, Indiana. He plans on pursuing a master’s degree in aerospace engineering upon completion of his bachelor’s degree in physics.

Why So Special? The Israel Lobby, Human Rights, and United States Foreign Aid

Stephanie Volz

Departmental Affiliation: Political Science and International Relations
College of Arts and Sciences

Considered as Israel’s strongest ally, the United States has long maintained a special relationship with Israel. The alliance has remained strong even through challenges such as war, terrorism, and global opinions against Israel. Throughout the lengthy Israeli-Palestinian conflict, the United States has made Israel the top annual recipient of its foreign aid. In addition, the United States defends Israel from accusations regarding the legality of its actions toward Palestine and the Palestinian people. In this paper, I argue that U.S. aid to Israel is predicated on domestic political and special interest concerns. Specifically, I argue that increases in aid to Israel are the result of the increases in the influence of the pro-Israel lobby. Furthermore, despite previous research contending that U.S. support of Israel does not change in light of alleged human right violations in Israel, I also argue that more Israeli violations of human rights actually lead to greater amounts of U.S. aid to Israel. Though many scholars have completed a comprehensive analysis of these issues, none has yet completed a quantitative analysis of the relationship between U.S. aid, human rights violations, and the pro-Israel lobby. This exploratory study of U.S. aid provision to Israel addresses that gap.

Information about the Author:
Stephanie Volz is a senior from Huntsville, Alabama, majoring in mathematics and political science. This specific paper was written for her political science senior seminar. After graduation in May, she hopes to find a job with a firm dealing with statistics and analysis.

Faculty Sponsor: Dr. Amy Atchison
Student Contact: stephanie.volz@valpo.edu
**The Effects of Question Placement on Reading Comprehension Scores of High Comprehenders**

Katharine Beideck, Kristen Bartlett, Jessica Kuiphoff, Jane Biedron, Shemika Cookbey, Thomas Sutherland, Katelyn Staples

*Departmental Affiliation: Psychology College of Arts and Sciences*

Previous research has shown that embedded questions hurt the reading comprehension of high comprehenders. All participants had high reading comprehension skills scoring at or above 66 percent on the ACT/SAT. Participants either read a packet with questions embedded about every paragraph or a packet where questions were all located at the end of the reading. Participants answered the questions as they came to them. After a week of delay, the participants came back and took a test with questions that were either: target, non-target, or related. For all of the dependent variables, people who had taken a statistics course before did better than those who had not. For the dependent variable of reading questions, there was a significant interaction. People who had taken a statistics course previously and those who had not did equally well. However, when people answered end questions, people who had taken a statistics course previously did better than those who had not. Embedded questions did not negatively affect the reading comprehension of high comprehenders. It might be possible that we did not reject the null because our sample size was too small.

*Information about the Authors:*
All of the authors are enrolled in the Human Cognition Laboratory class. This project was a class assignment.

*Faculty Sponsor: Dr. Kieth Carlson*

*Student Contact: katharine.beideck@valpo.edu*

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**Keep Calm and Carry On: An International Comparison of Stress in Law Enforcement**

Holly Buckman, Amanda Zelechoski

*Departmental Affiliation: Psychology College of Arts and Sciences*

This presentation will show the results of a comprehensive review of the literature and a cross-cultural comparison of law-enforcement related stress in the United States and the United Kingdom. In the formation of this comparison, we will obtain a better understanding of law enforcement exposure to stress and its effects. By comparing the stress experienced by law enforcement officers in these seemingly similar countries, we conceptualize the potential causes of these similarities and differences. More specifically, the organization/structure of law enforcement, support networks, community conditions, and the police subculture in these countries will be analyzed. This analysis will show that U.S. officers appear more likely to exhibit negative effects of stress as a result of avoidant coping strategies, while U.K. officers appear more likely to exhibit negative effects of stress but can cope more easily because of problem-focused coping strategies. A systematic comparison serves to inform our policy recommendations related to stress response and preventative strategies for law enforcement. We recommend that the U.S. needs to adopt programs that emphasize healthier coping models and that the U.K. should focus on emotional aspects of coping for their law enforcement officers.

