Celebration of Scholarship and Creativity








WORCESTER
State College

April 28, 2010

Engage. Challenge. Inspire.

Each day throughout the academic year, Worcester State College faculty engage their students in the process of active learning. They challenge students to go beyond the ordinary and inspire them to achieve their very best.

Our students benefit from our incredibly gifted faculty across the curriculum--from the arts and humanities through science and social science—who provide students with a wide range of opportunities for meaningful hands-on research. Our faculty offer expert knowledge, academic rigor, and personal attention to students. All of these qualities, which have long been hallmarks of our institution, ensure that we continue to fulfill our mission of providing an exceptional education and preparing students for active citizenship in a changing world.

Many of our faculty also actively pursue scholarly and creative interests outside the classroom and have become widely recognized as experts in their field. They lead by example and demonstrate the virtues of scholarship, vision, persistence, and hard work.

The third annual Celebration of Scholarship and Creativity showcases many of the remarkable accomplishments of our faculty and students. The College celebrates their talent and dedication with the 2010 Celebration of Scholarship and Creativity.

Maureen Shamgochian, Ph.D.
Interim Vice President
Academic Affairs

WORCESTER
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BIOLOGY

CCG-1423, A SMALL MOLECULE INHIBITOR OF THE SERUM RESPONSE FACTOR (SRF) TRANSCRIPTION FACTOR, DISRUPTS ENDOTHELIAL CELL FUNCTION

Dr. Bryan's BI-400 Angiogenesis Class

Faculty Adviser: Brad A. Bryan, Ph.D.

A transcription factor called Serum Response Factor (SRF) has previously been implicated in the regulation of blood vessel formation during embryonic development. Given that blood vessel formation is an essential and rate limiting step in tumor progression, our laboratory sought to inhibit SRF activity with a specific pharmacological inhibitor of SRF-mediated transcriptional signaling called CCG-1423. Treatment of endothelial cells with CCG-1423 completely disrupted cell migration and cell polarity. Further tests are currently underway to determine if CCG-1423 can block blood vessel formation in vitro and in vivo.

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shRNA KNOCKDOWN OF RHO-KINASE 1/2 IN ENDOTHELIAL CELLS

Christopher Doty

Faculty Adviser: Brad A. Bryan, Ph.D.

One major focus of our laboratory is studying the cellular roles of Rho kinase proteins during tumor progression and blood vessel formation. Our previously published studies revealed that Rho-kinase 1 and 2 are essential for blood vessel formation in a number of model systems, however the paralog specific roles of each of these proteins are largely unknown. In order to elucidate the individual contributions of Rho-kinase 1 and 2 in blood vessel formation, we sought to knockdown the expression of each of these genes in endothelial cells using short hairpin (shRNA) technology and subsequently assay the effects of Rho-kinase knockdown on cellular function. A panel of potential shRNA vectors was designed to target Rho-kinase 1 or 2. These vectors were transfected into immortalized mouse endothelial cells and stable transfectants were selected with hygromycin. Semi-quantitative reverse transcriptase polymerase chain reaction (RT-PCR) was performed to identify transfectants displaying successful shRNA knockdown of their respective target genes. These cell lines were then used to assay the contribution of Rho-kinase paralogs to endothelial cell function.

IDENTIFICATION OF DIATOMS FROM THE PEAT BOG AT POUTWATER POND SUGGESTS PH CHANGES OCCURRED DURING THE HOLOCENE.

Benjamin Parmentier

Faculty Advisers: Peter Bradley, Ph.D., Adrienne Smyth, M.S. '06

Peatlands provide a record of environmental history through centuries of preserved sediments containing microfossils such as diatom frustules, pollen grains and sponge spicules. A 5m core of peat was collected from Poutwater Pond in Holden, Mass. This location is a National Natural Landmark and Massachusetts' first Nature Preserve. The basal date was 8,500 years before present as shown by radiocarbon dating. The contents of the core were examined with a scanning electron microscope at nine different depths that represent different ages about 1,000 years apart. A large number of pollen grains and 250 diatoms were counted and identified for each time point. The diatom data are presented here as abundance diagrams and the changes in the assemblage suggest fluctuations in pH and climate at the site during the last 8,500 years. Cyclotella species that are characteristic of an open pond environment were later replaced with Tabellaria and Eunotia species as the acid bog conditions developed. Other fluctuations in climate and acidity during the Holocene are also suggested by the diatom data. These include a progression from circumneutral to more acid conditions from 8,500 to 7,000 years before present, followed by a dryer mid-Holocene period.

DNA MICROARRAYS AS A METHOD OF OPTIMIZING SACCHAROMYCES CEREVISIAE GROWTH AND PROTEIN EXPRESSION DURING SCALE-UP

Maura Pavao, Ph.D.

DNA microarrays can be used to study the expression of more than 6000 genes at once. In this study, Saccharomyces cerevisiae cells expressing recombinant B-galactosidase were scaled up to 1L from shake flasks in an effort to increase protein yields. As part of the process development, the temperature of the culture was dropped from 30'C to 18'C after the yeast cells reached an OD 600 nm of 0.6 so that cells could shift resources from growth to protein expression. The S. cerevisiae genome was surveyed during the temperature drop to 18'C using a microarray to identify genes that are linked to recombinant B-galactosidase expression.

ANNOTATION OF THREE FOSMIDS ON THE DROSOPHILA ERECTA 3L CHROMOSOME REVEALS CONSERVED GENES

Alissa Routhier, Edwin Mancharia, Julie Bollinger, Thao Ngo, Molecular Biology Fall 2009 (BI371)
Faculty Adviser: Daron C. Barnard, Ph.D.

D. melanogaster and D. erecta are closely related evolutionarily. There is a considerable amount of homology between the two species in terms of gene location. We have looked at fosmid 19, fosmid 20 and fosmid 42 of the 3L chromosome in D. erecta and compared it with known genes on the 3L chromosome of D. melanogaster to determine if there are conserved genes. PCR was also performed on adult, pupal and larval stages of D. erecta to confirm the results of the annotation and determine if the genes are in fact expressed. The annotation and PCR results revealed three conserved genes: CG15374, Olf413, and Mes2. CG15374 was determined to be a one exon gene located on Fosmid 19. Olf413 was determined to be an 11 exon gene which extends across fosmid 19 and fosmid 20. Mes2 is located on Fosmid 42 and has two isoforms. Based on our analyses, these genes are likely orthologs of the D. melanogaster genes, and at least two have detectable expression at multiple developmental stages.

CHARACTERIZATION OF PSYCHROPHILIC BACTERIA FROM THE WSC CAMPUS POND

Theresa Shafer
Faculty Adviser: Ellen F. Fynan, Ph.D.

Bacteria in the environment differ in their growth temperature requirements ranging from those that thrive at high temperatures (thermophiles), at mid-range temperatures (mesophiles) to those that prefer cold temperatures for growth (psychrophiles). This study was initially performed to test Lake Ellie for the presence of E.coli using serial dilutions and spread plates. Microorganisms were collected from the water and cultured on trypticase soy agar growth medium at 37°C for 48 hours. After incubation, the plates were stored at 4°C. During that time new bacterial colonies began to appear and others grew in size. Two of the colonies were streaked for isolation. Gram staining of both isolates were characterized to be Gram negative bacilli. Upon examination of the colonies, one isolate displayed an orange pigment and the other was a non-pigmented organism with a mucoid consistency, suggesting a capsule and capability of forming a biofilm. Biochemical testing determined that both lacked the oxidase enzyme and were unable to ferment glucose, lactose, or sucrose. Specific identification of the organisms was performed using the BIOLOG MicrologTM identification system. These results demonstrate the presence of psychrophilic bacteria in a local campus pond.

PHARMACOLOGICAL INHIBITION OF RHO-KINASE SIGNALING ENHANCES CISPLATIN RESISTANCE IN NEUROBLASTOMA CELLS

Catharine A. Street, Ashley L. Perkins, Katherine Masterjohn, Alex Hackathorn, Alissa A. Routhier, Carrie Spencer, John Montalvo, Emily Dennstedt
Faculty Adviser: Brad A. Bryan, Ph.D.

The role of the RhoA signaling pathway in cell survival remains a very controversial issue, with activation of the Rho effector, ROCK, being pro-apoptotic in many cell types and anti-apoptotic in others. To test if Rho/ROCK inhibition contributes to tumor cell survival or death following chemotherapy, we treated cisplatin damaged neuroblastoma cells with a pharmacological ROCK inhibitor (Y27632) or sham, and monitored cell survival, accumulation of a chemoresistant phenotype, and in vivo tumor formation. Additionally, we assayed if ROCK inhibition altered the expression of genes known to be involved in cisplatin resistance. Our studies indicate that ROCK inhibition results in increased cell survival, acquired chemoresistance, and enhanced tumor survival following cytotoxic injury, due in part to altered expression of cisplatin resistance genes. These findings suggest that Rho/ROCK inhibition in combination with cisplatin chemotherapy may lead to enhanced tumor chemoresistance.

BUSINESS ADMINISTRATION AND ECONOMICS

A SURVEY OF WORCESTER'S UNBANKED

Joshua Fickett

Faculty Adviser: Bonnie Orcutt, Ph.D.

Recognizing the potential untapped market, studies are being undertaken to explore ways in which to draw the unbanked into the banking system. This study is a community-based research project aimed at identifying and profiling individuals in Worcester, Mass., who can be classified as unbanked or underbanked. In addition to identifying the socio-economic characteristics of this population, the survey aims to identify the underlying reasons why individuals may choose not to participate in the banking system or not to fully utilize the banking system for meeting their financial needs. Gaining insights as to why people do not participate in the banking system or underutilize financial services available to them is important for developing policy options to improve the financial health of this population. The research is exploratory in nature and will be a starting point for further study on the issue.

STRATEGIC DECISION-MAKING IN THE EMERGING FIELD OF E-COMMERCE

Stephen Melville and International Marketing Class BA 494

Faculty Adviser: Rodney Oudan, D.B.A.

Electronic commerce is changing the traditional way of doing business and furthermore the growth of the Internet is creating new opportunities for business. This paper discusses how the nature of electronic commerce affects strategic decision-making. First, some features of electronic commerce are identified that distinguish it from traditional business - new markets and knowledge-based competition. This is followed by a review of literature on the theoretical background of e-commerce, an academic consideration on what are e-commerce strategies. This paper then examines some of the most common strategic tools used in decision –making, concepts for creating competitive advantage and value chains. Porter's Value Chain Theory, Five Forces Model is examined in the emerging world of e-commerce, as well as generic competitive strategies.

CHEMISTRY

STABILIZATION STUDIES OF METAL-CHELATING COMPLEXES VIA COMPUTATIONAL METHODS

Kweku Acquah

Faculty Adviser: Eihab Jaber, Ph.D.

The bidentate chelating ligands of a metal ion are known to result in a more stable molecule due to the chelate effect when compared with monodentate ligands on the same metal ion. In this work, we examine the enthalpic contribution to the stabilization of the metal ion complexes as the ligands change from monodentate to bidentate and subsequently, as the molecule itself becomes more macrocyclic. Copper (II), Cadmium (II), and Nickel (II), were used as the subject metal ions, and the monodentate and bidentate chelating ligands were NH3 and ethyldiamene (EN), respectively. The equilibrium values for Ni(en) and Cd(en), were 46.9, and 337.5, respectively. Our findings suggest that different equilibrium positions are established upon addition of new ligand interactions, favoring the bidentate chelating ligand interactions over the monodentate ligands interactions.

A COMPUTATIONAL STUDY ON THE FORMATION OF CARBON MONOXIDE POLYMERIC CHAINS PHASE DIAGRAMS OF VARIOUS SALT-SALT AQUEOUS BIPHASIC SYSTEMS

Keith Dusoe

Faculty Adviser: Meghna Dilip, Ph.D.

Ionic liquids are non-volatile and non-flammable solvents that have been used in place of traditional organic solvents in separations and extractions. A hydrophilic, or water-soluble, ionic liquid is used in a separation system by mixing the ionic liquid with a kosmotropic salt to cause a two-phase system to be formed. This type of system has been termed a salt-salt aqueous biphasic system, in which the upper phase is composed of the ionic liquid and the lower phase composed of the kosmotropic salt. Being composed largely of water, aqueous biphasic systems are considered to be a "green" separation technique. Phase diagrams of ionic liquid-NaCl aqueous biphasic systems are presented in this work. Studies of salt-salt biphasic systems using the following ionic liquids have been made: 1-butyl 3- methyl imidazolium tetrafluoroborate; 1-butyl 3- methyl imidazolium chloride and n-butyl pyridinium chloride.

MOLECULAR MODELING OF CATALYTIC OZONE DESTRUCTION BY THE HYDROXYL RADICAL

Ada Dyrmishi, Wyatt Merrill

Faculty Adviser: Eihab Jaber, Ph.D.

The hydroxyl radical plays a key role in the destruction of ozone in the stratosphere through a cycle that self perpetuates. This destructive cycle is carried out in a two step reaction in which the hydroxyl radical catalyzes the creation of diatomic oxygen from ozone and singlet oxygen. This cycle is of interest largely because of it contribution in the destruction of stratospheric ozone. In this work, we aim to computationally model this cycle in a way that is reasonable to recreate in an undergraduate physical chemistry laboratory setting, but which correlates well with experimental findings. Computational methods were largely performed at the ab initio level and include Hartree-Fock and Density Functional Theory at various basis sets. Our findings suggest that the enthalpies for this cycle computed at lower levels of theory compare well with both experimental findings as well as those of very high level theory which would not be realistic to use in an undergraduate laboratory setting. Furthermore, our findings suggest that rate of the reaction for the development of this cycle is dependent on both temperature and pressure changes.

THE SYNTHESIS OF POLYMER CHAINS CONTAINING SUBSTITUTED COUMARIN MOLECULES FOR USE AS WATER-SOLUBLE PHOTORESISTS

Stephen Glynn

Faculty Adviser: Margaret Kerr, Ph.D.

