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Invited Poster Presentation
Let's Talk About Open Access: Changes in Scholarly Communications

What is open access and why should you care? JMU Librarians explain how open access publishing can benefit you and your students. Learn about open access publishing opportunities, funding requirements, and impact factors in your discipline. Liaison librarians are available to consult on scholarly communications issues relevant to you.

The authors are the Rose Librarians: Kelly Giles, Carolyn Schubert, Yasmeen Shorish and Stefanie Warlick.
Developing Sustainable Transportation Infrastructure Systems

Elise Barrella, Department of Engineering

The sustainability of the transportation system is a multi-faceted issue that involves improving the effectiveness and efficiency of the system while enhancing positive impacts on quality of life and economic competitiveness of the community and preserving the natural environment. In this research, developing sustainable transportation infrastructure systems was addressed at two levels: (1) community-based design and planning and (2) strategic planning and policy development. The first area focused on using cutting edge frameworks like Health Impact Assessment (HIA), Quality Growth Assessment, and street typology to help communities explore relationships between transportation, the remaining built environment, and society. Applying these frameworks required extensive analysis of transportation, land use, and demographic data; public outreach in the form of design workshops, stakeholder interviews, and focus groups; and studies of specific infrastructure deficiencies and potential design solutions. The second research area involved development of a guidebook for evaluation and planning of sustainable transportation systems and a strategic planning tool to help transportation agencies systematically incorporate sustainability principles into their organizational culture, design guidelines, planning practices, and decision-making processes. The strategic planning tool was piloted by nine state DOTs and the results of the pilot test and of previous research suggest that DOTs’ sustainability approaches are at varying levels of maturity, and the siloing of sustainability within the organizations is characteristic of earlier maturity levels. Developing more sustainable transportation infrastructure requires both strategic decision-making at the agency level and consideration of community context in planning and design.

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This paper describes the results from a pilot study in which a culturally-relevant board game was used with leaders in the Maasai community in southern Kenya to explore the nature of an accelerating boom-bust drought and famine cycle in the region. During the drought part of the cycle, vast numbers of cattle and people suffer sometimes as many as 80% to 100% of the cattle perishing. As the rains return, people seek to re-establish their cattle herds to the extent that they collectively exceed the capacity of the local ecosystem. This then sets up conditions for a repeat crash of livestock holdings the next time prolonged drought occurs. The dynamics driving this phenomenon are rooted in greatly increased population densities in the area, the cultural values and evolving pastoral practices of Maasai culture, the natural ebb and flow dynamics of the semi-arid environment in which they live. A board game called Eramat (‘mind your cattle’ in the Maasai language) was developed in consultation with members of the Maasai community. The game places each player in the role of a pastoralist head-of-household who must manage his cattle herd and other resources in the face of dynamics created by the interactions of an arid climate, family needs, and other social constraints. The goal was to develop a learning tool that uses rules, symbols and language that are attuned to the local culture and that allows players to explore alternative strategies for survival in the presence of those dynamics.
Leakiness of Status: A Simulation Model Approach

Steven Harper, Department of Engineering

Organizations are concerned with their status and will take measures to improve or protect it from being harmed. However, many times the ability to control or create this status lies outside the organization. In this study, a Markov chain model was created to investigate how much leakiness there is of status when other organizations take actions as subtle as calling you a peer. A social network graph was created from the American Association of Universities’ member schools. The institutions were nodes, and self-reports of peer schools created links. A Markov chain model was created to exam the leakiness of status by allowing a bit of backflow through the links. Normally there is just a boost in status given by other organizations by calling you a peer (forward flow). However, there is some backflow of status by association when a link is publicly declared. Adding this backflow of status to the model, it is possible to vary the amount of status leaking and see the effect on the status ranking among members of the network (the AAU schools in this case). Results indicate that it takes only about 0.22% reverse flow to effect changes in status, and at 30.92% reverse flow the highest status organization slips from the top ranking. Since it is difficult to control who considers you a peer, an organization may have less influence over their status than they realize.

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Planning, designing, and implementing sustainable infrastructure systems

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While infrastructure is essential for human well-being and economic productivity, it also represents mankind’s most visible impact on the environment. Planning, designing, and implementing sustainable and resilient infrastructure is challenging because of the evolution of infrastructure from a series of unconnected structures to networks of interconnected systems, and because infrastructure is a complex socio-technical system. These challenges result in interdependent risks, potential for cascading failure, and demand interdependencies between sectors (e.g. energy, water, and waste). New methods are needed that enable the evaluation of infrastructure as complex, socio-technical networks that facilitate the sustainable provision of infrastructure.

This poster presents developments in two systems methods for infrastructure planning, design, and implementation. The first method discussed is a decision support and design analysis tool for the selection, design, and implementation of sustainable water, household energy, and waste infrastructure in developing communities. In the case of developing countries, lack of access to basic needs infrastructure leads to death, disease, and environmental degradation. Applications of the model include the design and implementation of a biogas digester in a rural community in western Kenya.

The second method develops a scenario analysis framework to evaluate long-term strategies to transition to sustainable infrastructure service provision. It evaluates the performance of these strategies according to key metrics such as emissions, cost, and security of supply, and develops a visualization tool for decision makers. The methodological design is in response to the complexity of infrastructure and the incommensurate uncertainty in the long term. An application to UK is presented.

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Coastal Wind Characterization with Advanced Modeling and Data Visualization

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A project team led by James Madison University (JMU) was contracted by the Virginia Department of Mines, Minerals and Energy (DMME) in 2010 to analyze the feasibility of siting offshore wind advanced technology demonstration projects in state waters. A major portion of this effort involved the characterization of the wind resource and metocean design environment using advanced modeling and data visualization. JMU partnered with the Old Dominion University Center for Coastal Physical Oceanography (ODU-CCPO), WeatherFlow, Inc., and Timmons Group (TG) to conduct a series of coordinated tasks to advance the understanding of the wind resource in state and federal waters off the Virginia coast and to characterize the meteorological processes that dominate weather events and wind patterns during each of eight sub-seasons. Many of the results are presented through an interactive online web-mapping facility.

WeatherFlow conducted a weather events-based analysis of the Virginia coastal wind regime. This study, while not a classic wind resource assessment with in-situ wind measurements, was intended to improve characterization of the coastal wind regime. ODU-CCPO consumed data sets from WeatherFlow, JMU and other sources and conducted a metocean design environment characterization including long-term wind analyses, monthly interval-duration statistics for wind speeds, extreme wind speeds, and extreme water levels and associated wave heights. JMU conducted a micro-meteorological modeling exercise to predict turbine performance at selected sites. A web portal was created in which relevant map layers, real-time measurements, and modeled data with associated wind energy predictions are provided over Virginia waters including the Wind Energy Area.