*Information about the Authors:*
Holly Buckman is a junior undergraduate student studying psychology, sociology, and criminal justice who plans to attend graduate school after graduation. Assistant Professor Amanda Zelechoski is a licensed attorney and clinical psychologist, specializing in the areas of trauma and forensic psychology. Holly wanted to participate in a research project during her semester abroad at Valpo’s Cambridge (England) Study Centre. Together they decided that Holly should capitalize on her time outside of the U.S. by making her project into a cross-cultural comparison of literature on the stress experienced by law enforcement in the U.S. and the U.K.

*Faculty Sponsor: Dr. Amanda Zelechoski*

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**The Structure of Addictions: A Confirmatory Factor Analysis Approach Using Structural Equations Modeling**

Gabrielle Krus, Victoria Labitan, Katherine Paul, Kelly Perfect, Diana Stribl, Liz Hostetler, Sarah Braun

*Departmental Affiliation: Psychology College of Arts and Sciences*

Addiction is one of the most important mental health problems in contemporary society, but relatively little is known about how various kinds of addictive behaviors relate to each other. In this study, we take a complex structural model of addictions developed from Christian theological sources and our own
previous research and test it against a large (N = 300) dataset of individuals who have rated their relationship to various objects of addiction. The analysis largely confirmed our theoretical model with some interesting modifications. We discuss implications of this research for addictions assessment and treatment.

Information about the Authors:
The authors are in the second year of a large project investigating how spiritual models of addiction from the Christian tradition might help us to better understand the problem of addiction.

Faculty Sponsor: Dr. Jim Nelson

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Facilitating Positive Reactions to Psychological Labels
Stephanie Kuipers

Departmental Affiliation: Psychology
College of Arts and Sciences

Receiving a psychological label is often a life-changing experience. Some people feel relieved and hopeful upon discovering a name for their problem, while others become scared and depressed about the implications of receiving such a label (Proudfoot et al., 2009). This study attempts to identify factors that may affect whether a client has a positive or negative reaction to psychological labeling. Specifically, three factors were examined: use of language, client personality, and type of diagnosis. Each participant was randomly assigned to read one of four short narratives in which they imagined themselves in the depicted situation. All narratives portrayed someone receiving a psychological label from a doctor for the first time, but there were four different types of narratives overall that varied depending on whether the doctor's diagnosis was clinical depression or schizophrenia and whether the doctor used labeling or benign language. Examples of labeling language included terms like “mental disorder,” “mental illness,” and “psychosis,” while narratives with benign language used none of the above terms and excluded the name of the diagnosis. Participants also took the NEO personality inventory. Results will be analyzed using regression and/or correlation methods, with conclusions forthcoming.

Information about the Author:
Stephanie Kuipers is a senior psychology major with minors in biology and philosophy. In the mental health field, one of the biggest issues is the stigma that people still face when they receive a psychological diagnosis.

Faculty Sponsor: Dr. Jim Nelson

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Effect of Emotional Cues on Memory Recall and Response Time
Rachel Rahn

Departmental Affiliation: Psychology
College of Arts and Sciences

Combining electroencephalography, the recording of the brain's electrical activity, with other psychological research techniques allows the link between memory and emotion to be investigated. This study, which is currently in the pilot phase, investigates the effect of emotions on performance in a memory test. Subjects are shown written memory cues with or without accompanying photos of strong facially-expressed emotions and later prompted to recall the written cues. By monitoring brain activity and recall success rate, emotion's effect on memory in this context can be determined, including what brain regions are stimulated by the emotion-memory link and the improvement or impairment of memory skills under the effect of outside emotional cues.

Information about the Author:
Rachel Rahn is a biology and German major who became interested in neuroscience and neuropsychology after attending neuroscience courses at the University of Tübingen in Germany while studying abroad.

Faculty Sponsor: Dr. Jim Nelson

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Effects of Electronic Communication on Face-to-Face Communication
Colleen Bulow, Barb LaRocco, Bethany Garling, Amy Wise

Departmental Affiliation: Social Work
College of Arts and Sciences

In the past 20 years, electronic communication fundamentally changed how people communicate. Though there has been much speculation about the effects of using this type of communication, little formal research has been done. This study expands
upon previous research asking, “Does more frequent use of electronic communication correlate with a lower reported level of comfort in dealing with face-to-face confrontation?” For this study, the researchers created an electronic survey targeting individuals ages 18-25. The survey consisted of three sections: first, a brief demographic section; next, a frequency checklist measuring how often participants used various types of electronic communication; and finally, the survey presents a series of conflict situations, asking the participants to determine, with a Likert scale, how comfortable they would be handling each situation face-to-face. Each scenario is followed by a list of communication tools from which the participant chose which type of communication they would prefer to use to address each scenario. In a society that is increasingly reliant on electronic communication, the question posed in this study is significant. If the study suggests that the proposed hypothesis is true, then further study must be conducted to address the possible effects of a decline in levels of social self-efficacy.