In conjunction with an ongoing project which seeks to incorporate substituted coumarin molecules into polymer chains for use as water-soluble photoresists, last semester experimental focus was on; examination of various coumarin synthesis techniques with an emphasis on environmentally benign methods. In recent years, synthesis techniques for coumarin and its derivatives have evolved considerably. This evolution has largely been driven by the recent push toward “greener” methods across the field of chemistry. Experimental aims were to recreate many different techniques, and improve upon them with the goal of optimizing the “greenness” of coumarin synthesis. Research is now taking place on a later step in the project; attaching chloro-coumarin molecules onto a polymer chain. By utilizing a substitution reaction, 7-(3-bromopropoxy)-3-chloro-4-methyl coumarin will be attached on to a Poly vinyl alcohol, with the goal of the coumarin retaining all of its florescent properties after being attached to the polymer.

METAL CHELATE MOLECULAR MODELING OF N, N’-DI-2-PICOLYL-1, 3-PROPANEDIAMINE STRUCTURES

Nicole Hanna, Cooper King

Faculty Adviser: Eihab Jaber, Ph.D.

Metal-ligand supramolecular systems have been of interest in the design of molecular pharmaceuticals. One important question in designing some classes of antibiotics is how to design the molecules so that they bond selectively the specified metal of choice, meaning fewer side effects from bonding to other metal ions important to physiological systems. DPA-2 (N,N’-di-2-picolylethylenediamine) and DPA-3 (N,N’-di-2-picolyl-1,3-propanediamine) are polydentate chelating molecules which have an interesting combination of both ring- and linear-integrated nitrogen donors. Under analysis is the energetic difference ligand-metal stability over a range of metals when changing from a 5-membered ring in DPA-2 to 6-membered in DPA-3. Computational efficiency using GAUSSIAN 03W in calculating these thermochemical parameters was compared among traditional low-level molecular mechanics, scaled to ab-initio Hartree-Fock, and density functional theory B3LYP methods. Also, in an attempt to address approximating the electronic characteristics of heavy metal atoms, partitioning the ligand-metal bonds into higher-level theory was tested for more computationally efficient calculations. For higher-level theory, LANL2DZ basis set was used.

PARTITIONING OF CHROMIUM IN IONIC LIQUID BASED AQUEOUS BIPHASIC SYSTEMS

Tiffany Hatstat, Isaac Dzomesku

Faculty Adviser: Meghna Dilip, Ph.D.

Salt - Salt aqueous biphasic systems (ABS) are a “greener” alternative to traditional volatile organic compound based solvent extraction systems. The heavy metal chromium was partitioned without any additional extractant in a salt - salt ABS based on the ionic liquid, 1-butyl 3-methyl imidazolium chloride and potassium phosphate. Results will be presented.

HYDROGEN BONDING FORMATIONS VIA CYANURIC ACID/MELAMINE COMPLEXES

Kevin Karanja

Faculty Adviser: Eihab Jaber, Ph.D.

The melamine and cyanuric acid are known to form hydrogen bonding agglomerates stable in water that produce a supramolecular system. The cyclic hexamer formation of these molecules is one example of a supramolecular system. These systems have played an important role in the design of self-assembling aggregates based upon molecular recognition. Cooperative interactions are thought to play a key role in these and other self-assembling aggregates. In this work, we evaluate the enthalpic contribution to the stabilization of these self-assembling aggregates. The calculations were performed using the molecular orbital methods at the ab initio (Hartree-Fock and Density Functional Theory) levels using the GAUSSIAN 03. The interaction enthalpy for melamine/cyanuric acid dimer was found to be 14.93 kcal/mol at DFT B3LYP/D95* level, while enthalpies for individual NH…O, and NH…N bonds are 1.92 and 4.86 kcal/mol respectively. The stabilization enthalpy in the hexamer is 96.36 kcal/mol at DFT B3LYP/D95* level.

FOSTERING INTERNATIONAL EXCHANGE THROUGH THE DEVELOPMENT OF AN UNDERGRADUATE GREEN CHEMISTRY RESEARCH COURSE

Margaret Kerr, Ph.D.

A new course developed to promote green chemistry research at Worcester State College was offered for the first time in the fall of 2009. Worcester State College students worked closely with exchange students from Thailand on a project titled "The Synthesis of Greener Polymers." The exchange program was developed to enhance collaborative research between Worcester State College and Chulalongkorn University in Bangkok. The research course was designed to provide fundamental research skills for undergraduates who are interested in pursuing a career in the chemical sciences. The course provided opportunities for students to learn how to implement, develop, and write about a research project. It also provided instruction in research methods, chemical theory, instrumentation, literature searching, green design, and research ethics. This presentation will discuss the course successes and challenges, our collaborative exchange program, and the student results of the project.

A COMPUTATIONAL STUDY ON THE FORMATION OF CARBON MONOXIDE POLYMERIC CHAINS

Kenneth Kirangi, Christina Lovell

Faculty Adviser: Eihab Jaber, Ph.D.

Carbon monoxide molecules have been known to form polymeric like-chains that consist of several molecules in length, with relative stabilities often referred to as polyketones. Understanding the stability of these molecules can help predict how easily these polymeric forms of carbon monoxide can exist in the atmosphere and as a result, this may provide further information about both the life span and the toxicity of different conformations of these polymeric like-chains of carbon monoxide. In this study, different lengths of the polymeric forms of carbon monoxide ranging in size up to a nanomer are modeled in order to understand the effect length and structure (helical vs. straight chain) has on stability, and also the effect the carbon monoxide monomer has on polarity. The electronic structures, geometries and frequencies of the carbon monoxide polymeric chains have been calculated with the use of ab-initio and density functional theories. The stabilities of these molecules have been predicted by calculating their respective energies and monitoring their energy differences as a function of polyketone length. This work alluded to the formation of polymeric like-chains of four carbon monoxide molecules, with a respective energy of 284508.248 kcal/mol.

RELATIVE STABILITY OF TRIGONAL BIPYRAMIDAL PHOSPHOROUS VIA ELECTRONEGATIVITY SELECTION

Ryan Knihtila

Faculty Adviser: Eihab Jaber, Ph.D.

Understanding binding affinity and binding stoichiometry between molecules allows for a unique look into ligand binding dynamics by way of selectivity of the molecules. Ligand binding interactions are frequently coupled to conformational changes in the molecules via electronegativity selection. Computational chemistry is a useful method to explore these types of ligand binding interactions and their respective affinities. For instance, in a five-coordinate transition metal complex the principal feature is to measure the effective electron-pair repulsion via measuring the ligand electronegativity selection. Typically less electronegative atoms bind to a trigonal bipyramidal phosphorous atom via the equatorial position over the axial position during the formation of the ligand binding interaction. Thus, this work explores these types of

ligand binding interactions through the study of PF4Cl molecule by removing the equatorial fluorine atoms and replacing them with less electronegative chlorine atoms. The polarizability of these molecules was also explored as a function of the hybrid methods of density functional theory (DFT). The structures of these molecules were optimized and energy calculations were conducted using DFT at both hybrid methods, BPV86 & B3LYP with basis sets up to 6-311G+(2df) basis sets and the Hartree Fock (HF) at the same basis sets.

CONFIRMATION ANALYSIS OF HEME IN HEMOGLOBIN VIA COMPUTATION METHODS

Ericca C. Lucht

Faculty Adviser: Jeffry Nichols, Ph.D., Eihab Jaber, Ph.D.

Hemoglobin is a protein that binds and transports oxygen throughout the body. Contained within the protein chain are prothetic groups called heme where dioxygen binds to an iron ion. The surrounding amino acid ligands directly influence the shape of the porphyrin ring as well as the energy of reactivity and the function of the iron center in electron transfer (3). This study compared the active site of heme derived from experimental (Protein Data Bank) methods and from ab inito (PubChem) methods. The stability of the molecule was calculated using DFT and a series of basis sets with Gaussian 03W. The active site of each molecule was visualized by comparing HOMO and LUMO diagrams. The heme molecule derived from experimental methods was shown to portray the characteristics that heme is known to have.

AB INITIO STUDY OF HYDROGEN-BOND ENERGIES OF HYDROGEN (BIFLUOURIDE)

Patricia A McNamara

Faculty Adviser: Eihab Jaber, Ph.D.

Since hydrogen bonding is an intermolecular force, it can be difficult to determine accurately where it begins and ends between neighboring molecules. Examining molecular interactions by means of molecular modeling helps to predict molecular energies that are, many times, not yet experimentally available. The hydrogen bonding interaction of hydrogen-bifluoride (FHF-) is of particular interest due to their exceptional intermolecular strength. The hydrogen bonding interaction of this, and other hydrogen-bihalide ions are especially strong since the ion consists of a hydrogen atom connected to strong electron withdrawing groups attached to either sides of the hydrogen atom. Thus, the relative strength of the bond is increased by the location of the hydrogen atom: symmetrically located between the two halides. Our computational methods consisted of Hartree-Fock (HF) and Density Functional Theory (DFT) with B3LYP functionals in conjunction with a basis sets as high as 6-311G (3df,3p). Our finding suggests that upon changes to the basis sets in terms of additions to both the diffuse functions as well as polarized functions leads interesting hydrogen bonding formations between neighboring molecules.

THERMODYNAMICS OF THE BIFURCATED HYDROGEN BONDING FORMATIONS OF GUANINE-DIMERS AND IONIC EFFECTS

Margaret Nguyen

Faculty Adviser: Eihab Jaber, Ph.D.

Telomeres are structures at the ends of chromosomes (end caps), which are guanine-rich sequences that protect the ends from destruction. These sequences contain domains of G-tetramers in which, G-G pairs are held together by intermolecular hydrogen bonding. It is believed that the hydrogen bonding of these G-G pairs occur by bifurcated interactions in the absence of monovalent cations. Cooperative interactions are thought to play a key role in the stabilization of these G-tetramers. In this work, the energetic contribution to the stabilization of these G-G pairs by bifurcated hydrogen bonding was evaluated. The calculations were performed using the molecular orbital methods at the ab initio levels. The dimer structures energies were calculated at the HF/6-311G++(d,p), the DFT/6-311G++(d,p), and MP2/6-311G++(d,p) levels/basis sets. Furthermore, our findings indicate that the guanine dimers hydrogen bonding formations are strongly influenced by the addition of cations as a function of cation distance to the guanine dimers. Our preliminary results indicate that the bifurcated hydrogen bonding formations play a pivotal role in the stabilization of these G-tetramers upon addition of cation interactions.

SYNTHESIS WATER SOLUBLE COUMARIN BASED POLYMERS AND PHOTOCHEMICAL DIMERIZATION

Anthony Rossetti, Sampson Ankomanyi

Faculty Adviser: Margret Kerr, Ph.D.

Coumarins are naturally occurring compounds that were first reported and isolated in the 1820's from the Tonka bean. Naturally occurring coumarin derivatives from over 800 species of plants have been isolated and investigated. Coumarin has excellent photoluminescence properties and electro-optical properties. This research involves substituting coumarin molecules into a polymer chain to obtain a water soluble photoresist, an application that is employed in the production of flat panel TV, integrated circuits and printed circuits. This research uses environmentally benign process in producing the monomer which is then irradiated using ultra violet light to obtain the water soluble polymer. The research also includes a photodimerization of 7-hydroxy-4-methylcoumarin and thymidine, by uv irradiation to study their properties and concentration over time irradiated.

HOW ENVIRONMENTALLY FRIENDLY ARE GREEN CLEANERS?

Bradford Spencer

Faculty Adviser: Meghna Dilip, Ph.D.

Several household cleaners claiming to be green have hit the markets recently. This study investigates the validity of these claims. Chemical tests of at least three different household all-purpose cleaners will be conducted. Tests performed will include Chemical Oxygen Demand (COD), pH and a spectrometric test for phosphate.

STRATOSPHERIC OZONE DESTRUCTION VIA BROMINE NITRATE - A MOLECULAR MODELING STUDY

Jason Welsh

Faculty Adviser: Eihab Jaber, Ph.D.

Deteriorating environmental conditions and controversial subjects such as ozone depletion and global warming have received increasing amounts of acclaim in both the scientific and political worlds. Therefore, it is imperative to implement these topics into an undergraduate curriculum to allow our future scientists a well-rounded view of these issues. Investigations into a means to combine the theoretical power of computational chemistry with real world environmental problems into an undergraduate laboratory activity are the main focus of this work. Computational chemistry investigations have provided an excellent means to recover experimental findings in a truly green process, both efficiently and cost effectively. Hence, with the use of computational methods we are able to provide a unique undergraduate laboratory activity for the study of a complex stratospheric chemistry reaction. The compound of interest for this study is Bromine Nitrate (BrONO2), which researchers believe to undergo key reactions with ozone during the dark hours of the night. The reactivity of BrONO2 without the need for sunlight allows it to undergo a unique reaction pathway for ozone destruction. In order to investigate this reaction, our calculations were conducted at the density functional theory (DFT).

COMMUNICATION

ESPERANZA Y SU EXITO (HOPE AND YOUR SUCCESS) SEASON II

Alta Carroll, Ph.D., Julian Berrian, M.F.A.

This video exhibit features segments from season two of the Spanish language television show entitled Esperanza y Su Exito. The program is hosted by local Latina activist/educator, Esperanza Donovan-Pendzic and features segments pertaining to health and social services, conflict resolution, education and cultural arts. Under the supervision of Professor Alta Carroll and Professor Julian Berrian, student interns are responsible for helping to produce, edit and promote this educational program which is sponsored by Worcester State College's Center for Community Media. It is recorded live-to-tape in the college's television production studio and broadcast on Charter Cable's WCTR-TV 3 during the fall and winter months. Current student interns include Albana Xhemollari, Michael Ajuonuma, Marie Denman and James Keller, with volunteer assistance from Christopher Edoka, Stephanie Parretti and Joseph Aliberti. Local Latino activists Michelle Ramirez and Juan Canales are also an integral part of the TV program's production and promotion.

PHOTOGRAPHY PROGRAM AT SANIBEL WRITERS CONFERENCE

Donald Bullens, M.Ed.

Donald Bullens was recently invited to teach a nature photography program at the Sanibel Writers Conference sponsored by the Florida Gulf Coast University. The workshop concentrated on a variety of camera techniques and basic photographic design elements. The format of the seminar included a field trip to J.N. Ding Darling National Wildlife Refuge at Sanibel Island. During the past academic year Don's work has been exhibited at "Arts in the Afternoon," a fundraiser for the Boys and Girls Club of Worcester, Artamorada, The Rain Barrel Artisan Village, and his photograph of" Two Big Black Hearts" at the DeCordova Sculpture Park was featured on the cover of *Northwest Life Magazine*.