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Exploratory Analysis of 2010 Starr Hill Brewery Company Production Data

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Objective/Purpose:
The objective of this study was to investigate the 2010 production data for six year-round brews to distinguish between high and low quality batches, and identify root causes and recommended solutions for reducing the volume of product lost during the manufacturing process.

Methods:
The Six Sigma DMAIC (Define-Measure-Analyze-Improve-Control) methodology was used to organize this project. Raw production data was collected, digitally cleaned, and formatted, including pH at various stages of the production process. Additional data were derived from the raw data, including volume loss, percentage of volume loss, original gravity, terminal gravity, and alcohol by volume (ABV). Descriptive statistics were employed to understand the characteristics and variability of each product, and control limits for future use were identified. Mixed methods, including cluster analysis and derivative dynamic time warping, were implemented to distinguish between acceptable and unacceptable batches. An analysis of variance (ANOVA) was used to determine any statistically significant differences in the percentages of volume loss between the product lines. Finally, the multiple regressions technique was applied to measure an impact of process time intervals on the percentage of volume loss.

Results & Conclusions:
Since the one sample t-tests produced p-values that were less than 0.001, each product line exceeded the 12% industry standard volume loss. With the exception of one product, The Love, the data indicated that Starr Hill had regularly shipped five of its year-round brews with a higher ABV than advertised. Also, the unfiltered brew had lower loss rates, confirming that the filtration process was a source of significant loss.

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Nowadays, intelligent systems provide passengers with comfortable alternatives. For example, the Harrisonburg, Virginia area has a good transportation system that allows its community, including university students, to effectively travel within the city. While this system functions reasonably well, there is always room for improvement. For example, the Harrisonburg Department of Transportation partnered with NextBus to implement a mobile friendly website that permits users to more efficiently use the bus system but does not fully use GPS tracking. Any mobile application system that is developed needs to help the passengers track in real-time any active bus on a specific route. Currently, existing applications give the passengers the schedule in a graphical user interface. Moreover, other mobile techniques are used to track the bus such as a Quick Response Code (QR) which is located on the bus stop sign and shows the passenger the projected arrival time and current location and also provides texting system that transmits similar information.

Our vision is to improve traffic flow by more effectively utilizing data that we acquire from mobile devices. We plan to improve upon the existing technologies that exist for the bus system by creating a mobile application that provides the passengers with Global Positioning System (GPS) signals location for buses in a specific route. We plan to extend our research through more effective analysis of the traffic flow data in Harrisonburg and develop a system that easily allows scalability to more densely populated areas.
Historical aerial images are becoming increasingly accessible to practitioners and the wider public, thanks in part to Internet-based mapping applications such as Google Earth. However, many of these aerial photographs were collected using panchromatic (black and white) film and most modern users of aerial photographs find color aerial photographs to be more aesthetically appealing and easier to interpret than panchromatic ones. This paper describes a technique for realistically colorizing historic panchromatic aerial photographs based on a recent color image of the same area. The technique works by using a classification technique to identify areas where the land cover is the same in both images and where it is different. For areas where the land cover is the same, color information is obtained for each pixel in the panchromatic image based on the image values found at the same location in the color image. For areas where the land cover has changed, color is obtained using a texture mapping approach. This technique was tested by colorizing a mosaic of panchromatic aerial photographs collected over Harrisonburg, Virginia in 1974 based on a normal color orthoimage of the same area collected in 2008. The resulting colorized image is visually appealing and is preferred over the original panchromatic imagery by the majority of viewers.

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Friend: A Cyber-Physical System for Traffic Flow Related Information Aggregation and Dissemination

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FRIEND: A cyber-physical system for traffic Flow-Related Information aggrEgatioN and Dissemination. By integrating resources and capabilities at the nexus between the cyber and physical worlds, FRIEND will contribute to aggregating traffic flow data collected by the huge fleet of vehicles on our roads into a comprehensive, near real-time synopsis of traffic flow conditions. We anticipate providing drivers with a meaningful, color-coded, at-a-glance view of flow conditions ahead, alerting them to congested traffic.

FRIEND can be used to provide accurate information about traffic flow and can be used to propagate this information. The workhorse of FRIEND is the ubiquitous lane delimiters (a.k.a. cat's eyes) on our roadways that, at the moment, are used simply as dumb reflectors. Our main vision is that by endowing cat's eyes with a modest power source, detection and communication capabilities they will play an important role in collecting, aggregating and disseminating traffic flow conditions to the driving public. We envision the cat's eyes system to be supplemented by road-side units (RSU) deployed at regular intervals (e.g. every kilometer). The RSUs placed on opposite sides of the roadway constitute a logical unit and are connected by optical fiber under the median. Unlike inductive loop detectors, adjacent RSUs along the roadway are not connected with each other, thus avoiding the huge cost of optical fiber. Each RSU contains a GPS device (for time synchronization), an active Radio Frequency Identification (RFID) tag for communication with passing cars, a radio transceiver for RSU to RSU communication and a laptop-class computing device.

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BiVO4 Films for Photoelectrochemical Water Splitting

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Hydrogen, a promising alternative fuel source, can be produced by photoelectrochemical (PEC) decomposition of water. BiVO4 has emerged as a promising electrode material to drive the PEC water splitting reaction using sunlight as an energy input. In this study, thin films of BiVO4 were deposited on a variety of substrates by spray pyrolysis of aqueous solutions of Bi(NO3)3 and VOSO4. N-type doping of the films was achieved by including various ratios of silicotungstic acid or ammonium metatungstate in the precursor solutions. The resulting BiVO4 films exhibited a porous microstructure and X-ray diffraction measurements confirmed that monoclinic BiVO4 was formed following 500°C annealing in air. The PEC water splitting performance of the samples was evaluated in a three-electrode cell containing a 0.5 M sodium sulfate electrolyte by exposing the samples to simulated AM1.5 illumination of 0.1 W/cm². Films that received additional annealing in 3% H2 produced the largest measured photocurrent densities, exceeding 2 mA/cm² with an applied bias of 1.5 V. The effects of tungsten doping of the BiVO4 films are the subject of ongoing investigation. Results indicate that the substitution of tungsten for vanadium rather than bismuth in the precursor solutions produces films with better PEC performance.