Information about the Authors:
All of the researchers are junior social work majors interested in the way that communication is changing within society. Colleen Bulow and Amy Wise are leading a group at the Boys and Girls Club with the goal of teaching effective communication skills to children. Bethany Garling recently returned to campus from a semester earning an urban studies minor in Chicago.

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Awareness of Contraceptive Availability at Valparaiso University

Katherine Cole, Charlotte Johnson, Megan Marimen

Departmental Affiliation: Social Work
College of Arts and Sciences

Despite contradictory perspectives, college students are having sex. College-age students engage in high-risk sexual behavior despite their relatively higher rates of both sexually transmitted infections and unintended pregnancy compared to other age groups. Several studies suggest that the majority of college students rely on campus health clinics or condom distribution programs for obtaining contraceptives. Because of the prevalence in college students, this study was targeted toward full-time, sexually-active Valparaiso University students (aged 18-24). The researchers hypothesized that sexually-active students at Valparaiso University who were unaware of campus availability of contraceptives participated in unprotected sex more often than sexually-active students who were aware of availability on campus. Based on the findings of this study, education and advertisement for contraceptives is likely inadequate. Since contraceptive use decreases the occurrence of both sexually transmitted infections and unintended pregnancy, it is beneficial that students be made aware of the availability on campus.

Information about the Authors:
The interest for this study came about through the personal observations and experiences of the researchers. Researchers Katherine Cole, Charlotte Johnson, and Megan Marimen are female college students who are intrigued by policies affecting Valparaiso University, especially comparing Valparaiso University’s policies to that of other higher education institutions.

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Amount of Knowledge about Sex Trafficking in the United States among Valparaiso University Students

Taylor Fuller, Abigail Matter, Alyssa Kasper

Departmental Affiliation: Social Work
College of Arts and Sciences

This research proposal will address awareness among students, concentrating on males, at Valparaiso University. Little research has been conducted on awareness alone, let alone awareness of college students. Therefore, this research will be filling a gap. It’s important for low awareness levels to increase because awareness is the first step toward change. The researchers will develop an online survey to be administered to a sample of the students attending Valparaiso University to gauge their awareness. After the results are collected, they will be analyzed, and reported upon. Sex trafficking is a major problem for the United States. Finding out college students’ awareness will help identify how much the educated future generation knows about sex trafficking so that they will be able to combat it. Education is key. This study will be useful for nonprofit and government organizations seeking to educate the general population about sex trafficking. This study will show whether men or women know more about sex trafficking and at what year in college they know more and less. The study can pinpoint the at risk
groups who are the most unaware and target them specifically.

Information about the Authors:
All three presenters are junior-level social work majors. Alyssa Kasper has done many presentations about sex trafficking as well as completed the Freedom Climb to raise awareness. She currently interns at The Caring Place in Valparaiso. Taylor Fuller became aware of the topic because of a presentation on campus and felt she should do something to make a difference. She is interning at the Porter County Detention Center in Valparaiso. Abigail Matter also saw a presentation on the topic and was compelled to take action. She’s interning at New Vistas School in Portage, Indiana.

Faculty Sponsor: Dr. Matthew Ringenberg

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Diversity in the Media

Jane Hurdish, Emily Penn, Ashley Watson

Departmental Affiliation: Social Work
College of Arts and Sciences

Research has shown that a lack of diversity exists in the media, particularly regarding how two vulnerable populations, women and people of color, are portrayed. For example, usually only very thin women are portrayed, and people of color are misrepresented, perpetuating negative stereotypes. This study seeks to determine whether a sample of college students from Valparaiso University recognize the lack of diversity in the media and would like it changed. Through this study, society may become more aware of the lack of diversity in the media. This study may also encourage further research into how equal representation in the media can be achieved.