LEARNING BEYOND THE CLASSROOM WALLS: KEEPING STUDENTS ENGAGED IN CLASS 2.0

Julie Frechette, Ph.D.

In this journal article, Frechette explores the pedagogical advantages to allowing students to express themselves using communication tools that are native to them and their generation as it can enrich the learning experience. Often times, new technologies stimulate learning in powerful ways because students begin to see themselves as authentic producers of knowledge who can secure legitimate cultural space to represent their world view and the fruition of their education. Students who might be disadvantaged in traditional school settings because of their inability to communicate through speech, level of confidence, or other socio-cultural dynamics often thrive online as new tools for expression are harnessed. With clear parameters in place for acceptable social collaboration and shared learning, students can motivate themselves and their peers to learn as a community.

COMMUNICATION DISORDERS

LANGUAGE KIT FOR EVALUATION AND TREATMENT OF LANGUAGE DISORDERS

CD310 students

Faculty Adviser: Maryann Power, Ed.D.

CD310 Language Disorders is the first disorders course offered to Communication Sciences and Disorders undergraduate students. To assist students in learning the etiology, characteristics, evaluation and treatment of Language Disorders, they collect materials for a "Language Kit." These materials include objects for identification, objects for matching, number and letter recognition cards, reading cards, a book for labeling and cards for sequencing, In addition, students' knowledge of concepts (hard/soft; empty/full) and morphemes (plurals, past tense, 'ing' verbs) is clarified by creating evaluation material to assess these skills in children and adults. Students report that this collection of materials is invaluable as they embark on careers in speech-language pathology.

EVALUATING EFFICACY OF SPECIFIC LANGUAGE IMPAIRMENT WEBSITES

Kristen Diggins, Dena Elghazzawi, Susanna Meyer

Faculty Adviser: Susanna Meyer, Ph.D.

The study investigated the effectiveness of Specific Language Impairment (SLI) websites to use for informational counseling with parents. Criteria for evaluation of websites were developed and websites were evaluated. The results demonstrated that some websites were more effective than others for SLI informational counseling. With minor changes, these criteria could be applied to other speech and language disorders.

MONITORING ENGLISH LANGUAGE ACQUISITION IN AN INTERNATIONAL ADOPTEE

Linda Larrivee, Ph.D., Emily Soltano, Ph.D., Susanna Meyer, Ph.D.

Morphosyntax of an internationally adopted (IA) child with a known history of a language learning disability was investigated. The participant was a ten year-old male adopted from the Philippines at 3 .10 years. The Dynamic Assessment Task of Morphological Analysis (DATMA), the Test of Linguistic Competence- Extended Edition (TLC-E), and a language sample analysis revealed persistent expressive language deficits. Results have implications for clinical practice in older IA children with language disorders.

DOES MY CHILD HAVE A LANGUAGE DISORDER? MONITORING ENGLISH LANGUAGE DEVELOPMENT AFTER INTERNATIONAL ADOPTION

Linda Larrivee, Ph.D., Emily Soltano, Ph.D., Susanna Meyer, Ph.D.

The presentation reviews language developmental milestones to help parents determine if their internationally adopted child is developing their new language adequately. Data from a longitudinal study on language development are presented. Parents will gain an understanding on how to stimulate language development. Practical ideas on language stimulation are presented.

CLINICAL DECISION MAKING IN FLUENCY DISORDERS

Kenneth S. Melnick, Ph.D.

After reviewing Dr. Walter Manning's "Clinical Decision Making in Fluency Disorders" 3rd edition (2010), I found it to have a thorough coverage of many topics related to fluency disorders and be a terrific clinical guide for practicing clinicians. Manning provides wonderful insights into the disorder of stuttering. Graduate students and clinicians reading the text would undoubtedly find themselves well equipped to be knowledgeable of, assess, and treat people of all ages who stutter. In addition to chapters that span clinical skills to etiologies, assessment and treatment of developmental stuttering, Manning also provides characteristics, assessment, and intervention strategies for other fluency disorders such as cluttering, neurogenic, and psychogenic stuttering. Audio and video clips from the Internet (new to the 3rd edition) through the publisher, Delmar Cengage Learning (www.delmarlearning.com/companions), are included to enhance the learning experience. PowerPoint slides of all the chapters are also very generously included on the Internet, providing an invaluable study guide and basis for an instructor to develop a tailor-made course on fluency disorders. *Melnick, K. Book review. Journal of Fluency Disorders (2010), doi:10.1016/j.jfludis.2010.01.004.*

EFFECTIVENESS OF A HEARING CONSERVATION PROGRAM FOR PRETEENS

Aimée St. Hilaire

Faculty Advisers: Susanna Meyer, Ph.D., Linda Larrivee, Ph.D.

Recent advances in technology expose children to prolonged intervals of loud sound, a potential cause of hearing loss. The efficacy of a hearing conservation program (HCP), developed for preteens, were assessed. Questionnaires were administered to 139 students before and after a presentation about the normal hearing process, risk factors, symptoms, and prevention methods for NIHL. The HCP was effective at increasing knowledge and prevention behaviors in the preteen population.

COMPUTER SCIENCE

AUTONOMOUS DRIVING AND DOCKING WHEELCHAIR

Stephen Stark

Faculty Adviser: Karl R. Wurst, Ph.D.

The goal of this project is to develop a wheelchair that will help driving and docking for people with poor motor control. The wheelchair drives autonomously to avoid obstacles to help with delayed reaction times. Another problem for persons with poor motor control is docking the wheelchair with a desk, table, or charging bay. The project began with a stair-climbing wheelchair. This was then converted to computer control using the CBC controller designed by KISS Institute for Practical Robotics. This is a GNU/Linux-based controller with a 350MHz Freescale ARM9 processor, integrated color vision system, 8 digital inputs, 8 analog inputs and a 320x240 color touch screen. It is programmed in KISS-C which is a multi-platform programming environment that supports ANSI C. The CBC has a limited number of inputs, and so one of the challenges was to determine what sensors are needed, and how many, to reach the goals of the project. This involved a lot of creativity in the programming, and placement of the sensors to accomplish. The biggest challenge was to get it to work with the limited inputs that are available on the controller. Sensors used are ultrasonic, infrared distance, and infrared reflectance.

CRIMINAL JUSTICE

SERVICE LEARNING WITH YOUTH PROGRAMS

Chris Abbascia

Faculty Adviser: Jeffrey Cohen, Ph.D.

Service-learning opportunities are often tied to a specific course. They sometimes foster long-term relationships between students and the community organizations they get involved with. While participating in a course in the WSC Criminal Justice Department, I began observing classroom activities at the Worcester Youth Center on Chandler Street as part of a service-learning requirement. After being introduced to the job placement and work ready program, I was able to work with juveniles who were given an opportunity to learn about small business planning. As a part of the program, the students were paid while learning about the responsibilities of paid positions. Although no longer participating in the same course, I have continued to volunteer at the Youth Center. Many of the programs that are offered through the Youth Center are there for students to be given a second chance or opportunity. I believe that this experience has changed my life and I plan to remain engaged in community service.

ANALYSIS OF PREDICTIVE POLICING

Elizabeth Bitar, Danielle Graslie, Emily Lanier, Devin O'Keefe, and Luis Torres

Faculty Adviser: Stephen A. Morreale, Ph.D.

Predictive Policing is the latest attempt in innovative trends combining existing and emerging technology to study, analyze and prevent crime. Predictive Policing incorporates elements of problem-oriented policing, technology, GIS and Computer Statistics (CompStat). Conceptually, predictive policing adapts a business analytic approach, using demand-driven forecasting to analyze the past in order to identify trends and predict the future. Policing is a field that does not easily embrace change. The U.S. Department of Justice, National Institute of Justice has engaged several agencies for demonstration pilots and evaluation of Predictive Policing. This research identifies the essential elements of Predictive Policing and its antecedents. It was found that Predictive Policing serves as an umbrella for incorporating components of Hot Spot Policing, Intelligence-led Policing, Problem Oriented Policing CompStat and Community-Oriented Policing.

CHEAPER BY THE HOUR

Robert A. Brooks, Ph.D.

Cheaper by the Hour by Robert Brooks is the first book-length account of the work of temporary lawyers, providing a richly-detailed ethnographic account of document review attorneys in Washington, D.C. Drawing from participant-observation and interviews, the book places document review work in the larger context of the deprofessionalization and proletarianization of the law. The book begins with an exploration of the "degradation of work" hypothesis and then goes on to document the rise of the temporary legal market (Chapter 2) and document review work in particular, which was found to be deskilled, routinized and fragmented (Chapter 3). Patterns of control and resistance – around work (Chapter 4), time (Chapter 5), and identity (Chapter 6) – were more similar to those in low-skilled labor environments than in professional ones. The book concludes by summarizing and integrating findings and making some predictions about the likelihood of further degradation of temporary legal work. The book is slated for release by Temple University Press in 2011.

PREDICTIVE POLICING: A NEW APPROACH OR A REBRANDING?

Dave Flynn, Carl Herrera, Brian Kling, Erich Manos, Chris Miller, Louise Pelley

Faculty Adviser: Stephen A. Morreale, Ph.D.

The concept of Predictive Policing is gaining popularity in America. The U.S. Department of Justice is taking steps to study the approach in pilot cities. This project examines the elements of Predictive Policing and seeks to identify its roots. The review attempts to evaluate the potential effectiveness of the idea. Initial findings show that Predictive Policing is a blend of several earlier approaches to analysis and resource deployment as police agencies react to crime. These include Intelligence-led policing, Hot Spots Policing, Evidence-based Policing, Community-Policing and CompStat. Predictive Policing approaches seek to anticipate trends and use "Smart" evidence-based data analysis, while working to be proactive in an attempt to prevent crime. The work reviews the efforts in the business, financial and medical disciplines and the potential adaptation for policing.

ANALYSIS OF HOT SPOT POLICING

Nathan Hawkins, Matt Fallon, Jennifer Rojcewicz, Drew Frigon, David Melkonian

Faculty Adviser: Stephen A. Morreale, Ph.D.

This research aims to conduct an analysis of "Hot Spot" Policing often used as a method for problem solving in communities. Hot Spot Policing pertains to identifying geographic areas with high level risk. The idea of Hot Spots is derived from several criminological theories, including Rational Choice, Social Disorganization, Control and Strain theories, which attempt to explain why certain areas may be more susceptible to crime. There are few police agencies choosing to utilize innovative police methods. This research looks to identify the elements of Hot Spot Policing in an attempt to allow other agencies to adapt the practice to reduce crime and mobilize limited resources in a more efficient manner.

ANALYSIS OF COMPUTER STATISTICS IN POLICING

Tyler Hopkins, Pete Fenelli, David Jerome, and Mike Black

Faculty Adviser: Stephen A. Morreale, Ph.D.

The purpose of this research is to evaluate the implementation of Computer Statistics (CompStat) in police agencies. CompStat originated in New York City in 1994. "CompStat is a management philosophy or organizational management tool." (Bratton, 1994) The implementation of CompStat has grown to county, state, and federal agencies. CompStat provides a method of analysis for law enforcement agencies. The effect is to allow analysis, crime solving and the prevention of crime. CompStat involves police executives and other related agency representatives to collaborate and review information and data derived from complaint and crime reports. This allows for statistical review and analysis to respond to outbreaks and prevent crime. The research indicates some effectiveness of CompStat, allowing for proactive response, accountability and identification of problem areas, allowing for improved resource allocation.

ANALYSIS OF INTELLIGENCE-LED POLICING

Stella Moraitis, Chris Takacs, Ryan McDermott, John Flaherty, Corey Johnson

Faculty Adviser: Stephen A. Morreale, Ph.D.

Intelligence-led policing (ILP) is a relatively new innovative police practice that is founded upon the crucial difference between information and its refined result--intelligence. Incorporating crime analysis and crime intelligence, ILP seeks to reduce crime through the extensive use of information sharing, collaboration and research. Conceptually, ILP is enmeshed in numerous philosophies and various techniques that aim to decrease the phenomenon of crime, especially with a focus on recidivism. Stemming from the United Kindgom, ILP has branched out to various regions across the world, including the United States. Despite its widespread adoption, evaluations of Intelligence-led Policing remain limited because of its recent implementation and admittedly, some problems arise due to structure. This review of the elements of ILP hold promise if they can be refined and utilized effectively.

EFFICACY OF GANG INJUNCTIONS TO REDUCE CRIME

Stephen A. Morreale, Ph.D.

As major cities in America struggle to respond to the growth of gangs and attendant crime and violence, gang injunctions have been used in California with some success. The foundation of this study was a four-county analysis of 25 southern California gang injunctions to understand if civil gang injunctions reduce crime. The research measured and analyzed police calls for service, including serious (Part 1) and less serious (Part 2) crime calls within the injunction area. Injunction-related crime reduction was assessed by comparing one year of post-injunction calls to one year of pre-injunction calls, and by contrasting with adjacent control gang area calls. The findings showed Part 1 calls decreased 11.6% compared to baseline; while the matched controls averaged a mild increase of 0.8% in Part 1 calls for service, a net benefit of 12.4% in the injunction area. Part 2 calls decreased by 15.9% compared to baseline, while the matched controls averaged a mild increase of 1.6% in part 2 calls for service, a net benefit of 17.5% in the injunction area. Total calls for service decreased 14.1% compared to baseline, while the matched controls averaged a mild increase.

SOCIAL DOMINANCE ORIENTATION AND THE POLICE

Stephen A. Morreale, Ph.D., James E. McCabe, Ph.D.

Social dominance orientation shows itself throughout society. In the vast majority of businesses using a hierarchy system, traces of social dominance are very well apparent. Through research and previous data collected, researchers as well as scholars have attempted to make hard proof of this theory and turn it into a proven fact. Using literary sources, i.e.: scholarly articles, books, and research articles, attempts are made to connect the social dominance that occurs on a regular basis all across the country, to a narrower scoped job field, the criminal justice system. Survey research focused on sworn police personnel and criminal justice students to evaluate their feelings on social dominance.