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Real-time Adaptive Restraints for Vehicle Occupant Protection

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Vehicular collisions are the leading cause of death in the US population between the ages of 5 and 34 and account for medical care and productivity losses in excess of $100 billion per year (CDC statistics). Automobiles typically implement a fixed seatbelt in combination with airbags. This restraint system is optimized to yield high performance in 5-Star Safety ratings: the restraints are very effective for 50th percentile adult males and 5th percentile females in ordinary driving postures and either a 35 mph head-on collision or a 38.5 mph side collision.

However, there is substantial evidence that off-test collisions combined with off-stature or off-posture occupants can lead to substantial increases in injury. Further, these increases can be offset with restraint behaviors optimized for the specific occupant and collision. Mechanisms to modify the behavior of restraint systems are available now, as are sensor systems to detect collision and occupant properties. What is missing is a reliable, high performance decision process for adapting the restraint behavior as the collision occurs - a decision which must typically be made in under ten milliseconds using computers suitable for commercial automobiles.

The work presented here develops an architecture and analysis to realize this decision process. Based on a statistical classifier that embeds an a priori database of restraint strategy assessments, the approach can incorporate an arbitrary array of sensors and restraint mechanisms and is expected to achieve robustly optimal behavior in the face of underdetermined measurement and inherently high noise levels.

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Function-based Biologically-inspired Engineering Design

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Biological organisms, phenomena and strategies, herein referred to as biological systems, provide insight into sustainable and adaptable design, which can be used to inspire engineering innovation. The majority of inspiration taken from nature, however, has happened by chance observation or through dedicated study of a specific biological system (e.g., gecko). This reveals a fundamental problem of working across the engineering and biological domains. This research aims to remove the element of chance, reduce the amount of time and effort required to developing biologically-inspired, or biomimetic, solutions, and bridge the seemingly immense disconnect between the two domains. Using functional representation and abstraction to describe biological systems presents the natural designs in an engineering context. Thus, the biological information is accessible to engineering designers with varying biological knowledge, but a common understanding of engineering design methodologies. Testing and validation of the function-based, engineering design approach has been through the domain applications of sensor design and energy system design. This work has demonstrated the feasibility of using a systematic framework for the discovery of biological inspiration that leads to novel engineering designs. Furthermore, results have revealed that the designs are simple and elegant, yet robust, without requiring expert-level knowledge, but rather broad knowledge of many fields.

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Biochar is a high temperature charcoal used as an agricultural amendment that also sequesters carbon. Most of the research on biochar manufacture in the United States has either focused on large scale continuous systems with multiple products or small batch systems with biochar as the only product. At JMU we have worked on a batch system to make high quality biochar and capture the heat for use either as a backup system for hot water heating, or to heat a greenhouse in winter. The system is now in its third iteration. In the first we used a small grant from CISAT to experiment with low cost material using a minimalist design. We captured some heat but the design was smoky and hazardous to handle. The second design, funded by a CISAT research grant, captured considerable heat, made 8-10kg of biochar per burn and captured up to 250 MJ per batch of biochar made, but remained smoky. The third generation pyrolysis unit was constructed on Avalon Acres Farm in Broadway, VA, funded by a 25 x 25 grant through JMU. This unit makes the same amount of biochar, with less smoke, and sends the captured heat to a storage tank to help heat a greenhouse and home on the site. Our average efficiency of heat transfer is 12.5% of the total heat value of the starting woody biomass.

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Community & Commonwealth Connections

The influence of campus traffic policy change on employee transportation behavior

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Background: The intersection of college campuses with surrounding community environments affects how people move and interact within communities. Related traffic congestion increases safety risks for pedestrians and cyclists, adds to the CO2 emissions, and reduces air quality. Prior studies revealed that convenience and safety were primary reasons why individuals traveled to, from, and on campus in single occupancy vehicles.

Purpose: In 2009, the Referent University announced plans for closing the campus interior to pedestrian/bicycle/transit-only access citing a commitment to environmental sustainability via reduction of single occupancy vehicles and traffic congestion. Additionally asserting a reduction in vehicles passing through the center of campus would provide a safer, more pedestrian-friendly campus environment. The plan was implemented in August 2011.

Methods: An initial survey was delivered electronically in June 2011 (n=748) to evaluate current employee transportation patterns and anticipated impacts of campus change. A follow up survey (n=655) was administered in October 2011 to ascertain actual changes.

Results: A total of 196 (out of 3800 faculty and staff) respondents completed both the initial and follow-up survey. Paired t-tests revealed changes in transportation patterns on campus. Mean scores for driving alone on campus decreased by 6% (p=0.025), walking on campus increased by 7% (p=0.009) and bus ridership increased by 2.5% (p=0.009). When traveling on and off campus, driving with others increased 8% (p=0.04).

Conclusions: Modest changes were found within two months of the policy change altering campus traffic flow. The policy change was associated with behavioral change among employees.

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Local Water Quality Impacts from Waynesboro Wastewater Treatment Plant Upgrades

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In August 2010, the City of Waynesboro’s wastewater treatment facility (WWTF) completed a $32 million upgrade to meet Virginia’s nutrient regulations. The upgrades included a biological nutrient removal (BNR) system that decreased phosphorus levels by 95% and nitrate-nitrogen levels by 99%. To investigate the impacts of these upgrades on local water quality, monitoring was conducted before and after the upgrades at four stations that ranged from just upstream of the WWTF outfall to one mile downstream of the outfall. Water quality and algal growth were measured at these stations over a 6-week period before the upgrades, directly after the upgrades, and one year following the upgrades. While nutrient reductions in the effluent were dramatic (95-99%), reductions of in-stream nutrient levels were more moderate (39-88%). These observed decreases in nutrient levels were also not sufficient to reduce algal growth in the South River. The biomass of attached algae after 2, 4, and 6 weeks of colonization was not significantly different between pre-upgrade and post-upgrade monitoring. After accounting for seasonal variability, the study concluded that while large reductions in nutrients resulted from the WWTF upgrade, those reductions failed to slow the growth of algae in the river. Ambient nutrient loads from non-point sources in this urban and agricultural watershed continue to be sufficient for maintaining algal growth at pre-upgrade levels.

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Recognizing Words Spoken with a Foreign Accent. Why is it so difficult?