Information about the Authors:
Jane Hurdish, Emily Penn, and Ashley Watson, all social work majors, are particularly interested in how diversity in the media, or lack thereof, affects two vulnerable populations – women and people of color.

Faculty Sponsor: Dr. Matthew Ringenberg

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The Ninhursag Lament, a Literary Precedent for the Stabat Mater

Clara Brandt

Departmental Affiliation: Theology
College of Arts and Sciences

The Stabat Mater Dolorosa of the Christian tradition bears a striking resemblance to the weeping goddess poems of Sumer, and in particular the Ninhursag Lament. The history behind both poems is briefly outlined, and then comparisons are drawn between the two poems’ structure, imagery, movements, and use of other literary devices. Using these comparisons and evidence from the Bible, it is proposed that the Ninhursag Lament is a literary precedent for the Stabat Mater Dolorosa.

Information about the Author:
Clara Brandt is a senior middle-level education major. This paper is a version of a term paper written for a theology course (THEO 319) she took for her minor. After the original submission, this paper was presented at the Society of Biblical Literature Student Religious Studies Conference.

Faculty Sponsor: Dr. George Heider

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The “A” is for Archetype: Gilgamesh as the Source for Captain America

Matthew Heider

Departmental Affiliation: Theology
College of Arts and Sciences

I investigate the archetypal roots of the modern American superhero who has been so popular of late in film, and find that they are located in Ancient culture, specifically in the Epic of Gilgamesh. In that context, the hero is an individual who must grapple with “an exploration of the inevitable conflict between, on the one hand, the forces represented by the absolute commitment of the powerful and heroic male to energy and battle and…the forces that represent some newly emerging situations and value systems” (Abusch). By employing that frame, I find there are narrative similarities between Captain America and Gilgamesh, and the arc of characterization followed by the latter from god-brute to wise king anticipates Captain America’s characterization as a god-like savior of American values, who must learn through suffering and loss how to relate to normal humans. Additionally, I
examine how the loss of Enkidu in the Epic plays an especially important role as an archetypal model of friendship and sacrifice, particularly in relation to the character of Bucky Barnes. I conclude that while there is no direct causality, Captain America and other American superheroes exist within the archetype of the hero related in the Epic of Gilgamesh.

Information about the Author:
Matthew Heider is a senior at Valparaiso University majoring in English. His primary research interest is in the literature of mid-20th century America, especially the poetry of the Beat movement.

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COLLEGE OF ENGINEERING

An Analysis of Sulfur Trioxide in Aggregates for Concrete Using an ASTM Standard for Portland Cement
Sarah Brunsvold

Departmental Affiliation: Civil Engineering
College of Engineering

It is well-known that sulfates in concrete can reduce the long term durability of concrete. Sulfates most notably contribute to the problem of sulfate attack, which causes cracking and deterioration of concrete. Some aggregates can contain these sulfates and so can contribute to a reduction in durability. However, there is currently no standard test methodology to determine the sulfate content in the aggregates used to produce Portland cement concrete. The purpose of this research is to apply the current American Society for Testing and Materials (ASTM) standard for analyzing the sulfur trioxide content in Portland cement to measure the sulfur trioxide content in several different aggregates. It needs to be determined whether the ASTM test methodology for cement can be applied to testing aggregate and whether the data retrieved from the tests are meaningful. The ASTM standard being followed in this study is C 144-11B Standard Test Methods for Chemical Analysis of Hydraulic Cement, Section 17.1 in particular. The current phase of this research involves a blind study of 27 aggregate samples, each being tested two times. The results from the testing include the percentage of sulfur trioxide in the sample.

Information about the Author:
Sarah Brunsvold is currently a junior civil engineering major. She became interested in participating in this research because she is interested in materials engineering.

Faculty Sponsor: Dr. John Schemmel
Student Contact: sarah.brunsvold@valpo.edu

Optimization of Eigenvalue Calculations within Quantum-dot Cellular Automata Stray Charge Simulations
Taylor Baldwin

Departmental Affiliation: Electrical and Computer Engineering
College of Engineering

Simulations for quantum computing typically involve the computation of a large number of eigenvalues of large matrices. This effort focuses on optimization of these calculations using algorithms tailored to the specific characteristics of typical matrices found in these simulations. Currently, computations which heretofore required over 30 hours of simulation time have been reduced to less than 3 hours.