TERRORISM EVENTS AND COMMUNITY POLICING IN INDIA

John Tahiliani, Ph.D., Jeff Cohen, Ph.D.

The November 2008 terrorist attack in Mumbai brought a great deal of attention to policing in India. In light of the proposed overhauls in policing in India, community-policing initiatives have become increasingly utilized across the sub-continent. There remains, however, the important question as to how successful these initiatives can be in a country with such ethnic, class and religious diversity. This study explores which variables are most closely associated with police confidence in India. The data for the study drew upon the India Human Development Study 2004-2005 of 41,554 households across India. The results show that the variables most significantly associated with confidence in police (human/social capital, religion/caste) is best examined at the state level due to the considerable differences in these variables across states. Possible implications in terms of impact on community policing policies in India are also considered.

EDUCATION

EFFECTIVE SCIENCE INSTRUCTION

Andrea Gordon

Faculty Adviser: Caroline Chiccarelil, Ph.D.

This study focuses on how science can be taught effectively in the classroom of today. It involved administering a questionnaire to nine local public school teachers and examining their responses. The responses lead to research about methods to improve science instruction which teachers have control over in their classrooms. These methods include focusing on the innate interests of students, seeking to humanize the field of science as a whole, and allowing students to participate in authentic scientific inquiry. Each of these areas is explored practically, explaining how teachers can implement them into the curriculum they use.

PROCEDURAL AND CONCEPTUAL KNOWLEDGE: THE CASE OF MATHEMATICS EDUCATION

Emily Rantala, Dannie Skog, Leah Dahlin

Faculty Adviser: Raynold M. Lewis, Ph.D.

This poster illustrates the use of procedural and conceptual understanding in solving a mathematical problem. The problem requires that students prove that the sum of n consecutive odd integers is a perfect square. Students in MA 131 use principles of mathematical problem solving and demonstrate how the two knowledge structures are alike and different as they arrive at a solution.

ENGLISH

THE NEW WORCESTER SPY

Elizabeth Bidinger, Ph.D., Editor

The *New Worcester Spy* is an online news and literary magazine that publishes feature stories, profiles, memoirs, fiction, poetry and commentary written or edited by Worcester State students.

POETRY AND HUMAN RIGHTS: POEMS BY DENNIS BRUTUS

Kenneth Gibbs, Ph.D.

A gathering of poems from the Dennis Brutus Collection, housed in the LRC. The book is edited by Ken Gibbs and Wayne Kamin, with an introduction by Ken Gibbs. Dennis Brutus has made Worcester State College a major repository for his manuscripts, which contain numerous unpublished poems. This book contains a selection of those previously unpublished poems along with tributes to Dennis Brutus's life work as a global activist.

THE SEVEN DEADLY SINS IN MEDIEVAL LITERATURE

Hannah Gunnell

Faculty Adviser: MaryLynn Saul, Ph.D.

One can neither fully understand nor appreciate works of medieval literature without also considering the philosophical and theological traditions on which they are grounded. An important facet of medieval theology which manifests itself frequently in the literature of the times is the query into the nature of sin, particularly the Seven Deadly Sins. This presentation focuses on the Seven Deadly Sins in the literature of the fourteenth century. It will display depictions of the various sins as they appeared in certain illuminated texts. The prominence of the Seven Deadly Sins within various works of literature will be highlighted. It will also contain a brief historical survey of the fourteenth century and explore how the events during this time may have influenced how fascinated fourteenth century writers were with the Seven Deadly Sins.

CURRENTS IN TEACHING AND LEARNING (PEER-REVIEWED E-JOURNAL)

Josna Rege, Ph.D., Editor

Currents in Teaching and Learning is a peer-reviewed electronic journal, interdisciplinary and jargon-free, that fosters exchanges among reflective teacher-scholars across the disciplines. Published twice a year, Currents seeks to improve teaching and learning in higher education with short reports on classroom practices as well as longer research, theoretical, or conceptual articles, and explorations of issues and challenges facing teachers today. Currents is a publication of Worcester State College, and is now completing its second year. You can find it at www.worcester.edu/currents.

"THIS NARRATIVE IS NO FICTION": HARRIET JACOBS IN THE ARCHIVES

Karen Woods Weierman, Ph.D.

Review essay on the Harriet Jacobs Family Papers, published in *Reviews in American History* (March 2010).

HEALTH SCIENCE

SAFE SHARPS DISPOSAL

Jolinda Smith

Faculty Adviser: Helena Semerjian, M.Ed.

As of July 1, 2010, Massachusetts State Law 105 CMR 480.000 will prohibit the disposal of hypodermic needles in the solid waste stream. While it was previously recommended that residents secure used needles in a puncture-resistant container before including them with regular household waste, it became clear that this recommendation was not sufficient given incidents of accidental needle sticks in the community. Considering Worcester's population of over 180,000 residents, a comprehensive safe needle disposal program needed to be designed for the city that would be accessible to everyone. Worcester already hosted four needle disposal kiosks; as of December 2009 over 500 gallons of used hypodermic needles and syringes had been collected. The proposed program was built based on research from other U.S. cities already hosting successful programs, as well as interviews with key informants at the four locations in the city already offering a needle disposal kiosk, and surveys of community members who regularly used hypodermic needles. Conclusions will be presented to the Worcester Board of Health and City Council. Some of which will include: recommendations for incorporating safe sharps disposal into the Ballard Street transfer station, the BD Safe-Clip device, and mail-backs.

CELL PHONE USE WHILE DRIVING AMONG WORCESTER STATE COLLEGE STUDENTS

Jolinda Smith

Faculty Adviser: Lynn Bloomberg, Dr.P.H.

Over the past decade college students have been observed to use cellular phones while driving at constantly increasing rates. Cell phone use while driving is the most common driver distraction, and increases the risk of injurious crash by four times. This study was modeled in part, after a study done at San Diego State University in 2007, and the U.S. Department of Transportation's National Occupant Protection Use Surveys (NOPUS) done since 2000. The goal of this study was to determine the rate of cell phone use while driving among students at Worcester State College. Fourteen research assistants were trained to collect observational data at each entrance to the Worcester State College campus. The data collected is predicted to prove a rate higher than the rate of 11.1 percent found in the referenced study at San Diego State University. The research assistants were also trained to collect paper and pencil surveys of students on campus. Conclusions of this study will also evaluate which of 13 predetermined driver distractions correlated with cell phone use while driving and reported motor vehicle accidents.

HISTORY AND POLITICAL SCIENCE

HISTORICAL DICTIONARY OF THE PROGRESSIVE ERA

Peter C. Holloran, Ph.D.

This authoritative dictionary/encyclopedia is the most recent and definitive reference book on the major people, politics, events, trends, popular culture, art and literature of the 1890-1915 era in United States history.

REVIEW: A STAGE IN THE FORMATION OF WORLD CITIZENRY

Joseph Baratta, Ph.D.

Published review by Joseph Preston Baratta, "A Stage in the Formation of World Citizenry," *The Federalist Debate*, 22, 3 (November 2009): 56-58.

THE USS LIBERTY INCIDENT

Jim Flynn

Faculty Adviser: Najib Saliba, Ph.D.

This student paper analyzes the Israeli attack on the USS Liberty on 8 June 1967 and assesses whether the Israelis knew this was an American ship, or whether it was a horrible accident. In a dearth of objective sources, the paper weighs evidence and argues that the attack was deliberate.

SEPARATION ANXIETY

Tess Howard

Faculty Adviser: Najib Saliba, Ph.D.

This student paper discusses the ongoing humanitarian crisis in Gaza as a growing apartheid situation. The author argues that the United Nations is culpable for the apartheid in Palestine through the selective enforcement of international laws. It is the purpose of her research to show that the United Nations is blameworthy: precisely because it has not lived up to its own standards as set forth within its charter. Instead of promoting and ensuring the international rule of law, the UN has come to be a passive aggressor against innocent civilians. She notes that Israel has always enjoyed the protection of the west, and now the UN has proved itself unable to protect the Palestinian people. In 2005 there were 320 roadblocks preventing people from freely moving in and out of the West Bank and Gaza, as of April 2009 there are 700. The apartheid grows clearer every day, according to her findings.

THE GOLDEN THREAD

Tess Howard

Faculty Adviser: Najib Saliba, Ph.D.

This paper discusses a text fragment from the Kitab al Hawi fi al tibb, "The Comprehensive book of medicine," written nine centuries ago. The author argues that it represents a bright and shining link between our present medical field and the past – preserving the case studies of a doctor who reliably documented the work he did the city hospitals and clinics. Such preserved documents leave us with the image of a doctor that is very familiar to us, writing about how he has treated a few patients suffering from a common human pain that even today is still no stranger to our advanced lives. Because of the efforts of al-Razi and other doctors in his time, western European nations emerged from the dark ages and reawakened their medical and scientific minds. If not for the doctors and scientists of the Arabic-speaking community in the Middle Ages, one would be hard-pressed to imagine our society as it is today with our modern hospitals, shining sterile instruments and bright lights. The page is a "golden thread" of history.

MATHEMATICS

CELEBRATING PI DAY AT SOUTH HIGH SCHOOL

Kaitlyn Brady, Andrew Gallant, Chad Binette, Steven Carrmann, Jessica LaVoice, Maria Fung, Hansun To

Faculty Adviser: Maria G. Fung, Ph.D.

In this poster we describe an outreach project for high school students done to celebrate Pi Day, March 14th. Pi, an irrational transcendental real number, is the ratio of the circumference to the diameter of any circle, and it has fascinated humanity for thousands of years. Mathematics majors Kaitlyn Brady, Andrew Gallant, Steven Carrmann, Jessica LaVoice, and Chad Binette prepared and presented hands-on sessions on introduction to cryptography, forensics, topology and graph theory to a group of over 300 first-year high school students. About 314 pies were served.

GRADE POINT AVERAGE VERSUS CLASS TEXTING PERCENTAGE

Amber Connors, Ashley McCarter, Carley Morrissey, Rebecca Mullen, Adriana Robles

Faculty Adviser: Maria G. Fung, Ph.D.

Our project examines the amount people text throughout their classes, in hopes of determining that it affects one's Grade Point Average. We surveyed 100 freshmen first to determine if there was a correlation. We later found that our data was too specific and that we needed to broaden our sample. To do this we requested the help of our classmates to receive a general sample of the entire population at Worcester State College. We will now incorporate the new data with our original sample to determine if our hypothesis that there is a negative correlation is correct.

COUNTING THE NUMBER OF GRAPHS

Joseph Fredette

Faculty Adviser: Maria G. Fung, Ph.D.

A graph is a collection of nodes and edges connecting these nodes. In this poster we will use techniques from combinatorics -- specifically a new field called combinatorial species and generating functions -- to count the number of unique graphs that can be created given a fixed number of nodes.

CARE TO COMPARE: ELICITING MATHEMATICS DISCOURSE IN A PROFESSIONAL DEVELOPMENT GEOMETRY COURSE FOR K–12 TEACHERS:

Maria G. Fung, Ph.D.

This book chapter describes how the idea of comparing Euclidean geometry with two non-Euclidean geometries (taxicab and spherical) provides participants with engaging mathematical tasks in a professional development geometry course for K-12 teachers. We illustrate with three different examples how the combination of rich mathematical activities centered on comparison, well-orchestrated group work, and skilled facilitators makes for productive classroom discourse and provides the teacher participants with a model to be emulated in their own classrooms. This model demonstrates for the teacher participants the process of generating and supporting student learning through mathematics discourse in the classroom.

COMPUTATIONAL ESTIMATION FOCUS IN A NUMBER SYSTEMS COURSE FOR ELEMENTARY PRESERVICE TEACHERS

Maria G. Fung, Ph.D.

We describe how a thematic emphasis and focus on computational estimation across a number systems course for pre-service elementary teachers affects their number sense skills and mathematics attitudes. The estimation emphasis includes mental computation practice with natural numbers, decimals and rational numbers; student reflections on articles about number sense and estimation; discussions related to real-life estimation situations; and a focus on number sense development. We report results related to significant improvement in estimation skills and ability, together with an enhanced understanding of the importance of computational estimation. These results are obtained using a pre- and post-survey to collect both quantitative and qualitative data as it pertains to demographics, and to estimation understanding, skills and attitudes.

A FIRST-YEAR SEMINAR ON EXPLORING DATA FOR SOCIAL CHANGE

Maria G. Fung, Ph.D.

In this talk we discuss a writing intensive first year seminar course on statistics that was centered on data that reveals social injustice issues in health care, education, and the environment: both locally (a large urban center) and globally. We also describe the social service project of this course which involves collaboration with students from an applied sociology course. First-year students and their sociology counterparts analyze data collected from community partners of the Center for Service Learning and Social Engagement at Worcester State College and they present a report of their findings.

(Received September 23, 2009)

WRITING IN A MATHEMATICS CLASS? A QUICK REPORT ON CLASSROOM PRACTICES AT THE COLLEGIATE LEVEL

Maria G. Fung, Ph.D.

In this article, a series of writing assignments for the college mathematics classroom is described. These assignments can be easily be adapted to other disciplines Examples of personal, expository, and expressive types of writing assignments are provided together with ideas for evaluating these assignments.

TWO MAGNETS AND A SPRING: USING PHASE PORTRAITS TO INTERPRET DIFFERENTIAL SYSTEMS

Steven Karrmann, Jonathan Marokhovsky

Faculty Adviser: Maria G. Fung, Ph.D.

An iron mass is affixed to a spring, and it swings over two magnets equidistantly placed to the left and right of the natural rest position of this mass. As the positions of the magnets change, what is the impact on the mass's motion behavior? Hooke's law of elasticity contributes to the creation of a system of differential equations that models the mass's rate of change in position and velocity with respect to time. First, the equilibrium values of this system are obtained, which are the positions where the mass is at rest. Next, using HPGSystemSolver (a differential equations software application), phase portraits are created, which visualize the mass's position and velocity as time increases. By establishing these equilibrium values and phase portraits for several placements of the magnets, qualitative analysis is employed to translate the results into physical interpretations. Furthermore, the bifurcation that results from changing the magnets' positions is explored.

NURSING

CHALLENGES IN HEARING CONSERVATION: THE HEARING-IMPAIRED WORKER

Stephanie Chalupka, Ed.D.