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Two experiments examined why it is so difficult to recognize words spoken with a foreign accent. Specially, Experiment 1 investigated whether native listeners experience recognition difficulty in all kinds of foreign-accented words or only in a subset of words with certain lexical characteristics neighborhood density. Neighborhood density refers to the number of similar sounding words the target word has. Recognition of native-produced and foreign-accented words with many (a.k.a. dense words; e.g., the word cat) and only a few (a.k.a. sparse words; e.g. the word dog) similar sounding words were compared with auditory lexical decision and perceptual identification tasks in Experiments 1 and 2 respectively. Using an auditory lexical decision task, Experiment 1 found that in the presence of a foreign accent, words with many similar sounding words were recognized much more slowly than words with few similar sounding words. Analysis of perception errors from Experiment 2 found the misperceptions in the foreign-accented condition to be more similar to the target words than those in the native-produced condition. This suggests that pronunciation deviations in foreign-accented speech tend to activate similar sounding words as alternative word candidates, which possibly pose increased lexical competition for the target word and result in greater processing costs for foreign-accented word recognition at the lexical level.

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Harrisonburg Garden for Biodiversity

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As urbanization increases, green spaces in cities are becoming increasingly important for conservation of biodiversity. Also important are the benefits of green spaces for people. This presentation focuses on the development of an urban garden in Harrisonburg which was designed to serve as a green space for wildlife and people. We highlight the development of the physical environment for attracting native butterfly and bird species and the challenges of garden sustainability. We explain the natural and social benefits of the garden, including observations of butterfly species and involvement of grade school teachers and children during implementation of the garden. We make recommendations for more habitat gardens that benefit wildlife and people within the Harrisonburg community.

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“Suitcase Clinics”: A Possible Economic Answer to Healthcare for the Homeless

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This presentation will describe a new healthcare delivery model that addresses the unconventional and complex health concerns of homeless children and adults in the city of Harrisonburg, VA. “Suitcase Clinics” provide health care at the point of contact in 5 local shelters and human service agencies. Specifically, it provides onsite primary care services by an experienced Nurse Practitioner to homeless clients enrolled in local shelters while providing onsite case management services when more comprehensive services were needed. Follow up care referrals articulate with the Harrisonburg Community Health Center (HCHC). Uniquely, rather than the program functioning within a permanent clinic setting, the supplies are transported in a suitcase on wheels and the clinics functions in private space within the shelters. This new model of healthcare delivery to homeless populations offers an effective and economic model of service that aims to break the cycle of homelessness by providing comprehensive preventative care with positive long term results. Outcomes and lessons learned will be highlighted, including results from a Vulnerability Index and Patient Satisfaction Survey.

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The Virginia Early Childhood Needs Assessment is a $400,000 grant from the Virginia Department of Social Services. The grant has four major tasks: (1) to understand and estimate the number of children 0-5 years who will be eligible for early childhood education programs and services in the near term (2012-2015), (2) to understand and document the current supply of formal providers of early childhood education programs, (3) to conduct a gap analysis to determine deficiencies/challenges present across the state in terms of the diverse demand of early childhood education and care programs services, and (4) to generate a detailed, comprehensive fiscal map report that provides information that is critical for decision making regarding allocating and screening resources for children and families.

There are different research components based on the four major tasks. One of the components that this poster presentation focuses on is the development of a Geographic Information System (GIS) to map and analyze the data for the early childhood needs assessment. The GIS will help to analyze demographic data, map the childcare facilities and help with the gap analysis for the funding sources of the different types of child care providers. Currently millions of records of demographic data and life birth data are in the GIS database for Virginia.

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Outcomes associated with measuring quality of life: A look at 15 years of community-based participatory research

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Introduction/Background: The Healthy Community Council (HCC) is a community coalition with the mission to enhance quality of life for the community through collaborative efforts of individuals, agencies and institutions. Goals of the HCC include: 1) conducting needs assessments, identifying the priorities from the assessment data, and assisting and supporting community initiatives aligned with the community priorities. Since 1995, the HCC has conducted four assessments (1996, 2001, 2006, 2011). Methods: In each of the assessments conducted by the HCC, a sample of community members were contacted via phone and asked to complete a community-specific assessment instrument. Data were analyzed and priorities identified based on the assessment results. Assessment data was also compared to state, national and Healthy People goals when appropriate. Data is made available to the community for use when developing grants, contracts, and community programs. Results: Outcomes since 1996 that can be attributed to the use of the HCC assessment data include: 1) a community health center, 2) a community resource center, 3) an intergenerational day-care center, 4) youth council, 5) elder alliance, 6) LEED certified buildings, 7) recycling center, 8) suitcase clinic for the homeless, 9) food co-op and 10) over 10 million in grants and contracts. Conclusions: While conducting community-specific assessments using community-based participatory research techniques has the basic benefit of learning about the needs of the community, the data can also be beneficial in seeking funds and developing programs and initiatives.

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Archaeology at the White House (Page Valley, that is): Citizen Science and Professional Research

Carole Nash, Department of Integrated Science and Technology

The White House, located along the South Fork of the Shenandoah River five miles west of Luray, is one of the Shenandoah Valley’s most recognizable landmarks. Constructed around 1750 as a dwelling and meeting house, the Rhenish stone flurkuchenhaus dates to the era of the original Massanutten Settlement. This poster details the first archaeological field school undertaken at the White House in June 2012, in association with the Archaeological Technician Certification program of the Archeological Society of Virginia, Virginia Department of Historic Resources, and Council of Virginia Archaeologists. Directed by the author, the Certification program offers rigorous training that furthers professional archaeological research in the Commonwealth. In return, 70 graduates and 90 current students volunteer thousands of hours each year, collaborating with professionals to uncover Virginia's remarkable cultural heritage. The different backgrounds of the participants, many of whom have retired from professional careers, enriche the field and laboratory experience, often bringing interdisciplinary expertise to bear on a project. At the White House, certification students recovered artifacts and features consistent with an early colonial fronter occupation, as well as geoarchaeological data on the evolution of the South Fork floodplain.

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Programs and Research Supported by the Virginia Center for Wind Energy

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The Virginia Center for Wind Energy (VCWE) supports research efforts at JMU to advance wind energy development and is supported by state and federal energy agencies and the private sector. The Center is structured around five programs that focus on key tactical areas, each of which applies unique skills, resources, and experience. The five programs are (i) State Based Anemometer Loan Program (SBALP); (ii) Small Wind Training & Testing Facility (SWTTF); (iii) Virginia Wind Energy Collaborative (VWEC); (iv) Wind for Schools (WfS); and (v) Research, Development & Commercialization (RD&C).

