

2020 Innovation Presidential Incentive Awards

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Education for All: Examining the Implications of Education Reform Policies on Teacher Training Programs in Uganda

Dr. Winnifred Namatovu

Assistant Professor, Middle, Secondary, and Science Education, College of Education

Abstract

This project seeks to examine current approaches of education reform policies in the Ugandan education system. In particular, this project will explore the Universal Primary Education (UPE) and Universal Secondary Education (USE) policies and their impact on the teacher preparation program at Makerere University. In order to address the goals of the project, I will conduct interviews with teacher educators and administrators at Makerere university.

Although Uganda and the United States have some differences in their histories, both countries have experienced an issue with ensuring equitable access to education for all children. While both countries continue to explore education reform efforts to address the issue, there is also a need to examine the implications of the reform efforts on teacher training programs. Since the College of Education at the University of North Georgia (UNG) emphasizes the preparation of teacher candidates who create equitable learning spaces for all children, it is important to explore the role that education reform policies play in achieving that goal. The information gathered from Makerere University on how the UPE and USE policies have impacted the goals of their teacher training program could provide insight useful for faculty and students in UNG's College of Education program.

This project will provide me with a global perspective of how education reform policies impact teacher preparation programs. My plan is to share my findings with my colleagues in the College of Education, incorporate my findings into my courses, and present my findings at education conferences nationally and internationally.

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Innovatively Implementing Stock Trading Game in Investment Class: Experiential Learnings, Regional Engagement, and Global Views

Dr. Ning Wang

Assistant Professor of Finance, Economics and Finance, College of Business

Abstract

After the recent financial crisis, more and more individuals realize the importance of personal financial planning. According to the 2018 Bureau of Labor Statistics, jobs of financial analysts and financial advisors are predicted to grow at a faster than average rate of 11% and 15% through 2026. However, many students fear for finance due to its quantitative and analytical nature. Based on the results of the Major Field Test from 2011 to 2019, business students consistently had weaker performance in finance than other business disciplines at UNG. It has become more and more important at UNG to promote academic excellence and technological innovation in teaching finance. The proposed project will implement best practices of experiential learnings, regional engagement, and global views into investment class to provide more applicable and productive education in finance to business students. The main idea is to apply stock trading simulation game into the classroom, which will be intensively managed and monitored by faculty. Gamification of real-world trading situations could provide multiple ways of learning course materials in investment while providing students with real-world practices in math, economics, accounting, management, social studies, communication, and other subjects. The access to the real global marketplace data allows students to develop global views of financial markets. Group competitions in the trading game can help students develop skills in critical thinking, problem solving, and teamwork. Financial managers in local and regional business will also be engaged to offer practical investing advices and give guest lectures. The anticipated outcomes of the project would include a more practical and attractive class in investment with enhanced learning outcomes and technological skills, improved results of academic performance in finance, events of student service learning such as education of personal finance principles in community, more internship opportunities and guest lectures, and faculty presentation on best practices of teaching and learning to peers through a campus event.

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The First Amendment and Classroom Dynamics: Preparing Faculty and Staff to Handle Difficult Dialogues

Dr. Carl Ohrenberg

Interim Associate Director, Center for Teaching, Learning, and Leadership, CTLL, Office of Research and Engagement

Abstract

*In a time of polarizing discussions in the body politic, UNG faculty and staff may be challenged to address student expression that is subjectively offensive or provocative. Guided by the text *Start Talking: A Handbook for Engaging Difficult Dialogues in Higher Education*, this proposed five-day, in-person workshop will help prepare faculty and staff to navigate difficult dialogues by including sessions on diversity and inclusion, Academic Freedom, First Amendment legal analysis, and classroom management techniques that help students productively discuss complicated social and political issues. We specifically seek funding for supplies for the workshop and supplemental compensation for workshop participants.*

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Pilot Study: Investigating the Use of Virtual Reality Simulator Technology in Teacher Preparation