The unique needs of hearing-impaired (HI) workers for hearing protection and communication may not be fully addressed by many hearing conservation programs. Meeting the hearing conservation needs of HI workers requires team collaboration that always includes the worker because each case is unique and interventions will be based on job tasks, communication needs, work environment (including noise level), type of hearing loss, degree of hearing impairment, and worker preferences. *Chalupka S. (2009). Challenges in Hearing Conservation: The hearing-impaired worker. AAOHN Journal, 57, (8), 348*

COLD STRESS IN THE WORK ENVIRONMENT

Stephanie Chalupka, Ed.D.

Workers in construction, agriculture, oil and gas extraction, utilities industries, warehousing, cold storage, food processing, transportation, military activities, the commercial fishing industry, and many other fields who work outdoors are at increased risk for thermal stress illness and injury. Occupational illness and injury as well as lowered productivity result from net body heat loss (core body temperature) or heat loss from areas of the body such as the head and extremities. Hypothyroidism, diabetes, and cardiovascular or circulatory disease and the use of alcohol, central nervous system depressants, or medications that interfere with thermoregulatory processes place workers at greater risk for cold stress. *Chalupka, S. (2009). Cold stress in the work environment. AAOHN Journal, 57, (1), 40.*

GESTATIONAL WEIGHT GAIN TO PROMOTE OPTIMAL OUTCOMES

Stephanie Chalupka, Ed.D.

In the past two decades, many changes have occurred in the health of women of childbearing age. This population now includes a higher proportion of women representing diverse ethnic and racial subgroups. Also, the prevalence of overweight and obesity has increased among American women of childbearing age. In population subgroups that are at risk for poor maternal and child health outcomes, the prevalence of overweight and obesity is particularly problematic. Additionally, American women are becoming pregnant at an older age and, therefore, may also have a wide variety of chronic health conditions (e.g., diabetes and hypertension) that place them at risk for complications during and after pregnancy. Potential maternal consequences of excess gestational weight gain include increased risk for cesarean section and postpartum weight retention. Potential consequences for the offspring include increased risk for preterm birth or larger than normal birth weight. Each of these consequences increases the odds of subsequent health problems including heart disease and diabetes in the case of extra weight and impaired development in the case of premature birth. *Chalupka, S. (2009). Gestational weight gain to promote optimal outcomes. AAOHN Journal, 57, (12), 532.*

HEALTHY HOMES FOR ALL: IMPROVING CHILDREN'S HEALTH IN DIVERSE COMMUNITIES

Stephanie Chalupka, Ed.D.

This 4-year project will identify and recruit 176 low-income, immigrant families living in homes with environmental hazards. Environment assessment, remediation, and educational interventions will be conducted. In addition, training and technical assistance will be provided to 75 institutional partners, 500 first time home buyers and 75 housing activists. Evaluation of the impact of remediation and educational interventions on health, behavior, exposure, and safety outcomes will be conducted. *Funded by: United States Department of Housing and Urban Development. Award: $897,000.00 (2009-2013)*

THE IMPACT OF ENVIRONMENTAL AND OCCUPATIONAL EXPOSURES ON REPRODUCTIVE HEALTH

Stephanie Chalupka, Ed.D.

In the last decade, more than half of U.S. children were born to working mothers and 65% of working men and women were of reproductive age. Clinicians must possess an awareness of the impact of work on the health of their patients and their future offspring. Most chemicals in the workplace have not been evaluated for reproductive toxicity. Many toxicants with unambiguous reproductive and developmental effects are still in regular commercial use and thus present exposure potential to workers. Examples of these include heavy metals, organic solvents, pesticides and herbicides and sterilants, anesthetic gases and anti-cancer drugs used in healthcare. Many of these reproductive toxicants are well represented in traditional employment sectors of women, such as healthcare and cosmetology. Environmental exposures also figure prominently in evaluating a woman's health risk and that to a pregnancy. Caregivers must be aware of their patients' potential environmental and workplace exposures and weigh any risk of exposure in the context of the time-dependent window of reproductive susceptibility. *Chalupka, S. & Chalupka, A., N. (2010). The impact of environmental and occupational exposures on reproductive health. Journal of Obstetrical, Gynecological, and Neonatal Nursing, 39,1, 84-102.*

OMEGA-3 POLYUNSATURATED FATTY ACID IN PRIMARY AND SECONDARY CARDIOVASCULAR DISEASE PREVENTION

Stephanie Chalupka, Ed.D.

The use of Omega-3 Polyunsaturated Fatty Acid continues to show promise in primary, and particularly in secondary, prevention of cardiovascular diseases. Omega-3 Polyunsaturated Fatty Acid appears to benefit healthy individuals as well as those with heart disease including atrial fibrillation, post-myocardial infarction, and heart failure. *Chalupka, S. (2009). Omega-3 polyunsaturated fatty acid in primary and secondary cardiovascular disease prevention. AAOHN Journal, 57. (11), 480.*

PROCEDURE TRAYS: A CALL TO ACTION FOR SHARPS SAFETY

Stephanie Chalupka, Ed.D.

Hospitals in Massachusetts are routinely offered prepackaged procedure trays containing sharp devices that conflict with mandates of the Occupational Safety and Health Administration Bloodborne Pathogens (BBP) standard, which requires hospitals to systematically evaluate and select safety products whenever possible. These trays may also be in conflict with state regulations and with the hospital's own sharps injury prevention efforts. *Galligan, C., Chalupka, S., Laramie, A., Davis, L. (2009). Procedure trays: A call to action for sharps safety, Nursing 2009, January, 13-15. Research funded by the Massachusetts Department of Public Health.*

SHARPS INJURIES AND OTHER BLOOD AND BODY FLUID EXPOSURES AMONG HOME HEALTH CARE NURSES AND AIDES

Stephanie Chalupka, Ed.D.

Objectives: We quantified risks of sharp medical device (sharps) injuries and other blood and body fluid exposures among home health care nurses and aides, identified risk factors, assessed the use of sharps with safety features, and evaluated underreporting in workplace-based surveillance. Methods: Questionnaire survey and workplace-based surveillance, collaborating with 9 home health care agencies and 2 labor unions from 2006 to 2007. Results: Approximately 35% of nurses and 6.4% of aides had experienced at least 1 sharps injury during their home health care career; corresponding figures for other blood and body fluid exposures were 15.1% and 6.7%, respectively. Annual sharps injuries incidence rates were 5.1 per 100 full-time equivalent (FTE)nurses and 1.0 per 100 FTE aides. Sharps with safety features frequently were not used. Underreporting of sharps injuries to the workplace-based surveillance system was 50%.
Conclusions: Sharps injuries and other blood and body fluid exposures are serious hazards for home health care nurses and aides. Improvements in hazard intervention are needed. *This study was funded by the National Institute for Occupational Safety and Health (NIOSH; grant 1RO1OH008229).*

USING ASPIRIN TO PREVENT CARDIOVASCULAR DISEASE IN ADULTS

Stephanie Chalupka, Ed.D.

According to newly released recommendations from the U.S. Preventive Services Task Force, patients and clinicians should consider overall risks for coronary heart disease and gastrointestinal bleeding before deciding whether to use aspirin to prevent myocardial infarction or stroke. Coronary heart disease risk assessment should include evaluation of risk factors such as age, sex, diabetes, blood pressure, total cholesterol levels, high-density lipoprotein cholesterol levels, smoking, and risk of gastrointestinal bleeding. The USPSTF recommendations are not applicable to those who have a history of coronary heart disease or stroke. *Chalupka, S. (2009). Using aspirin to prevent cardiovascular disease in adults. AAOHN Journal, 57, (7), 300.*

GESTATIONAL DIABETES: WHAT'S NEXT?

Joann Reidy, M.P.H., Stephanie Chalupka, Ed.D.

Gestational diabetes mellitus (GDM) is on the rise in the United States, affecting between 1% and 14% of all pregnancies. GDM is defined as impaired glucose tolerance with onset or first recognition during pregnancy. Untreated, women with elevated fasting blood glucose levels in GDM appear to be at higher risk for the development of several adverse outcomes, including fetal macrosomia and perinatal complications. Women who have had GDM have a 40% to 60% chance of developing type 2 diabetes mellitus in 5 to 10 years. Occupational health nurses can provide interventions, including education and referral. Occupational health nurses can also provide counseling regarding diet, exercise, and management options for women returning to the workplace after maternity leave. These workplace interventions have the potential to significantly influence the disease process. *Reidy, J. and Chalupka, S. (2010). Gestational Diabetes: What's Next? Journal, 58(2):80.*

PHILOSOPHY

INTRODUCTION TO SOCIAL AND POLITIAL PHILOSPHY

Richard Schmitt, Ph.D.

Introduction to Social and Political Philosophy by Richard Schmitt was published by Rowman and Littlefield in June 2009. The book is designed to introduce students to some of the major problem areas in social and political philosophy, such as freedom, property, democracy, war, and peace. It introduces some of the major traditions in political philosophy such as liberalism, anarchism, and Marxism. The book ends with questions about the view, held by the Founding Fathers, that the moral life of citizens is of the greatest importance in maintaining the American Republic. The book sets itself the task of stimulation student thinking and is liberally sprinkled with questions for students to consider by themselves or to discuss in class. A course in which this book is used will leave the students active participants in reflection about social and political philosophy instead of being passive recipients of information passed on by the instructor and the textbook.

GENOCIDE STUDIES AND PREVENTION

Henry C. Theriault, Ph.D.

Genocide Studies and Prevention, an interdisciplinary peer-reviewed scholarly journal, is the joint venture of the International Association of Genocide Scholars and the International Institute for Genocide and Human Rights Studies, a division of Toronto's Zoryan Institute. The journal publishes research from a range of disciplines seeking to understand historical cases of genocide or the phenomenon of genocide generally, or presenting new ideas regarding intervention against and prevention of genocide in the present and future. I am one of four co-editors-in-chief of GSP, a position I was appointed to in 2007. I am currently lead-editing a special issue on genocide in Latin America and in 2008 lead-edited special issue 3:2, on "The Aftermath of Genocide." Issue 4:2 featured articles from the March 13, 2009, "Symposium on the Genocide Prevention Task Force Report" held at the Woodrow Wilson International Center for Scholars in Washington, DC. This major report prepared under the co-chairship of Madeleine K. Albright and William S. Cohen was released in 2008. The articles examined various facets of the analysis and recommendations to the United States government made in this report.

ROUSSEAU, PLATO, AND WESTERN PHILOSOPHY'S ANTI-GENOCIDAL STRAIN

Henry C. Theriault, Ph.D.

Metacide: In the Pursuit of Excellence, edited by James R. Watson (Rodopi, 2010), features my article "Rousseau, Plato, and Western Philosophy's Anti-Genocidal Strain." Contrary to the prevailing notion that only within the past century has genocide been (1) conceptualized and (2) recognized as a specific ethical wrong, figures far back in the history of Western philosophy recognized genocide as a moral problem. Jean Jacques Rousseau was the first figure in the Western tradition to argue explicitly for the ethical wrongness of genocide. Rousseau's contribution is especially significant because he made his argument in *On the Social Contract* more than 150 years before Raphael Lemkin, who coined the term "genocide" in 1943, conceived of mass extermination as a particular category of crime. Elements in Plato's *Republic and Gorgias* appear to condemn the Athenian genocide against Melos in 416 BCE as an example of the "justice is the interest of the stronger" approach that these dialogues challenge.

SCHOLARLY ACTIVITIES

Henry C. Theriault, Ph.D.

This exhibit features programs and other material from various events this past year, during which I lectured widely in the United States and internationally. The Congressional Caucus on Armenian Issues, chaired by US Representatives Frank Pallone and Mark Kirk, invited me to give the keynote address at the April 22, 2009, Armenian Genocide Observance on Capitol Hill. Speaker of the House Nancy Pelosi and Congressman James McGovern spoke at this event as well. I was also invited to Armenia and Beirut, Lebanon, to give papers on long-term justice for the Armenian Genocide. I was an invited speaker on panels at George Washington University, Brandeis University, Clark University, and elsewhere, on the relationship between genocide and violence against women, Armenian-Turkish relations, and other issues. I delivered two papers at the June International Association of Genocide Scholars Conference at George Mason University. At the invitation of scholars and human rights activists in Ankara and with generous WSC support, on April 24-25, 2010, I participated in a landmark Armenian Genocide symposium in Turkey, where I delivered a paper on the ethical dimensions of the contemporary Turkish relationship to the 1915 genocide.

WONDERFUL PHILOSOPHIES OF MARY SEACOLE

Kristin Waters, Ph.D.

First-hand, personal reflections by nineteenth century Caribbean women are relatively rare. One exception is Mary Seacole's memoir, *Wonderful Adventures of Mrs. Seacole in Strange Lands* (1857), an illuminating recollection of her extraordinary life that reveals sophisticated observations about race, gender, class, and nation. This paper explores five different accounts of who Seacole is: her own, and those by Rhonda Frederick, Cheryl Fish, Jane Robinson, and a multi-faceted account from the English press (Frederick 2003, Robinson, 2004). I examine these in relation to a theoretical framework outlined in Charles Mills' essay, "But what are you really?" (Blackness visible: Essays on philosophy and race, (Ithaca: Cornell University Press, 1998). Mills articulates a set of metaphysical positions which I examine in the context of studies of Seacole's identity: realism, materialist constructivism, and relativism. This essay demonstrates the importance of an objectivist metaphysics and argues that Seacole was one of the early writers to explicitly explore the power of objectivist constructivism against racial realism. Also, the reader learns more about Mary Seacole, the Jamaican hotelier and healer, and also about the ontologies of race.

PHYSICAL AND EARTH SCIENCES

EVALUATING TRADITIONAL MEDICINAL EFFECT ON MELANOMA CELLS (SKIN CANCER)

Evan Boisvert

Faculty Advisers: Brad Bryan, Ph.D., Douglas Frink, Ph.D.