Each program facilitates wind energy education, research, awareness, and development in Virginia and regionally through activities led by JMU faculty, staff, and students. RD&C efforts include ongoing offshore wind energy studies including Characterization of Offshore Wind Resource in U.S. Mid-Atlantic Region using LiDAR Technologies and Jobs and Economic Development Impact (JEDI) Modeling and Analysis in Southeastern States. Earlier this year the VCWE completed a study entitled Virginia Offshore Wind Advanced Technology Demonstration Site Development which addressed an array of issues relating to wind energy development and deployment in coastal state water. WfS efforts include Development of a Best Practices Manual (BPM) for Wind for School. This BPM will provide a comprehensive explanation of resources, options and project ideas to future WfS participants. VWEC efforts include GIS mapping to aid county planners in siting renewable energy projects. These and other efforts supported by the Virginia Center for Wind Energy will be described.

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Urban Sustainability Challenges and Opportunities for Mid-Sized Cities

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Sustainable urbanism has long emphasized the importance of compact, mixed neighborhoods and the limits to low-density sprawl. At a city-wide scale, the smart growth or compact city approaches in planning and design prioritize access to mass transit, non-automobile accessibility, and the avoidance of encroachment into the surrounding countryside. This poster outlines the value of looking to small- to medium-sized cities as ready opportunities for compact city development. Cities with a population between 30,000 and 100,000 present a distinct set of opportunities and challenges in the smart growth movement. This poster will suggest a range of sustainability advantages these places may boast, and indicate some of the prospective challenges due to their size; as a preliminary outline of research directions, this work is primarily indicating hypotheses to test with further study.

The poster will outline some background work, and point to these potential areas of study. First, a statistical snapshot of these cities, and the challenges of defining such places, will be presented. Second, the particular opportunities and problems of cities in this oft-ignored population range subset are discussed. Third, some examples of efforts pursued here in Harrisonburg, as examples of the potential and limitations of such a planning/design focus, are illustrated. Finally, noting that this research is in its early stages, a prospectus for future directions will be suggested.

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Addressing Student Wellness Concerns

Faculty Perceptions of their Roles in Alcohol Education/Prevention at One University

Katherine Ott Walter, Department of Health Sciences

Alcohol use among college students continues to be a major public health threat to our nation. Regrettably, there is very little involvement of faculty in many of the prevention strategies. The present study was designed to explore faculty perceptions of their roles and responsibilities in alcohol education and prevention.

A survey was sent to all faculty members (N=1600) to explore their perceptions of faculty roles and responsibilities in alcohol education/prevention. The researchers adapted the Core’s Faculty and Staff Environmental Alcohol and Other Drug Survey to include only questions regarding alcohol and created additional questions concerning Friday classes.

Completed surveys were collected from 122 faculty members. The majority (95%) agreed that institutions of higher education should be involved in alcohol awareness efforts. However, only 77% agreed that alcohol consumption negatively affects the quality of student life. Similarly, 76% percent agreed that faculty can positively affect (reduce) student alcohol consumption.

Additionally, responses from open-ended questions revealed that faculty perceived they have the most impact by holding students accountable, maintaining academic rigor, and having open, honest discussions about alcohol use.

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Prevalence and correlates of helmet use among cyclists and skateboarders

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Purpose: Recent street-scale changes within and around the campus of James Madison University may promote active commuting - walking and cycling to destinations - as a strategy to increase levels of physical activity. Yet, helmet use among cyclists and skateboarders is necessary to decrease the severity of potential head injuries. Currently, the prevalence of helmet use at the university is unknown.

Methods: Trained observers were stationed at one of two locations. Observers recorded the mode of transportation, demographic characteristics, and travel behaviors of persons engaged in active transportation. Data were collected in the spring of 2012 and analyzed using SPSS to determine factors associated with helmet use among cyclists and skateboarders.

Results: Cyclists and skateboarders accounted for 7.6% of the trips recorded; the prevalence of helmet use was 33.8%. Helmet use was more common among Caucasians (35.7%) than among participants of other races (6.7%) and among older participants (80.0%) than among younger participants (28.8%). Helmet use did not differ by gender, mode of transportation, or location.

Conclusion: In the absence of legislation requiring helmet use among adults, the low prevalence of helmet use suggests the need for interventions targeted at high risk groups.

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Examining Predictors of Antibody Testing among College Youth:

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Young adults continue to be disproportionately affected by HIV and AIDS. Despite efforts, antibody testing rates have remained stable. Utilizing a sample of 1,874 students from three universities, and seven instruments, this study examined hypothesized demographic, behavioral, and psychosocial predictors of HIV antibody testing. Logistic regression indicated that sexual regulation, depression, attributional style, drug and alcohol use/abuse, HIV knowledge, and sexual risks significantly predicted the likelihood of testing among students. Comprehensive HIV prevention approaches among youth must examine the impact of personal and health locus of control and mood state, among other factors, on health promoting and protective behaviors.

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Simulation Game to Prevent Distracted Driving Using the Health Belief Model as a Theoretical Framework

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The National Safety Council estimates 1.6 million crashes are caused annually by drivers talking on cell phones and texting. A 2010 survey indicated 90% of young adults text or talk while driving knowing the increased accident risks.

The purpose of this study was to identify attitudes, behavioral intention, and behaviors related to distracted driving, before and after completion of a distracted driving simulation game. The Health Belief Model was used as a theoretical framework to explain attitudes and behaviors related to distracted driving.

Participants were university students who completed a pretest measuring distracted driving attitudes and behaviors. Immediately after the pretest they completed a simulation game that tested their ability to text while avoiding driving hazards, followed by the posttest. They completed the posttest again one month later to determine changes in attitudes and behaviors. Some behaviors measured included how often they text while driving, during what driving situations they text, their willingness as passengers to tell drivers not to text, and negative consequences experienced due to distracted driving. Attitudes measured included perception of risks, “fairness” of laws, and general safety concern. Response to cues to action, behavioral intention and behavior change were also assessed. All attitudes tested changed positively with significance found for 10 attitude variables. From the pretest to the final posttest significant improvements were found related to reading and sending texts while driving.

However, most students reported they still occasionally or often read or send texts while driving.