Information about the Author:
Taylor Baldwin is presently a junior in electrical engineering. Taylor is a member of IEEE, the electrical engineering student society, and Tau Beta Pi, the engineering honors fraternity. He is president of VU Students for Life.

Faculty Sponsor: Dr. Jeff Will, Dr. Doug Tougaw
Student Contact: aaron.baldwin@valpo.edu

Spacial Optimization: A Study in Theme Park Design
Zachary Balgeman

Departmental Affiliation: Electrical and Computer Engineering
College of Engineering

Optimization is carefully considered when a company begins to design a theme park. The company wants to maximize their profits while still meeting the consumers’ expectations. One of the things that must be kept in mind throughout the optimization process is space management. With a fixed space budget, only a finite amount of land is
available for different park components (including attractions, shops, restaurants, and open areas). We have been studying the allocation of these areas in the Walt Disney World Magic Kingdom. From this, we want to develop a model for an amusement park in an urban environment.

**Information about the Author:**
Zachary Balgeman has liked Disney since early childhood. During high school, he decided to pursue being a theme park designer. He is very passionate about this project and learning how to optimize space in a theme park.

**Faculty Sponsor:** Dr. Mark Budnik

**Student Contact:** zachary.balgeman@valpo.edu

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**Design and Fabrication of an Ultra-Low Capacitive Pressure Transducer**

Justin Brown, Armand Gagne, Stephen Charnley, Kyle Devlin, Ryan Finley, Jenan Almishari, Anna Wint, Dr. Shahin Nudehi

**Departmental Affiliation:** Mechanical Engineering College of Engineering

The goal of the Capacitive Pressure Sensor project is to redesign the Alpha Instruments 168 series capacitive pressure sensor sold by Dwyer Instruments. The primary objectives of the new design will be to eliminate the use of welding in the assembly of the sensor components and to eliminate stray capacitance in the system measurements through the use of dielectric boundaries. Additionally, the sensor housing will be a stamped design in order to avoid expensive machining steps. The electrical components of the system will be tailored to accept a capacitive signal and transfer it to a voltage reading. This voltage will be used to obtain a proportional loop current that can then be calibrated as a pressure differential and displayed onto a digital read-out device. The project is set to be completed by the end of spring semester 2013.

**Information about the Authors:**
Justin Brown, Armand Gagne, Stephen Charnley, Kyle Devlin, Ryan Finley, Jenan Almishari, Anna Wint are undergraduate mechanical engineering students. Kyle Devlin, Ryan Finley, and Jenan Almishari are undergraduate electrical and computer engineering students. Dr. Shahin Nudehi is a mechanical engineering professor and senior design team faculty adviser.

**Faculty Sponsor:** Dr. Shahin Nudehi

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**Opinions about Smoking, Secondhand Smoke Exposure, and Smoking Behaviors of Freshmen College Students**

Nathan Matejczyk, Nina Tu, Michelle De Young, Nicole Arena

**Departmental Affiliation:** Nursing College of Nursing

The purpose of this project was to assess first semester freshman college students’ opinions about smoking, secondhand smoke exposure, and smoking behaviors on a smoke-free campus. This research used an online cross-sectional survey. For two years, surveys were emailed via Zoomerang to all first semester freshmen students at Valparaiso University. Survey questions contained 60 forced-choice or open-ended options. Data were analyzed using descriptive statistics. A total of 630 students responded. Subjects were primarily female (58.4%) and Caucasian (84.9%). Twenty-five percent of the respondents reported being exposed to secondhand smoke in their environments. Twenty-nine percent of those surveyed said they had smoked during the previous 30 days, with only 28% identifying themselves as “current” smokers. The majority of the respondents agreed or strongly agreed that the campus should be a smoke-free environment, 79% have seen smoking on campus, and 75% believed the smoke-free policy is not enforced. Seventy-seven percent of the respondents agreed or strongly agreed that the campus should be a smoke-free environment. Thirty-four percent of respondents admitted to smoking at some point in their lifetime. Fourteen percent (n=91) indicated that they had smoked during the previous 30 days, with only 28% of these identifying themselves as “current” smokers. The majority of the respondents supported a smoke-free environment and believed the current campus policy is enforced. Data from this study will add to the growing body of evidence about college students’ smoking behaviors.