Cancer is a major disease whose treatment has been a focus of traditional medicines for thousands of years. Chaga, Inonotus obliquus, is a non fruiting mycelium growth traditionally used in the treatment of cancer and other ailments by cultures throughout the northern latitudes in both the eastern and western hemispheres. Modern medicine has only recently begun to determine the chemical constituents of Chaga and conduct controlled trials on its anti-tumor properties. This study is looking at the affect of concentrated Chaga extract (70% ethanol solution) on invitro mice melanoma cells,

and comparing these results with similar extractions from Reishe (Ganoderma lucidum), another mycelium traditional medicine used only in Asia. After 24 hours both treatments showed some degree of cellular morphologic change. The morphologic change in those melanoma cells treated with the Chaga extract, however, was far more extensive that was that observed for those treated with the Reishi extract.

A GREASY CLEAN FUTURE: EMPOWER AND COOPERATIVE CLEAN ENERGY PRODUCTION IN WORCESTER

Maureen Carroll, Nicholas Charette

Faculty Adviser: Stephen Healy, Ph.D.

Empower is a democratic worker owned enterprise born from the social justice organization EPOCA (Ex-Prisoners and Prisoners Organizing for Community Advancement). EPOCA works toward legislative reform of the rules governing Criminal Offender Record Information (CORI). CORI regulations undermine ex-felon's participation in the labor market, as their records remain open to employers for up to fifteen years, discouraging hiring and encouraging recidivism. A subset of EPOCA created Empower Energy Coop to confront this social concern. Empower's goal is to convert waste vegetable oil (WVO) into bio-diesel and create employment for ex-felons in the cooperative tradition, entailing democratic involvement in all aspects of ownership, management and labor. Empower relies on partnerships with small, locally owned and operated businesses, of which Worcester boasts a profusion. In our action research project we surveyed area restaurants to identify potential WVO donors. The results were applied to a digital map using ArcGIS programming to show restaurants willing to donate WVO to Empower. From the map we can visually identify business contacts, symbolized by the frequency of pick-ups, to establish a route to be used by Empower to efficiently deliver services..

HISTORICAL BATHYMETRIC CHANGES IN THE LOWER PASSAIC RIVER

Jeff Cranson

Faculty Adviser: William Hansen, Ph.D.

The Lower Passaic River is one of the most polluted bodies of water in the United States. The sediments of the river contain high levels of heavy metals, PCBs, dioxins and a host of other industrial by-products. A key question in the decision on remediation of the river is the long term stability of these sediments. Historical bathymetric data was used to analyze changes in bathymetry since the halt of dredging in 1949. Scanned historical hydrographic survey sheets obtained from the U.S. Army Corps of Engineers were converted to Geographic Information System (GIS) data layers. Dates of surveys included 1949, 1966, 1976 and 1986. Hydrographic point depths were digitized from rectified surveys into point GIS data layers. The bathymetric sample points were transformed into upstream and across stream coordinates to account for the highly anisotropic nature of the data points. Resulting point locations were interpolated to continuous grids using Interpolation. Bathymetric surfaces for subsequent time periods were used to create difference maps showing areas of deposition and erosion during the given time interval. Results showed significant infilling of the river during the initial decade after dredging halted with significant reworking of the cross section and thalweg during later time periods.

IMPACT OF THE DECEMBER 2008 ICE STORM ON THE FORESTS OF CENTRAL MASSACHUSETTS

Jeff Cranson

Faculty Adviser: William Hansen, Ph.D.

Ice storms are severe meteorological events that often result in damage to forested areas in the mid-latitudes. The December 2008 ice storm caused severe damage in northern New York and New England. Over 1 million homes lost power and forests were heavily impacted. Impacts on forests in the central Massachusetts region were analyzed through field surveys using GPS receivers and a Geographic Information System database. Over 70 10 meter radius sites were surveyed during the summer of 2009. In each site all trees were identified by species and assessed for damage. Transects results from this study showed a clear positive correlation between altitude and damage. Spatially, damage was heaviest in the central portion of the study area in the high elevation area running roughly along the route of the Midstate Trail.

BLACKSTONE VALLEY BIKE PATH IN MILLBURY

Samuel Dziel, Adam Maguire, Paige Cooper

Faculty Adviser: William Hansen, Ph.D.

The Blackstone Valley Bicycle path, located in Millbury, Mass., is a paved, recreational path that runs along the Blackstone River. Using a Global Positioning System and field surveys, the path's primary features where mapped. Rest stops along the path, access points to get on and off the path, and steepness throughout all parts were identified and analyzed. Facilities, such as bathrooms and water fountains, were plotted. The information was then used to construct a detailed map of the trail. The map was placed on a digital elevation model to determine its slope. A final production of the map was rendered for the presentation for the general public.

A SUSTAINABLE FUTURE FOR FOOD

C. David Harris

Faculty Adviser: Stephen Healy, Ph.D.

The rise of the industrial revolution brought enormous changes in the human production of food as small-scale farming that provided sustenance to local communities with a diversity of seasonally grown crops was replaced by large-scale monoculture farms, a transformation that has resulted in many unsustainable practices. Through examining modern food production methods in terms of their environmental effects and the embodied energy of the food produced, I aim to show that small-scale, local, organic farming is more sustainable, and can reduce the threat of climate change as it uses less fossil fuels, chemicals, and water, while also having the ability to improve the health of humans and ecosystems, the conditions of the impoverished, and aid in reducing population growth. This transformation would require major changes to governmental, consumer, and cultural practices of food consumption. Consumer purchasing power has the ability to evoke such a transformation, as has been seen in the recent growth of local and organic food industries due to consumer demand. I will therefore survey individuals in an effort to show that increased awareness can further stimulate the growth of local and organic food production.

RETHINKING THE WAR IN IRAQ: A HUMAN IMPACTS ASSESSMENT

Jenkins Macedo

Faculty Adviser: Mohamed Eskandari

On March 20, 2003, the United States and its allies invaded Iraq in hope of bringing a better life and a change in the political system. Using the language of "Strategy of Preemption," President George W. Bush's justification of the war was based on the assumption that Iraq had weapons of mass destruction (WMD), and that posed national security threats to the United States and its allies in the region (Drasner, 2009). According to Robert (2003), the British and American governments were also looking for a point to stage a war against the regime of Saddam Hussein which they claimed had links with Al-Qaeda. This study seeks to assess the human impacts of the war in Iraq such as health related issues, interruptions in education, the use of Depleted Uranium (DU) and forced migration in the forms of internal displacements and refugees. Analysis will be based on secondary data collected from Iraq between 2002 and 2006 as reported in series of surveys conducted by "Medact," a UK-based global health charity. The central research question to be explored is: What were the human impacts of the war on the Iraqi people?

THE RESIDENCE LOCATIONS AND LOCAL INTEGRATION OF REFUGEE STUDENTS FROM WAR-AFFECTED AFRICAN COUNTRIES LIVING IN THE CITY OF WORCESTER: A CLOSER LOOK AT THE AFRICAN COMMUNITY EDUCATION PROGRAM (ACE)

Jenkins Macedo

Faculty Adviser: William Hansen, Ph.D.

The focus of this study is to geocode the residence locations and local integration of African refugee students living in the City of Worcester vis-à-vis changes in the weather conditions. A GIS residence locator data layer was used to locate and develop maps of all students of African Community Education (ACE) program. A total of 227 addresses were available for analysis out of which 35 students were randomly sampled to answer a questionnaire. The results show that changes in the weather conditions in the City of Worcester do not significantly impact African refugee students' ability to locally integrate. Using data layers of the City of Worcester from MassGIS, a map was produced which reveals that about 85% of the students of the ACE program and their families live in areas classified as sites of environmental contamination, making them vulnerable to carcinogenic substances and other materials that could cause serious health hazards in later years.

ENVIRONMENTAL IMPACTS OF WAREHOUSING REFUGEES: A CASE STUDY OF THE BUDUBURAM LIBERIAN REFUGEES CAMP IN GHANA

Jenkins Macedo

Faculty Adviser: Stephen Healy, Ph.D.

Much of the literature on refugee warehousing and their impacts on the environment of the host country assumes that refugees are "exceptional resource degraders" (Leach, 1992:44 in Jacobsen 1995). The dominant conceptualization of refugees' impacts on the environment treats refugees as actors with destructive behaviors rather than seeing the degradation as a result of inappropriate social policies implemented by host country governments, inefficient humanitarian assistance, and ineffective durable solutions to the refugee crisis. This study seeks to challenge these assumptions through the use of questionnaire directed at refugees in the Buduburam refugee camp in Ghana and internally displaced persons (IDPs) in Liberia. A statistical software (SPSS) was used to analyze the data collected from 311 participants in Ghana and Liberia and results reveal that warehousing refugees in camps correlates with their excessive use of resources within the environment of the host country.

MORPHOLOGY OF CRYSTALS GROWN AT HIGH PRESSURE

Ira Male

Faculty Adviser: Frank Lamelas, Ph.D.

Crystals grow with specific shapes which depend upon growth conditions. At equilibrium, stable shapes are those which minimize the surface energy of the crystal. The equilibrium shape depends upon (i) the symmetry of atomic arrangements within the crystal and (ii) external factors such as the temperature and pressure of the crystal environment. For example, crystals deep within the earth can grow in metastable high-pressure phases. In an ongoing series of experiments at WSC, we are studying the growth of crystals at elevated pressures, with precisely controlled temperatures. We study the approach to equilibrium by recording time-lapse images over periods ranging up to several weeks. In current experiments with ammonium iodide crystals grown at several thousand atmospheres of pressure, we find that the crystal morphology is extremely sensitive to small temperature gradients within the cell. We show how control of the temperature gradient can be used to produce widely-varying crystal shapes. We also show how temperature gradients produce dynamic instabilities, leading to steady-state cycles of dissolution and precipitation with no approach to a stable morphology.

POSITRONIUM QUENCHING

Wyatt Merrill, Stephen Glynn

Faculty Adviser: Sudha Swaminathan, Ph.D.

Positronium is a hydrogen-like atom without a nucleus which consists of a positron and an electron. A positron is a fundamental particle which has the same mass and spin as the electron, but while the electric charge of an electron is negative, the electric charge of the positron is positive. There are two types of positronium: para positronium, which lives for 0.12516 billionths of a second, and ortho positronium, which lives for 142.05 billionths of a second. During a collision between an ortho positronium atom and a target atom, it is possible for the electron in the ortho positronium atom to be exchanged with an electron in the target atom. As a result of the electron exchange, a fraction of the ortho positronium atoms can be converted to para positronium atoms. This process is referred to as quenching of the long lifetime of ortho positronium. In this poster, we present results from a study of collisions between ortho positronium atoms and two types of targets.

THE BENEFITS OF CONVERTING WORCESTER AIRPORT INTO A WIND FARM

Jeffery Mills

Faculty Adviser: Stephen Healy, Ph.D.

This dissertation explores the possibility of replacing the mainly unused airport in Worcester and converting it into a wind farm. Installing wind turbines, or other wind powered alternatives, will help off-set the cost of electricity for the city, provide an environmentally safer alternative to the use of fossil fuels, and help to reduce greenhouse gas emissions in conjunction with the city of Worcester's Climate Action Plan. By collecting wind speed data at the airport, computing the cost of installation and maintenance versus the debt repayment for the federal loan taken out by the city to make improvements and remodel the terminal, and using a comparison of the Princeton wind turbines and other case studies, my objective is to show that over time the installation and use of wind turbines (or other wind powered alternatives) at Worcester Airport would be more beneficial to the city then to let the airport continue to run to avoid paying back a federal debt.

CARBON DYNAMICS AND ICE STORM IMPACT ON HARVARD FOREST

Kelly Morgan

Faculty Adviser: Allison Dunn, Ph.D.

Carbon sequestration plays roles in both small areas of forest dynamics and large global events such as climate change. This study oversees the carbon budget of two different aged sites in Harvard Forest over a short timeline, a year. The two sites trees were measured using diameter breast height and recorded and the carbon fluxes were then calculated using the biomass estimators for aboveground biomass. Carbon storage was calculated by site, species and size. In December 2008, both sites were heavily impacted by a major environmental disturbance, an ice storm. The two sites were each affected in different ways by the storm; while the younger forest site had carbon growth, the older site had a significant loss of carbon. The ice storm also appeared to have hit certain tree species more than others and tree size played a role in mortality. The short and long term studies of these sites will help in determining the future effects of carbon on the atmosphere and in the forests.

THE ECONOMIC IMPACT OF SNOWMOBILING IN NEW HAMPSHIRE

Jeff Reynolds

Faculty Adviser: Stephen Healy, Ph.D.

This research paper explores the economic impact of a poor economy and bad winter on snowmobiling in Errol, New Hampshire. Errol relies heavily on income from snowmobiling, one of the most significant recreational activities in the state. Snowmobiling has an enormous positive economic impact on New Hampshire, bringing in over $1 billion annually. New Hampshire has profited immensely even with the adverse effect of a poor season and economy. When southern New Hampshire, Massachusetts and Connecticut lack snow, snowmobilers flock to the North Country to find good snowmobiling conditions. Towns like Errol, located in the North Country, benefit. Indirect income comes from money spent in restaurants, clothing stores, grocery stores, and on lodging and gas. Other income comes from fund raisers held by individual clubs. Expenses include maintaining grooming machines, drags and trails. Not only does it provide jobs for people who work in those areas, mechanics and groomers also find employment. It is no longer a poor man's sport but considered a sport for the affluent. Errol has been slightly affected by the poor economy and short season but was fortunate to still have a profit, unlike southern New Hampshire towns.

WORCESTER STATE CAMPUS PARKING RUN-OFF STUDY; GREEN SURFACE COVER AND THEORETICAL SECOND GARAGE

Steve Roberts

Faculty Adviser: William Hansen, Ph.D.

Using the college campus as a learning resource is one of the key tenets of campus sustainability. The WSC campus is used by a variety of disciplines for examining ecological habitats and processes as well as distribution of physical and cultural resources. This project uses field data collection, both past and current data, to create and compile an inventory of campus resources in the GIS database. The data will be used to make a detailed GIS (geographic information systems) map of the WSC campus including buildings, campus surface types, and parking lot types. It will also include the theoretical existence of a second parking garage to replace parking when green space is introduced.

WATER QUALITY IN AN UNDEVELOPED WATERSHED: ANALYSIS OF THE DEERFIELD RIVER WATERSHED IN WESTERN MASSACHUSETTS

Darren Schmidt

Faculty Adviser: Allison L. Dunn, Ph.D.