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Aging Degrades the Neural Representation of Dynamic Sounds

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Older adults, even with normal hearing sensitivity, often have difficulty understanding speech. This difficulty may be related to age-related declines in the neural representation of the sounds that speech consists of. The purpose of this study was to examine the effect of age on the neural representation of sounds with dynamic frequency content, or glides, and the ability to understand speech in the presence of background noise. Ten adults (ages 22 - 75) with clinically normal hearing sensitivity participated in this experiment. Tones that linearly changed in frequency were used to elicit the frequency-following response (FFR), a phase-locked neural response generated in the auditory brainstem. Tones with increasing and decreasing frequency content were used and the frequency content of these tones changed at rates of 1333, 3999, or 6667 Hz/sec. With increased age, older adults showed decreased amplitudes in response to rising and falling sweeps with varying degrees of frequency change. Stimulus-to-correlation responses, reflecting the quality of neural encoding, also declined as age increased. In addition, speech-in-noise understanding declined with age. These results suggest that the aging auditory system, even in the absence of significant hearing loss, does not accurately encode dynamic frequency content and this may be related to the difficulty that older adults have understanding speech in background noise.

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Localizing and identifying sounds in background noise are important tasks. Many vulnerable listeners have deficits in these important auditory processing skills often leading to various confusions and learning delays. We have a unique opportunity to test patients during and after a maximal hearing loss in one ear. Patients with congenital aural atresia (missing an ear canal and ear drum) come from all over the world to UVa for surgery to give them normal hearing. Insurance pays for a simple hearing test (only pure tone thresholds) at one month post surgery, but there is much interest in assessing long-term effects of this corrected maximal conductive hearing loss on more realistic, complex auditory processing. Recent NIH grant reviews as well as a publication indicate a need for repeated follow-up testing. Paying for repeated tests at UVa would be prohibitively expensive. Consequently, it seems worth preparing a testing system that can be mailed to patients to assess stereo hearing in participants’ homes. The complete working prototype (being designed and constructed as an engineering capstone project) testing system will include the packaging system, instructions for use, speaker test kit, and software ready for client use and patient testing. Results of continued testing will have implications for more common, milder hearing losses such as middle-ear infections and noise damage. There are no standard tests of stereo hearing outside specialized laboratories. We believe that a deployable system can be developed.

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Fatigue is a common and debilitating symptom for adult patients with end-stage renal disease on hemodialysis and has been associated with decreased survival and quality of life. Patients on hemodialysis must find ways to manage their fatigue and mitigate its effects on their lives. Currently, there is no description of the experience of fatigue for American hemodialysis patients, nor is there any description of the ways in which they manage their fatigue. The purpose of this qualitative descriptive work was to describe the experience and self-management of fatigue as well as how fatigue changes over time from one dialysis session to the next. Several themes were identified which included: the nature of fatigue, management of fatigue, consequences of fatigue, and factors associated with fatigue. Further, hemodialysis patients experience two types of fatigue, post-dialysis fatigue, fatigue that occurs acutely after the dialysis session and resolves after sleep or rest, and continuous fatigue, a persistent, underlying fatigue that patients experience at all times and worsens after the dialysis session usually requiring a prolonged period of recovery.
Change factors in stress management programs for teachers

Claire Lyons, Department of Psychology

Objective
This study explored teachers’ experiences of engaging in a brief stress management program and to identify the factors that facilitate change in teachers’ stress and coping. This study addressed a lacuna in stress management research by using qualitative research methods to explore teachers’ experiences.

Method
Fourteen elementary teachers in a rural school in Virginia participated in an 8-week stress management program which included the following elements: mindfulness; relaxation; problem-solving; communication. Their experiences of the program were measured through questionnaires and semi-structured interviews. The interviews were analyzed using a grounded theory approach.

Results
Teachers describe their lives as very busy and reported little time for self-reflection or self-care. Their experience of situations as stressful and their ability to cope with that stress was facilitated or hindered by individual, interpersonal and organizational factors. In particular, the extent to which teachers were self-aware impacted on their ability to cope. Cognitive-behavioral strategies for dealing with stress were rated as most beneficial by teachers although their ability to maximize the use of these strategies was affected by their level of self-knowledge. The study also revealed a number of contextual factors that influence teachers’ experience of stress, including physical structure of the school and state appraisal systems.

Conclusion
Teachers’ experience of stress is affected by their appraisal of self, other and environment. The degree to which stress management programs are effective depends on participant interpretation of the program and the extent to which they believe in their ability to change.

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Immunodetection of a Lacritin-like Protein in Human Breast Milk

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Purpose: Human breast milk and tears share a number of common proteins including lysozyme, lactoferrin, albumin, secretory immunoglobulins, and mucins. Human breast milk has been used as self-medication for conjunctivitis and has been recently reported to improve corneal healing in an animal model system. Lacritin is prosecretory, mitogenic and when cleaved, antimicrobial. Topical application promotes sustained basal tearing in rabbits and is protective against INFγ and TNF. Here we ask if lacritin can be detected in human breast milk.

Methods: Voluntarily donated breast milk samples were stored at -70°C until processing for analysis. Milk fat was removed by centrifugation and samples were analyzed by Western blot using polyclonal anti-lacritin antibodies specific for N- and C-termini. Blots included recombinant lacritin, human tear samples, and human milk samples. Detection was by chemiluminescence.

Results: N-terminal specific lacritin antibodies produced distinct primary bands between 18 kDa - 20 kDa on the western blots for milk, tears, and recombinant lacritin. C-terminal specific lacritin antibodies produced distinct primary bands between 18 kDa - 20 kDa for tears and recombinant lacritin; however, only a faint band for milk was observed at this mobility while the primary band for milk with the C-terminal antibody was shifted up in molecular weight to approximately 75 kDa on the blot.

Conclusions: Anti-lacritin antibodies that detect recombinant lacritin and human tear lacritin also detect a protein in human milk with similar electrophoretic mobility suggesting that lacritin or lacritin-like proteins are expressed in human breast milk.

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Pedagogy and Instruction: Team Lessons

Interprofessional Collaboration

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Abstract: Healthcare professionals from many different disciplines are expected to work closely together in providing safe, high quality care to patients resulting in positive outcomes and patient satisfaction. Fragmented and poor coordination of care affects patient safety and quality of care. In today's health care of complex patient needs, interprofessional collaboration is becoming a priority in optimal patient care delivery. This systematic literature review explores the emerging concept of interprofessional collaboration (IPC) and the implications for successful patient outcomes and effective team performance.

Keywords: Team, teamwork, interdisciplinary, interdisciplinary team, multidisciplinary, multidisciplinary team, interprofessional, interprofessional team, interprofessional practice, collaboration, interprofessional collaboration, and interprofessional education (IPE).