**Information about the Authors:**
Nathan Matejczyk and Nina Tu are senior nursing majors, and Michelle De Young and Nicole Arena are junior nursing majors. The authors have been involved in multiple research projects focusing on smoking cessation throughout Northwest Indiana. This project is supported by a Wheat Ridge Ministries – O.P. Kretzmann Grant.

**Faculty Sponsors:** Prof. Elise Alverson, Dr. Terry Kessler

**Student Contact:** nathan.matejczyk@valpo.edu
Health Literacy: Understanding Medication Labels

Jennifer Sechrist, Brittany O’Reilly, Katherine Jankauski, Emily Czekala, Lily Salinas

Departmental Affiliation: Nursing
College of Nursing

Introduction: According to the Institute of Medicine (IOM), over 90 million people in the U.S. have difficulty understanding and using health information including medication labels. Purpose: To determine how individuals interpret medication labels and the relationship between medication label interpretation and level of health literacy. Method: Participants were recruited from a student-run health fair and a University Relay for Life. After securing consent, participants completed demographic information and the Rapid Estimate of Adult Literacy in Medicine (REALM). Participants were asked to blindly choose three medication containers from a bag. The labels were prepared by a registered pharmacist and affixed to medication containers. In response to questions, participants relayed information perceived to be on the labels. Sample: There were a total of 21 participants. Ages ranged from 18-89 years. Education levels varied from 10th grade to master’s degree. Findings: Using content analysis, respondents were unable to correctly interpret dosing directions on four out five medication labels. Participants added incorrect information not on the labels. No relationship was found between REALM scores and the ability to correctly interpret medication labels. Conclusions: Findings support that nurses should ask clients to restate medication label information. This assessment of understanding may increase a client’s ability to adhere to the medication regimen.

Information about the Authors:
Jennifer Sechrist, Brittany O’Reilly, Katherine Jankauski, and Emily Czekala are seniors and Lily Salinas is a junior. All authors are nursing students who understand the impact that low health literacy can have on health outcomes.

Faculty Sponsors: Dr. Carole Pepa, Prof. Constance Lemley

Student Contact: jennifer.sechrist@valpo.edu

Beyond the Volcanoes: A Community Partnership for Health in Rural Nicaragua

Paige Snyder, Catherine Wingstrom, Carly Crave, Claire Simonpietri, Christina Lundy

Departmental Affiliation: Nursing
College of Nursing

Background: Health inequities related to gender, ethnicity, socioeconomic status, and geography exist in rural Nicaragua. The purpose of this ongoing project is to improve health equity in rural Nicaragua through social transformation using community-based participatory action research. Bronfenbrenner’s ecological model of human development, school health, and primary health care theories provided the framework for this research. Methods: Community-based participatory action research involves six phases: partnership, assessment, planning, implementation, evaluation, and dissemination. In the evaluation phase, the goal was to use the data obtained during the assessment, planning, and implementation phases to evaluate the cookstove intervention in its ability to reach the community’s health-related goals. Pre- and post-test surveys were used to assess indoor air pollution including: kitchen layout, stove type, fuel usage, and women and children’s health. Results: Forty-eight community members participated in the cookstove evaluation. Pre-test surveys indicated that the community members used open fire stoves in closed kitchen spaces with wood being the primary fuel source. Women reported suffering from headaches, eye irritation, and chronic coughing. One year following the implementation phase, post-test surveys indicated a sustainable, significant improvement in women’s health (p=.05) but no significant change in the amount of wood used for cooking. Conclusion: Results from the cookstove evaluation were used by community members to guide the re-engineering of the cookstoves’ firebox to decrease wood consumption and improve deforestation. Partnership in community health research provides a mechanism to engage community members in social justice through working toward a common goal – sustainable health for all.

Information about the Authors:
Paige Snyder and Catherine Wingstrom are senior BSN students and have been members of the community-based participatory action research team for the past three years. They have each traveled to Nicaragua multiple times throughout their undergraduate career to conduct research. Carly Crave, Claire Simonpietri, and Christina Lundy are junior BSN students and have been involved in the research project since 2012. They have also traveled to Nicaragua to conduct research in the past year.

Faculty Sponsors: Dr. Amy Cory

Student Contact: carly.crave@valpo.edu
## Creative Work and Research Committee
### Student Undergraduate Research Grant Recipients

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