The Deerfield River Watershed in Western Massachusetts is a heavily forested area with minimal levels of agricultural and residential development. The presumption is that the Deerfield River is clear of pollutants considering the undeveloped nature of the area. Knowing this, it is possible that water quality is adversely affected by historic mining, present development, the Yankee-Rowe nuclear power plant, agriculture and acid rain. These issues were investigated via research into water quality issues and assessments. Water samples were collected and tested to analyze the water quality. Tests included: nitrates and phosphorus which indicate agricultural activity, fecal coliform which indicate fecal matter, pH which could indicate high acidity in rain, and dissolved oxygen which provides oxygen to aquatic life. Water samples and GPS locations were collected at seven locations equally dispersed spatially and downstream of threats to water quality. These GPS locations were collected by a Garmin GPSmap 60CS and the computer program Arc Map was used to create a Geographic Information System map of the data points. Results of the water tests don't directly indicate contamination in the river. Nor was it proven that the water is uncontaminated. More studies may be necessary to further assess the river.

POSITRONIUM FORMATION

Sudha Swaminathan, Ph.D.

This paper on positronium formation has been accepted for publication in the *Physical Review A*, a journal of the American Physical Society. In this paper, we present results from a study of single collisions between positron beams and targets in which positronium and target ions are produced. A positron is an antimatter equivalent of an electron. It has the same mass and spin as the electron, but while the electric charge of an electron is negative, the electric charge of the positron is positive. When a positron collides with an electron, sometimes a hydrogen-like atom without a nucleus is formed for a short period of time. This matter-antimatter atom known as positronium decays into particles of light called photons. There are two types of positronium: para positronium, which lives for 0.12516 billionths of a second before decaying into two photons, and ortho positronium, which lives for 142.05 billionths of a second before decaying into three photons. We have used the conservation of spin in our calculations to predict the probabilities of forming a particular type of positronium, coincident with the formation of a particular target ion.

PRECIPITATION VARIABILITY IN THE BOLIVIAN ALTIPLANO: CMIP3 PROJECTIONS

Jeanne Thibeault, Ph.D.

The Bolivian Altiplano is a semi-arid region located in the central Andes of South America. Water is a major constraint to agriculture, where approximately 50 percent of the rural population employs traditional farming methods, depending entirely on water supplied by spring and summer rainfall. This research examines the ability of a subset of coupled models from the World Climate Research Program Coupled Model Intercomparison Project version 3 to simulate the observed relationships between Altiplano precipitation anomalies and large-scale atmospheric variables for spring (OND) and summer (JFM), also examining the evolution of these relationships through the 21st century under conditions of greenhouse warming. Results suggest that the known relationships between Altiplano precipitation anomalies and large-scale atmospheric variables will likely continue to be important in the future. Changes associated with expansion of the Hadley circulation may reduce the frequency of upper-level easterly winds that carry moisture into the Altiplano, reducing springtime rainfall. More frequent El Nino-like conditions may explain the reduction in upper-level easterly winds during summer, reducing the frequency of summertime rainfall events. These results explain projections for the annual cycle, which have serious implications for water resources and food security in the Altiplano.

EFFICACY OF MASSACHUSETTS LAW CHAPTER 61A IN THE WORCESTER COUNTY AREA

Jeffrey Tod

Faculty Adviser: William Hansen, Ph.D.

Open space conservation is a pressing concern in developing metropolitan areas. Open space is undeveloped land, traditionally reserved in its natural state or used for agricultural/recreational purposes. As urban areas mature, expansion to surrounding suburban open space area occurs. Preservation of this land is essential for a sustainable environment. Local governments have attempted to preserve open space through programs that persuade people to participate, but development continues. In 2005, Massachusetts passed the Chapter 61A Law to protect local farmland. Forest clearance and agricultural abandonment continue to persist in Worcester County due the ineffectiveness of the Chapter 61A law. The purpose of this study is to measure the efficacy of the law in Worcester County. A spatial analysis of MassGIS data reveals patterns of land change over the last 30 years. We identified towns with similar characteristics in terms of demography and area but with varying levels of participation in the Chapter 61A program. The analysis was used to formulate correlations based on land use change and developmental characteristics, like population change. Based on the analysis towns were chosen for interviewing about the Chapter 61A law and its success. Conclusions are based upon the spatial analysis, correlations, and interviews.

A HOW TO MANUAL FOR RECREATIONAL TRAIL MAPPING

Matt Tolozcko, William Edge, Stephen Roberts

Faculty Adviser: Stephen Healy, Ph.D.

Organizations such as the Greater Worcester Land Trust (GWLT) are responsible for the management of both private and publicly owned open space amenities in the city of Worcester and surrounding towns. The GWLT makes extensive use of volunteer labor to maintain and preserve these opens spaces. A critical need of the GWLT is accurate mapping of the trails that connect discreet properties under their management. With accurate maps, the GWLT could qualify for state and

federal grants that would support their organization. Past trail mapping efforts have misrepresented these open spaces, diminishing opportunities to access funding. Our research aim is to produce a replicable methodology for trail mapping in the form of a manual that will allow volunteers to make accurate maps using both ArcGIS and Garmin GPS technologies. The manual will describe how to record GPS track logs, download raw data into a convertible form, transform it into a data layer, as well as how to distinguish trail landmarks that facilitate geodatebase organization.

PSYCHOLOGY

PERSONALITY AND COPING DIFFERENTIALLY PREDICT DEPRESSIVE AND ANXIETY SYMPTOMS IN COLLEGE STUDENTS

Kathryn Fokas

Faculty Adviser: Champika K. Soysa, Ph.D.

Depressive and anxiety symptoms are present in roughly one-third and one-half of college students, respectively, and are associated with poor academic achievement and physical health. To identify factors that predict these psychological states, this study examined personality traits, coping patterns, and depressive and anxiety symptoms in 98 undergraduates (men = 49, women = 49). Statistical analysis revealed that, when personality traits were examined alone, decreasing conscientiousness and extraversion and increasing neuroticism predicted depressive symptoms, while only increasing neuroticism predicted anxiety symptoms. When coping strategies were analyzed alone, increasing self-blame and behavioral disengagement predicted depressive symptoms, and increasing self-blame and venting predicted anxiety symptoms. Finally, when personality and coping were examined together, decreasing extraversion and increasing neuroticism and self-blame predicted depressive symptoms, whereas increasing neuroticism and venting predicted anxiety symptoms. These findings indicate differentiation in the prediction of depressive and anxiety symptoms. This adds to the previous research literature, which has primarily investigated depressive and anxiety symptoms in separate studies, and rarely explored the combined contribution of personality and coping. College students may benefit from recognizing these mechanisms as vulnerability factors for depressive and anxiety symptoms.

Accepted for presentation at the Association for Psychological Science May 2010.

PROCRASTINATION, COPING, AND ACHIEVEMENT ANXIETY IN COLLEGE WOMEN

Champika K. Soysa, Ph.D., Kathleen Clark '09, Jaimie Venini '09

This study investigated the relationship between procrastination, coping, and achievement anxiety in female undergraduates (N = 90). Procrastination was associated with increasing debilitating achievement anxiety and decreasing facilitating achievement anxiety. In addition, maladaptive coping was positively related to procrastination, and adaptive coping was inversely related to procrastination. Maladaptive coping was positively associated with debilitating achievement anxiety, but there was no relationship between adaptive coping and facilitating achievement anxiety. Finally, both procrastination and denial predicted debilitating achievement anxiety. *Presented at the New England Psychological Association October 2009.*

LIMITS OF RESILIENCE: POSTTRAUMATIC RESPONSES TO WAR IN SRI LANKA

Champika K. Soysa, Ph.D., **Kathryn Fokas**

War exposure, post-traumatic responses, temperamental flexibility, approach coping, and parental support, were examined in Sri Lankan children. Individual and environmental resilience factors contributed to the prediction of post-traumatic responses with low but not high war exposure. In extreme adversity, resilience may peak, and, therefore, cannot increase with even greater stress exposure. These results inform individuals, families, and communities, about the need for external resources to supplement individual and familial resources, in the context of war exposure. *Presented at the Association for Psychological Science May 2009.*

PERSONALITY SUPERSEDES COLLEGE ENVIRONMENT IN PREDICTING PSYCHOLOGICAL WELL-BEING AMONG COLLEGE STUDENTS

Champika K. Soysa, Ph.D., **Kathryn Fokas, Jonida Theodhoraqi '09, Casey Ciolfi** Psychological well-being is related to academic achievement and physical health in college students. Studies report that personality and college environment predict student psychological well-being, but these dimensions are rarely examined together. This study, therefore, investigated personality traits and perceptions of the college environment in the prediction of psychological well-being among 98 undergraduates (men = 49, women = 49). Gender comparisons revealed that women were higher than men on the personality traits of conscientiousness, extraversion, and agreeableness, but not neuroticism. Statistical analysis revealed that, when personality traits were examined alone, increasing conscientiousness and extraversion and decreasing neuroticism predicted well-being. Likewise, positive ratings of the college environment predicted well-being. When personality and college environment were analyzed together, however, only the personality traits remained significant as predictors of well-being. These findings suggest that personality factors supersede college environment (as examined here), in predicting well-being. This result could be an artifact of a primarily commuter college, where environment plays less of a role in the lives of students than at primarily residential schools. Institutions and individuals may benefit from recognizing the potential implications and limitations of personality dispositions and college environment in predicting psychological well-being among college students. *Accepted for presentation at the Association for Psychological Science May 2010.*

SOCIOLOGY

WSC@TATNUCK PARK

Center for Service Learning and Civic Engagement

Faculty Adviser: Matthew Johnsen, Ph.D.

As a part of Worcester State College's outreach to the community, since November 2009 the Center for Service Learning and Civic Engagement has organized an ongoing series of lectures by faculty and students to residents of Tatnuck Park Assisted Living, a nearby assisted living facility. In addition to allowing faculty to share presentations that are of great interest, it offers a continuing way of challenging Tatnuck Park residents and expanding their knowledge. Faculty and students who have made (or are scheduled to make) presentations include: Bonnie Orcutt, Ph.D., Lori Dawson, Ph.D., Matthew Johnsen, Ph.D., Fortunata Makene, Ph.D., Maria Fung, Ph.D., and Amanda Wittman and members of Nicaragua Alternative Spring Break Team.

THE IMPACT OF INTERSECTING DIMENSIONS OF INEQUALITY AND IDENTITY ON THE RACIAL STATUS OF EASTERN AFRICAN IMMIGRANTS

Katja M. Guenther, Sadie Pendaz

Faculty Adviser: Fortunata Songora Makene, Ph.D.

In this paper, we examine how immigrants from eastern Africa to the Minneapolis and St. Paul metropolitan area understand and navigate the American color line and its implications for non-whites. Although these immigrants are subject to constraints based on their racial status as
black, they mobilize other intersecting aspects of their identities to manipulate racial classifications in the hopes of attaining upward mobility in the United States, even when doing so creates other social costs for them. Eastern African immigrants draw on their ethnicity and,
among Muslim immigrants, their religion to differentiate themselves from African Americans, who occupy the lowest position in the American racial hierarchy. In challenging their categorization as racially black and seeking to move up the racial hierarchy, Eastern African immigrants refine the color line to distinguish between African American blacks and non-African American blacks.

THE SINGING REVOLUTION: THE ROLE OF MUSIC IN THE ESTONIAN INDEPENDENCE MOVEMENT

Matthew Johnsen, Ph.D.

This project began as a WSC mini-grant to collect information about the Singing Revolution in Estonia in 1989-1992. I traveled to Estonia and met with a variety of people (including the first Prime Minister of independent Estonia, Mart Laar) to collect information and materials about social conditions before and after the independence of Estonia. During the visit, I spoke with a number of Estonians about their experiences during this time period. I also participated in Laulupidu -- a national song festival which featured over 26,000 performers and over 150,000 in the audience. I presented information about the Singing Revolution developed from the project as part of "WSC@Tatnuck Park" in January 2010 to a group of about 30 participants. Information developed from this project has also been incorporated into a course entitled "Music and Social Change."

INTEGRATING LIBERIAN REFUGEES IN THE HOST COUNTRY: A CASE STUDY OF LIBERIAN REFUGEES AT THE BUDUBURAM REFUGEES CAMP IN GHANA

Jenkins Macedo

Faculty Adviser: Fortunata S. Makene

The refugee crisis is a universal phenomenon. The integration of refugees into the local communities poses a serious challenge both to the UN Refugee Agency, the governments of host countries, the local communities in which refugees are hosted and the refugees themselves. According to the United Nations High Commissioner for Refugees (UNHCR 2008), the world's refugee population is estimated to be about 14 million. By the end of the 14-year civil wars in Liberia, there were an estimated 750,000 internally displaced persons in Monrovia, the capital of Liberia, and about 500,000 Liberian refugees settled in refugee camps in other countries (Nilsson, 2003). As of 2008, UNHCR estimated that about 45,000 Liberian refugees still remain in Ghana. This study focus on Liberian refugees located at the Buduburam refugee camp in the Central Region in Ghana and how those refugees can be integrated into local Ghanaian communities as a durable solution to the refugee crisis. A total of 311 Liberian refugees at the Buduburam refugee camp participated in a survey in 2009. SPSS version 17 was used to analyze the data.

PICNICS, PARTICIPATION AND POWER: LINKING COMMUNITY BUILDING TO SOCIAL CHANGE

Joyce Mandell, Ph.D.

The main emphasis of the network centric community organizing model is to create social bonds within the neighborhood and to make bridges to connections outside of the neighborhood. The development of this model was strongly influenced by the works of Robert Putnam (2001) who called for an increase of social capital as an antidote for civic disengagement. Critics of the community building approach deny the link between social capital and social change. The case study of the community development corporation, Lawrence Community Works, demonstrates a model for creating social change and neighborhood empowerment based on a community building approach to community organizing. In this mode, social capital hits lead to relationships of place, identity with place and place ownership. Combined with leadership empowerment education and public action opportunities, the "picnics" approach to community organizing results in an increase in civic participation and civic power for local residents.