Method: The systematic literature review includes forty-nine journal articles related to Interprofessional Collaboration(IPC) from Academic Search complete, CINAHL, Nursing and Allied Health Literature, MEDLINE, and Health Source: Nursing Academic Edition.

Findings/Conclusion: In healthcare today, there is a call for greater collaboration and teamwork. Today's healthcare environment requires leaders to be socially competent and engaged in building a teamwork where members are collectively responsible and accountable for patient care and positive outcomes. Positive work climates result in environments or climates with team members willing to work together with high inspiration versus negative work climates where there is an avoidance of cooperation and decreased energy. The success of IPC is crucial in a complex healthcare environment with increasingly more interdependencies among health professionals. Findings reveal the greater the collaboration among team members, the higher the level of perceived empowerment, quality care, and job satisfaction there is within the team.

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Piloting a study of the mentoring relationship between two levels of nursing

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The purpose of this study was to explore the relationship between two levels of nursing students in a mentoring program. The objectives of this study were to 1) evaluate the experiences of students in an RN-BSN program as they developed their own professional nursing roles while they fostered acceptance and socialization into the profession of nursing through mentoring traditional BSN students 2) Assess traditional BSN students’ role development in a non-punitive relationship with a practicing nurse during their last semester of nursing school. Promoting mentoring is a subject that nursing literature is lacking. Based on this, an assignment was implemented during the spring 2012 semester in the Department of Nursing. Students in the RN to BSN program’s NSG-471 Leadership and Management in Health Care course (N= 17) were assigned the role of mentor and paired with students in the traditional BSN program’s NSG-440 Transition to Practice course (N = 56), which were assigned the role of mentee. Each student enrolled in NSG 471 was assigned 3-5 NSG 440 students to guide and mentor. Using qualitative methodology, a hermeneutic phenomenological study design was implemented to evaluate the relationships and identify themes in relation to professional role attainment. A Qualtrics survey containing open ended questions was administered to evaluate the mentoring relationship and how it supported the students’ growth towards achieving professional identity. It was found that the traditional undergraduate students were seeking support and guidance but the RN to BSN students were developing leadership skills and professional behaviors.

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A study on conflicts during an interdisciplinary capstone design experience

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When teams are formed, conflict can often arise. We studied new teams composed of student cohorts majoring in engineering and management to try to understand how to increase the productivity in these interdisciplinary teams. Our goal in this research project is to understand the factors which each of the student groups perceive to cause conflict such that we can tailor our instruction toward helping the two different groups to work together as a successful project team. We hypothesized that the factors which create conflict among the engineering cohort and management cohort will be different. Additionally, we hypothesized that the factors influencing conflicts among engineering students will be related to mission and goals for the project, while the factors influencing conflicts among the management students will be related to personnel and trust. Models were fit with a superset of variables to determine the causes of task, relational, and process conflict. In general, the hypothesis was found to hold true; however, with the notable exception of gossip and interpersonal cohesiveness. Also, it was noted that the task and relational conflicts identified by the managers tended to be driven by the personnel on the capstone team. Engineers, however, perceived more causes for the relational conflict with predictors from both project assignments and team personnel. Based, in part on the results of this study, changes are being made to the course such as revised course structure and course deliverables that promote group cohesion.

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This 3-week study abroad program titled ‘Australian Sports: Perspectives in Sports Medicine’ offered 13 students a unique opportunity to study the interaction between sport, healthcare, culture and government in a progressive and sport crazy nation. Funding from the government, a motto of ‘sport for all’, different titles/roles for healthcare providers and the unique sports of Aussie Rules Football, Netball, Cricket and Rugby resulted in intriguing learning opportunities for students interested in the global understanding of sports, medicine and injuries. Students visited with and learned from healthcare professionals working with professional teams, Olympic athletes, club teams, non-traditional athletes and the general population. Students also toured world class facilities observing available equipment, discussing emergency action plans, and developing an appreciation for how sports medicine fits into sport and risk management schemes. Learning objectives attained are reflected on the poster with comments from student journals, papers and overall reflections. Additional personal growth and development occurred during structured sight-seeing activities and cultural learning experiences. These included learning about the Aboriginal culture, scuba diving on the Great Barrier Reef, Sydney Harbour Tour and touring the Daintree Rainforest. Students grew through immersing themselves in a different culture, participating in personally challenging activities, trying new foods and interacting with Aussies on both a professional and social level. All returned with a broader, more enlightened perspective of the world, and most likely a few items checked off of their life’s ‘bucket list’!
Pedagogy and Instruction: Innovations & Outcomes

Training Culturally Competent School Psychologists: Evaluation and Outcome Data

Tammy Gilligan, Department of Graduate Psychology

The James Madison University School Psychology Program’s Culturally Competent Practitioner Initiative (CCPI) was developed seven years ago in response to calls by the national professional organizations of school psychologists [NASP and APA] to train professionals who are equipped to provide services to children and families whose cultural beliefs, values, and expectations are different from the mainstream. The program is committed to training culturally competent practitioners who possess unique consultative, intervention, and assessment skills to better meet the needs of diverse student populations. The CCPI provides graduate students with knowledge, skills, and opportunities for applied clinic and school-based experiences with culturally and linguistically diverse children and families. Multi-method evaluation of the CCPI across the three cohorts of students includes: yearly student self-assessment of cultural competency, a specific question pertaining to cultural competent practice on the Comprehensive Exam required for completion of the masters degree, and case simulations completed by interns and assessed by outside expert raters. This poster will highlight the integration of the CCPI within the curriculum and will share specific examples of dyadic and experiential activities. Data indicating the effectiveness of the CCPI will be provided.

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A Solomon four-group design assessed the efficacy of concept mapping of complex concepts by students in four sections of an introductory psychology course. No differences were found among students for the covariates, SAT scores and gender. Concept mapping is a technique for graphically depicting the structure of knowledge. Concept maps were constructed using Cacoo, a free online application. Analysis of specified complex concepts, the dependent variable, was assessed within three unit tests administered to students in all four sections. The independent variable, construction of concept maps of specified complex concepts to be submitted immediately prior to each of three unit tests, was required of students in two of the four sections. Significant differences in subtest scores for specified complex concepts were found on unit tests one and two. On both tests, students who were required to construct concept maps performed significantly better than students who did not construct concept maps. No differences in student performance were found on test three. Interpretation of the findings suggest that the construction of concepts maps facilitates critical thinking and performance on tests when the complexity of a concept consists of coherence and interaction within the concept as was the case on tests one and two. On test three, where no significant differences were found, the specified concept consisted of two elaborate serials. In summary, our findings suggest that students possess adequate academic skills for learning content in a serial format but require additional skills when coherence and interaction characterize the content.