Dr. Brooks Peters

Assistant Professor, Teacher Education Department, College of Education

Abstract

Preparing effective, innovative preservice teachers that are equipped to enter the field of education is the fundamental mission of all teacher preparation programs. However, teacher preparation is more complex than providing preservice teachers with an inventory of strategies and instructional techniques that they can choose from as they instruct the students within their own classrooms. Rather, the focus of teacher preparation should be on providing them the knowledge-base and experiences that develop well-informed professionals whom understand not only the curriculum they teach, but their role as decision-makers in the instructional process. Additionally, significant attention should be given to developing preservice general and special educators who can effectively deliver instruction utilizing evidence-based practices (EBP), as required by No Child Left Behind (NCLB; 2001) and the Individuals with Disabilities Improvement Act (IDEIA, 2004). Results of these efforts allow teacher preparation programs to produce teachers who can utilize a professional, data-based, decision-making process and can understand, select, and implement pedagogy with empirical support to best meet the needs of their students.

While preservice teachers may be instructed about EBP, once in the field, many general and special education teachers are reported as utilizing instructional practices daily within their classrooms that have minimal empirical backing (Kretlow & Helf, 2013). This is a direct reflection on the lack of their ability to use and generalize their knowledge of EBP learned within their teacher preparation programs within their PK – 12 classrooms (Scheeler, Bruno, Grubb, & Seavey, 2009). Research suggests that teachers will continue to implement the same instructional practices and techniques throughout their teaching career that help them to endure their first-year teaching (Griffin & Kilgore, 1995). Therefore, teaching preservice teachers about EBP and how to implement them with fidelity should be considered a top priority in throughout teacher preparation programs.

To accomplish this goal at the University of North Georgia, teacher educators provide their preservice teachers with pedagogical methods rooted in the evidence-base through their coursework, as well as extensive field experiences that afford them opportunities to observe and to gain experience in implementing EBP. While we already provide clinically-rich field experiences to our preservice teachers, it is important for their future success to provide experiences that guarantee proficiency in implementing EBP with fidelity. UNG has embarked on a new partnership with the CEEDAR (Collaboration for Effective Educator Development, Accountability and Reform) Center to embed high-leverage practices within our coursework within the Elementary/Special Education teacher preparation program. CEEDAR collaborates with the faculty work groups in a self-evaluation process that leads to deep inspection of course sequences, syllabi, key program assessments, and pedagogical methodologies.

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Combining our current programming with innovative instructional tools like TLE TeachLive (Diekers et. al, 2014) that provide our students with multiple opportunities to perform EBP and receive feedback upon their performance within a simulated environment has the ability to improve the competencies of the future educators that we aim to release to the profession. TLE TeachLive is a mixed-reality, avatar-based simulation environment to prepare teacher candidates in implementing EBP with fidelity. This technology allows participants the opportunities to hone their instructional methods without putting “real” students at risk, while incorporating the critical components of personalized learning, suspension of disbelief, and a cyclical process (Deikers et al., 2014).

The objective of the proposed project is to conduct a pilot study in collaboration with the University of West Georgia’s UWGLive Simulations program that investigates how the use of an immersive simulated learning environment like TLE TeachLive within the courses taught in the Elementary/Special Education Program can enhance the learning of EBPs and student’s ability to implement them with fidelity. The project will occur within the context of the course calendars for the Applied Behavior Analysis (ECSP 4001), and Instruction of Students with Special Needs (ECSP 4200) courses. Preservice teachers will participate in a series of simulation modules developed to address specific core objectives of each course.

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An Investigation into the Effects of Eastern Hemlock Chemical Treatments on Amphibians