STRENGTHENING COMMUNITY PARTNERSHIPS THROUGH MUTUAL UNDERSTANDING: A REPORT TO THE CENTER FOR SERVICE LEARNING AND CIVIC ENGAGEMENT AT WORCESTER STATE COLLEGE

Students from Applied Sociology and Community Research, SO305 fall 2009

Faculty Adviser: Joyce Mandell, Ph.D.

In spring 2009, WSC's Center for Service Learning and Civic Engagement began an extensive evaluation and assessment of its services, programs, goals and mission to guide its strategic planning initiative. The evaluation and assessment of community partners, faculty and students involved with the Center will provide rigorous quantitative and rich qualitative data identifying what is working and what are the areas for potential growth. This evaluation and assessment will also set the stage to institutionalize mechanisms for future assessment and data collection. The Center contacted Professor Joyce Mandell to work on one section of the Center's organizational assessment with her advanced sociology research methods class, Applied Sociology and Community Research. The research class was instructed to assess the community partnerships of the Center in order to provide the Center with important information and suggestions to maintain and improve the partnerships between the community organizations and the faculty and students at WSC. This report details the research process and findings assessing the strengths and challenges of the Center's partnerships with community based organizations.

EVALUATION OF "REDFINING COMMUNITY THROUGH THE ARTS" -- A WORLD CAFE EXPERIENCE

Students from Research Methods in Sociology 2009: Lead Iris Lika

Faculty Adviser: Matthew Johnsen, Ph.D.

During fall 2009, the Research Methods (SO 275) class was engaged in a service learning project which led to the evaluation of a conference sponsored by Alternatives and VSA of Massachusetts. Held in November 2009, the conference was designed to assist persons with and without disabilities to make connections with one another, and to explore how we can redefine our communities in ways that are more satisfying. It utilized a World Cafe format to encourage strong engagement among all conference participants. About 60 people participated in the conference, and students developed the evaluation form that was used to gather information about the event. In addition, one student and the faculty adviser participated in the event as a participant observer. Findings including a detailed PowerPoint presentation developed from the evaluation were shared with conference organizers.

URBAN STUDIES

MONTREAL: A CITY AMONGST THE QUESTION OF SECESSION

Lois Artz

Faculty Adviser: Lisa Krissoff Boehm, Ph.D.

Located within the province of Quebec, Montreal is the world's second largest French-speaking city. The people of the region are linked with a strong sense of nationalism. Over time, the presence of national identity has caused many to want to break away from the Canadian government and create their own independent state. This project explores the possibility of Quebec secession and the dependence that the province has on Montreal, the region's economic staple.

WTF: WORCESTER TWENTY-FIFTY

Maureen Carroll, Nicholas Charette, David Fields, Stephen Roberts, Matthew Toloczko

Faculty Adviser: Steven Corey, Ph.D.

Just as our present finds its foundations in the past, so too will our future plant roots in what we do today. Our goal is to determine the status of Worcester, Massachusetts, in 2050. This project looks toward the future by looking into our past by taking elements from today's cityscape and casting a projection forward forty years. This is achieved by taking into account the last forty years of public records, city planning and documented patterns in the geo-political space. The synthesis of this data is supported by scientific models on changes yet to come. Our projection reflects how global climate change, demographic shifts, progressive technologies and constantly changing society will shape Worcester, and the depiction we give is of a theoretically realistic, whole city. Each team member then chose what we have termed a "utopian" ideal, a change we do not necessarily foresee happening, but predict vast improvements if it were adopted. This generates two possibilities: the Worcester, should we stay the course, and a Worcester we can actualize with these five realistic changes.

PEDAGOGY AND PLACE: MERGING URBAN AND ENVIRONMENTAL HISTORY WITH ACTIVE LEARNING

Steven H. Corey, Ph.D.

"Pedagogy and Place: Merging Urban and Environmental History with Active Learning," *Journal of Urban History* 36, no 1 (January 2010): 28-41. [Article only, not poster.]

ADDING GENDER TO AMERICAN URBAN HISTORY

Lisa Krissoff Boehm, Ph.D.

"Adding Gender to American Urban History" is an article from *The Journal of Urban History*, January 2010, written by Lisa Krissoff Boehm. She also served as guest editor for the journal edition, which centered on teaching urban history. This was the first volume of the journal devoted to teaching. The paper was first presented as part of a panel presentation at the American Historical Association in Washington D.C. in January 2008. In this article, the author explores the intellectual journey that led her to combine urban history and women's history, both in her own research and in her college classroom. The intricacies of the WSC class "Gender and the City" are explored, including reading assignments, course exercise in mental mapping, and class participation in the Worcester Women's History Association's community oral history project. (The class actually piloted the interview process for the project.) Oral history proves to be an extremely malleable assignment, even when rigorously following the Oral History Association guidelines, and the methodology befits many kinds of urban history courses.

A PROFILE OF CENTRAL MASSACHUSETTS NONPROFITS: CHALLENGES & INNOVATIVE SOLUTIONS

Shiko Gathuo, Ph.D., Miao-Ju Wang, M.B.A.

There are over 1,600 nonprofit organizations operating in central Massachusetts, helping to not only improve the lives of their clients, but also helping to drive the economic engine of the region. In trying to achieve their missions, however, many nonprofits face various challenges including funding, management, and high employee turnover. Further, the sector tends to be inefficient due to duplicate efforts of many small nonprofit organizations that either share or have similar missions. For this study, 81 nonprofit organizations in central Massachusetts were surveyed. Unsurprisingly, almost all the organizations in the survey indicated funding as their greatest challenge. Worse still, they expected the demand for their services to increase and their revenue to decrease in 2010. Despite the lack of funding, however, only 35% of the organizations had formal fundraising plans, and barely 15% had fulltime grant writers. Seventy-three percent of the organizations responding to the survey indicated that they had formed collaborations with other nonprofits to ensure survival. More than 90 percent of respondents reported relying on volunteers.

ENDING HUNGER TOGETHER

Intergenerational Urban Institute

Faculty Adviser: Maureen Power, Ph.D.

An intergenerational team of WSC students is working to take a bite out of hunger on our campus and in our community. As members of the Governor's Commonwealth Corps, whose mission is to engage Massachusetts residents of all ages and backgrounds in direct service, these students have been engaged in hunger awareness and SNAP outreach. Their efforts have not only helped to put food on people's tables, but also brought economic benefits to the local community. Every $5 in SNAP benefits (formerly known as food stamps) to new participants yields a total economic activity of $9.20 in the community. Outreach to elders has been focused at senior housing sites, senior centers and churches, where students use food stamp bingo to engage elders. By working with the Youth Policy Council at South High School, the team is trying to increase participation in SNAP among families, 80 % of whom are on free or reduced lunches. At WSC, there is a push to enroll commuter students who may be eligible. Outreach participants include: David Fields, Lauren Burgess, Helen Shuster, Mary Kersten, Paul Lewis,Zenaide Ribeiro, Charlyn Valencia, Amanda Diaz,Joely Frias, Carloyn Graham, Thea Aschkenase, Gladys Wood, Laken Euzibio, Tonya Vargas, and Judy Knight.

WORCESTER PLANNING TEAM PROJECTS: SOME CREATIVE IDEAS FOR DOWNTOWN WORCESTER

Introduction to Urban Studies students

Faculty Adviser: Joyce Mandell, Ph.D.

Downtown Worcester has seen its share of vacant storefronts, empty properties and megaprojects that have failed to revitalize this core. Using downtown Worcester as a case study for urban planning and economic development, Introduction to Urban Studies students made numerous site visits, detailed the problems and envisioned some potential solutions to continue bringing the area back to life. Students offer their models and papers detailing their vision and creative dreams for downtown redevelopment.

DOMESTIC VIOLENCE: HOW DO WE COPE

Angela MacKinnon

Faculty Adviser: Lisa Krissoff Boehm, Ph.D.

Surveys conducted in the industrialized countries of the world indicate that violence from an intimate partner is a problem everywhere. The lowest reported instance of women reporting physical abuse from a partner is 16 percent. The highest reported instance of domestic abuse is 60 percent. These statistics indicate millions of women across the globe are experiencing and enduring violence. The movement to protect women has grown and been transformed. The government has begun to take part in some of the programs provided for victims of abuse. This paper will define trauma, domestic violence, and sexual violence and the ramifications violence has on the lives of its victims. The recommended counseling survivors need will also be discussed and compared to the actual services that are currently offered. There is a gap between the services needed by victims of violence and what is offered to them. More women will continue to fall through the cracks in our society until the necessary services are made accessible to all.

VISUAL AND PERFORMING ARTS

STUDENT ART SHOW, GALLERY ST113
Gallery Director Catherine Wilcox-Titus, Ph.D.
This show is a culmination of the creative efforts of our students, demonstrating artworks that exceed class exercises to become original and inventive art equal to any. The show was highly selective and juried by Visual and Performing Arts faculty Stacey Parker, M.F.A., Susan Fisher, M.Ed., and Catherine Wilcox-Titus, Ph.D. Student artists are: Jaqueline Amarante, Alex Arous, John Balco, Rona Balco, Alyssa Barnett, Matthew Barsaleau, Alyssa Bell, Mike Borowiec, Chris Bruinsma, Nikki Campanale, Anastasia Caras, Han Chen, Emily Chesna, Alisha Connors, Kayla Cortis, Stephanie Courville, Maura Crossman, Marissa Daniels, Heather Deliago, Tessa Demers, Alexandra DeRoser, Kristie Dunhan, John Dunn, Lindsay B. Durell, Abdiwali Farah, Kaitlin Fedyk, Linda Feliciano, John Fenelli, Karen Finnegan, Christina Foley, Gabrielle Gebo, Eron Gjoni, Jaclyn Glover, Gillian Goodhue, Hannah Gunnell, Laura Hamel, Bharat Hans, Ashley Harvey, Lindsey Holloway, Emily Hutt, Elena Isratescu, Jamie Jacobs, Sarah Jakubiak, Erica Kempo-Fuedo, Sara Kendall, Shawn Kennedy, Kwasi Kwarteng, Peter LaPrade, Kristina Lisacki, Jiaqi Liu, Samantha Lombardo, Darysabel Lopez, Rachel S Lubanko, Cia Mai Ly, Alanna Madru, Cedric Marsh, Catherine Milkiwski, Tamara Mims, Cole Motz, Emily Nelson, Emma Nerssessian, Katie Newton, David Nielson, Caroline Nyaga, Andrew Orsini, Alyssa Panarelli, Grace Papandrea, Thomas Pappa, Allyson Pereira, Stephanie Perkins, Molly Provencher, Kerry O'Gorman, Bill Rasku, Lauren Reppucci, Chris Resteghini, Lacey Rodgers, Karla Rotondi, Dawn Scott, Ted Seitanny, Ellen Sikanski, Rachael St. Jean, Mike St. Pierre, Kyle St. Thomas, Jennifer Stowell, Bethany Strothers, Ilyse Sugar, Qifang Sun, Mike Sutton, Marie Taowkdjian, Nick Tarani, Ana Taveras, Kristen Teague, Jennifer Thulare, Cory Tobey, Josh Torchia, Kim Tran, Shaun Tribbett, Zuleika Vazquez, Kristine Wall, Cody Warila, Janet White, Katelin White, Matthew Wright

SCENE FROM TARTUFFE
Cast Members
Faculty Adviser: Adam Zahler, M.F.A.
Students perform scenes from the recent production of TARTUFFE, the 17th century comedy by Moliere.

WOMEN'S STUDIES

"WEIGHT CLASS": BURDENS WE BARE IN ACADEMIA AND THEIR SHAPING OF COMMUNITY
Andrea Dottolo, Ph.D., Champika K. Soysa, Ph.D., and Lori Dawson, Ph.D.
This symposium explores the notion of "weight class" as a category that both defines and restricts. Presentations will address gender, social class, race, sexuality and bodies in relation to their boundaries, identities that are experienced as a source of strength and pride as well as limitation and burden. "Weight" refers to both fatness and burden (stigma and stress), while "class" indicates classification, social class, and the classroom. Presenters examine ways in which stigmatized identities simultaneously "weight" our roles as feminist teachers, scholars, administrators, friends and colleagues. Panelists identify the ways in which baring these identities in various contexts constructs community in their respective locations and also with each other as these panelists continue to meet and share their work. *Presented at the Association for Women in Psychology February 2010.*

WOMEN'S MENTAL HEALTH IN TIMES OF CRISIS: THE 2004 TSUNAMI IN SRI LANKA
Champika K. Soysa, Ph.D.
This talk addressed the impact of the Asian Tsunami of 2004 on Sri Lankan women. Non-governmental organizations in Sri Lanka have expressed concern about the dearth of gender analyses regarding post-tsunami relief and rehabilitation efforts. The need to examine the differential experiences of Sri Lankan women regarding both risk-exposure and recovery processes, based on ethnicity, social class, age, geographical location, etc., were discussed. The ways in which prior exposure to ethnic war followed by exposure to the tsunami had a cumulative psychological impact on Sri Lankan women were highlighted, together with the identification of vulnerable groups among women. The importance of culture in understanding emotional experience and expression was examined, as well as the dialectic between psychological distress and resilience. Further, the talk addressed the distinction between normal responses to catastrophic events and psychological diagnoses. In conclusion, the presenter emphasized the need for empowerment of women through their inclusion in participatory processes in post-disaster relief, rehabilitation, and reconstruction. *Presented at the NGO Parallel sessions of the United Nations Commission on the Status of Women-54 Conference March 2010.*

WORLD LANGUAGES

A STUDY OF UNRECIPROCATED LOVE IN THE THEATRICAL WORKS OF FEDERICO GARCIA LORCA

Colleen Croteau

Faculty Adviser: Ana Perez-Manrique, Ph.D.

Federico Garcia Lorca is one of the most recognized Spanish writers of the 20th century. Out of Brenda Frazier's *La mujer en el teatro de Federico García Lorca* came the notion of *amor fantasía-realidad*—a love that exists yet does not exist at the same time. Building upon that concept, this paper establishes three major types of *amor fantasía-realidad*: love negotiated for financial gain; love based purely upon physical attraction; and love based upon the desire of the impossible. This paper shows how each of these themes is present in Lorca's plays and reveals how this concept was used by Lorca to criticize Spanish society and its perception of love. Lorca reveals how abstract the society's notion of love truly is and demonstrates how greed and superficial perception can taint humanity.

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