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A Short Rubric for Assessing Student Research Projects

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A short, one-page rubric for assessing student communication of authentic research experience findings was developed from an extensive 22-item rubric bank (Kishbaugh, 2012). Seven areas of student communication of science findings were addressed by the rubric, representing various levels of higher-order cognitive skills: 1) content knowledge: accuracy of scientific understanding, 2) analysis: identifying rationale/hypotheses, 3) synthesis: design of methodology, 4) application: data presentation, 5) synthesis: conclusions, 6) evaluation: the socio-cultural relevance of the study, and 7) evaluation of findings and drawing inferences. The rubric was developed for the purposes of assessment of student competence within courses, as well as comparing across research projects, such as in a poster competition. Because the rubric was designed for evaluation of student learning and for use by multiple raters, it was crucial to evaluate the reliability of ratings from use of the rubric. Therefore, the reliability of rubric ratings were extensively evaluated via both mixed methods and generalizability theory approaches, and the findings supported the use of the rubric for both normative and criterion assessments. Inter-rater reliability estimates for experienced and naive raters were comparable to reliability estimates reported in the current literature. The validity of the ratings in capturing student development was also supported by comparing entry- and upper-level student ratings. Based on findings from the reliability analyses, modifications were made to the original rubric. The shortened rubric is offered for use in evaluation of student research projects.

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The Journey Around the World is a comprehensive socio-emotional intervention program for 9-to-12 year-old children that bridges socio-emotional competence and self-regulation skills. The primary goals of the program are to (1) develop children's social understanding, perspective taking, and collaboration skills; (2) promote prosocial feelings and behaviors; (3) develop self-regulation skills; (4) increase knowledge about cultural diversity and a sense of global citizenship. The program is based on the socio-cultural framework which emphasizes the importance of social interaction, socio-cultural activities, external mediation, and scaffolding for child development and the acquisition of socially-valued meanings and behaviors.

Several core activities were designed. In collaborative projects children co-construct mutual goals, learn collaborative planning, decision making, and perspective taking skills. Conversational activities are designed to facilitate social motivation and conversation skills such as asking questions, taking turns, and maintaining conversation. Self-regulation of verbal exchanges is promoted through using external mediators such as speaking only after specific cues are provided. In collaborative story-telling activities, children learn social understanding in addition to collaboration skills.

The presentation will discuss how this program was implemented in local schools. Samples of children's projects and children's feedback about the program will be presented.

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Evaluating the Impact of the Life of a Caregiver Simulation on Student Attitudes, Understanding, and Knowledge of Frail Older Adults and Their Family Caregivers: A Mixed Methods Study

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Background: The number of older adults is rising rapidly and most age at home. Unpaid family caregivers largely care for these older adults, many of whom have caregiving needs such as chronic illnesses, frailty, and/or dementia.

Objectives: To report the impact of The Life of a Caregiver Simulation on students' knowledge, understanding, and attitudes about family caregiving.

Design & Setting: A convenience sample of pre-professional nursing and health and human service undergraduate students (n = 45) participated in the Life of a Caregiver Simulation study, which used a mixed-methods design. Data were collected at three points across the semester.

Methods: The Caregiver Knowledge Scale and the Understanding of Family Caregiving Scale were administered pre- and post-simulation. The Caregiver Simulation Impact Scale was administered post-simulation, along with qualitative questions that were analyzed using descriptive content analysis.

Results: Dependent samples t-tests indicate that participants reported significantly higher confidence in their vocabulary knowledge on the Caregiver Knowledge Scale and significantly higher understanding of family care given to elderly adults through the Understanding of Family Caregiving Scale following the Simulation. Post-test means per item on the Simulation Impact Scale averaged slightly higher than Agree. Qualitative data illustrate that students experienced a greater understanding of family caregiving following the Simulation.

Conclusion: The Life of a Caregiver Simulation was an effective experience that significantly and positively enhanced student knowledge, attitudes, and understanding of family caregiving issues and of community services that support aging and family caregiving.

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The Effects of Service Learning in a Gerontology Course for Health Administration Students

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With the aging of the population, projections indicate there will be increased opportunities for health administrators to work in long-term care (LTC) settings. Few health administration students, however, enroll in LTC courses or work in LTC settings upon graduation. Although little is understood about student interest in LTC, recent research by the authors found volunteer or work experience in a LTC setting to be positively associated with interest in a career in LTC administration. Based on these findings, a 20-hour service learning component in a LTC facility was incorporated in Gerontology for Health Services Administration in Fall 2011. Pre- and post-service learning surveys were administered to 30 students to explore the effect of service learning on students' interest in LTC administration, attitudes towards aging, and course learning objectives. The results suggest that the service learning experience had a positive effect in all three areas. Findings may be useful for other faculty teaching gerontology curriculum and have implications for health administration programs.

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Developing Multiple Ways of Thinking in the Nursing Skills Lab

Donna Trimm, Department of Nursing

Over the recent years, nurse leaders have reported on nursing education through the Nursing Executive Center (2008) and Benner, Sutphen, Leonard and Day from The Carnegie Foundation for the Advancement of Teaching (2010). Each group addressed specific needs for changes in how nursing students were taught. Nursing Executive Center (2008) examined new graduate nurses’ readiness to perform 36 competencies in the hospital setting. The lowest ranking competencies included delegation of tasks, ability to prioritize, ability to keep track of multiple responsibilities, to name a few. Benner et al. (2010), strongly suggests that nursing education is fragmented between classroom, skills laboratory, and the clinical setting. To connect these areas of nursing education and address these competencies, Benner recommended teaching “clinical reasoning and multiple ways of thinking that include critical thinking” (p. 84). Clinical reasoning was considered “the ability to reason as a clinical situation changes, taking into account the context and concerns of the patient and family” (Benner, et al., 2010, p. 85).

As a result of these findings, a new BSN nursing curriculum was implemented at JMU, Fall 2012. To coincide with the curriculum changes and current nursing education principles, the nursing skills class and lab were restructured to mimic a hospital setting with multiple patients (mannequins) with various common medical/surgical problems. By creating a hospital like environment with integration of classroom knowledge and lab skills, students could develop clinical reasoning and multiple ways of thinking for safe, real patient care.

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