Mrs. Jessica Patterson

Lecturer, Biology, CSM

Co-Applicants - Ms. Aminda Everett, Lecturer, Biology, CSM

Abstract

Pesticides, insecticides, and other chemical pollutants can play a negative role in the environment, especially on the forest floor and in streams. Application of these toxins can disrupt the delicate balance of nutrient cycling in an ecosystem, slow the growth and development of amphibians, and cause disorder in the food web. Each of these "small" factors can play a cascading role in the downfall of an ecosystem. While many insecticides have been regulated to decrease the likelihood of these problems occurring, there is still one group of water-soluble (able to dissolve in water) insecticides used locally that is banned in Europe: the neonicotinoids. It is known that neonicotinoids are ecotoxic and can bioaccumulate up the food chain, causing behavioral changes in animals. However, very little is known about how neonicotinoids affect the surrounding ecosystems where they are used, especially in the southern Appalachian Mountains. The southern Appalachian Mountains are considered a biodiversity hotspot, or a biologically rich area where many unique species can be found. Unfortunately, there has been a significant decline in the native Eastern Hemlock tree in the Appalachian Mountains, which is necessary for ecosystem health. In order to slow the loss of these beautiful trees, neonicotinoids are being used as a form of chemical treatment against an invasive pest, the Woolly Adelgid. However, no research has been done to determine the effects that neonicotinoids may be having in Appalachian Mountain habitats and how the species there are being affected. The best practice for determining how an ecosystem may be affected by a new or changing factor is to focus on indicator species. Amphibians (frogs, salamanders, toads, etc.) are often affected by pollutants and chemicals first due to respiration through their skin. Our primary objective of this study is to determine the effects that varying concentrations of neonicotinoids are having on local amphibians. Controlled frog habitats, called mesocosms, will be built and regulated by faculty and students on the UNG Dhalonega campus. Cope's Gray Treefrog egg masses will be collected in the field and placed in the mesocosms where they will hatch into tadpoles and metamorph into frogs. Varying concentrations of two neonicotinoids used locally on hemlocks, imidacloprid and dinotefuran, will be added to the mesocosms. Data will be collected over time, including abiotic variables in the water (i.e. pH, dissolved oxygen, and temperature) and biotic variables on the frogs (i.e. mortality rate, weight, length, etc.). The outcomes of this work will be the 1) collaboration of several UNG departments to create and use ArcGIS maps for data collection, 2) field surveying techniques for treefrog egg mass collection and tadpole observation, 3) data collection and analysis to determine how levels of neonicotinoid are affecting frogs, 4) collaboration with agencies that will facilitate potential graduate level projects and careers for UNG students, 5) dissemination of our results to government and conservation agencies to contribute to management plans for hemlock treatment and amphibian conservation, and 6) training of undergraduate students in each stage of this process.

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Investigating the Relationship Between Various Granitic Rock Types in Georgia

Dr. Jerry Allison

Professor of Chemistry, Chemistry and Biochemistry, College of Science and Mathematics

Co-Applicants - Dr. Katayoun Mobasher, Professor of Geology, Institute for Environmental & Spatial Analysis

Abstract

The goal of this project is to provide the first detailed investigation of the relationship between granitic rocks within the Georgia Piedmont region such as those exposed in Stone Mountain, Elberton, Panola, and several rock quarries with a similar rock types. We will analyze the collected rock samples from different locations in Georgia for their elemental composition, mineral content, and their texture in an attempt to discern relationships between them. Then we will classify the samples based on their origin, formation, tectonic settings, and possible evolution from one rock type to another using petrological and geochemical diagrams.

After serving our state for over 150 years, the Georgia Geologic Survey, the primary state agency charged with investigating the geology of our state, was abolished in 2004 due to the absence of a legislative mandate that would afford reliable funding (ArcNews, 2018). The loss of Georgia Geologic Survey has created a real gap in the knowledge our state's geology. To try to narrow this gap, we have begun to study different regions in Georgia and add new information to a state geological geodatabase developed by one of the authors in 2014. The information and knowledge in this geodatabase can be widely shared among geoscientists, geology educators and students.

One of the topics in Georgia that needs more investigation is related to the crystalline rocks in Georgia where there are a few misconceptions. For example many believe that the Stone Mountain granite underlies half of Georgia, all of Georgia, three states, seven states, or even that Elberton and many other granites in Georgia are part of Stone Mountain. In order to clear this misconception and also investigate the relationship between these crystalline rocks (exposed by erosion or through quarrying) in the Piedmont region, we plan to study them by conducting geochemical and petrological analyses.

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Project Beloved: The Past that Haunts Us

Dr. Anita Turlington

Associate Professor, English, Arts and Letters

Co-Applicants - Dr. Miriam Moore, Assistant Professor, English, Arts and Letters

Abstract

The proposed project, "Project Beloved: The Past that Haunts Us" will comprise a month-long, cross-disciplinary examination of Beloved, the novel considered to be Morrison's masterpiece. Project organizers will employ the same process that yielded the extraordinary success of the Frankenstein Bicentennial Celebration in Fall 2018, a massive undertaking that resulted in a wide variety of events on four of the University's five campuses: Gainesville, Dahlonega, Cumming, and Oconee. In a final meeting of the steering committee for the Frankenstein Celebration, project organizers met to consider the success of that project. At the time, all indicated a willingness to work on and promote a similar project in the future. Thus, the Toni Morrison event already has an infrastructure in place. We will work with faculty from several disciplines, including the departments of English, Art, Music, History, Theatre, Biology, and IESA to organize a variety of events in October 2020. We anticipate that several English classes will teach the novel in Fall semester, and faculty will build attendance at Morrison events into their syllabi. With some of the grant funds, we will also distribute copies of the novel to faculty in other disciplines, particularly those who teach history, psychology, political science, sociology, and art, and organize reading groups to discuss ways that excerpts from the novel can be taught in their disciplines.

We have chosen Toni Morrison and Beloved as the focus for this project to address the tensions and divisions so prevalent in our nation. Next year is an election year, and much of the prevailing discourse is divisive and angry. Morrison, considered by many to be "America's Shakespeare," confronts readers with the need to reckon with a troubled history that has left deep wounds in our nation's psyche. Her novels, however, always extend mercy and compassion to characters who seem lost, and she never allows us to lose sight of their essential humanity. As Robert Greene writes in The Nation, Morrison believed that writers can use language

to help those without power find their own voices. This language might never be able to "pin down" slavery, genocide, war—it, too, had its limits. Yet for Morrison, this did not mean that writers should retreat from the awesome task of describing life. By recognizing the limits of the word, one could also recognize its strengths. Literature could not eradicate humanity's evils, but it could force us to wrestle with them.

Student and community participants will have the opportunity to attend lectures and panel presentations, view art exhibits, and attend performances and film screenings. All the events, however, will offer participants the opportunity to discuss challenging ideas and topics in an informal and encouraging setting. We hope their experiences will result in several outcomes:

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- 1. Students, faculty and community participants will find common ground in discussions of challenging topics on race and gender;*
- 2. Participants will understand the social, political, historical, and scientific contexts for the novel;*
- 3. Participants will be able to articulate the forces shaping the experiences of the novel's protagonists;*
- 4. Participants will understand the power of narrative to address complex and controversial issues;*
- 5. Participants will be able to articulate the importance of slavery as a force in shaping American history.*
- 6. Participants will demonstrate understanding of the experience of slaves through examples of narrative, music, and art.*

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Mastering the Software Tool and Getting Connected to the Community Partner for UNG Students Who Are Interested in Data Analysis

Dr. Ping Ye

Assistant Professor, Mathematics, College of Science & Mathematics

Abstract

Data analysis is all about inspection, cleansing, transformation and modeling of data in order to achieve information that further suggests conclusions and assists with decision making. [1] It is a rapidly booming field of study for college students, and companies are always on the hunt to find people who are masters at this procedure to increase their growth. For any research, data analysis is critical as it provides an explanation of various concepts, theories, frameworks and methods used. It eventually helps in arriving at conclusions and proving the hypothesis.

R is the most widely used tool for statistical programming. It is powerful, versatile and easy to use. It is the first choice for thousands of data analysts working in both companies and academia. [2] R is open source so that it is free for anyone to download, use, and modify. Because R is open-source and free to modify, over 10,000 free packages, or add-ons, exist to do any possible statistical technique, from complex visualizations to models. [3] Almost any new statistical technique developed comes with a new package in R. This flexibility and power is why graduate programs in many fields are increasingly teaching in R. However, there is no training program of learning R at the University of North Georgia. This limits the opportunity for our students to apply for graduate programs, especially in the Statistics field.

In order to improve our students' competence in applying jobs and graduate schools, the author proposes two approaches in this project: One is providing R labs and instructional handouts for our students to learn R language, of which the goal is to equip our students who are interested in data analysis with appropriate tools. The second is to seek support from the local community such as local business/nonprofit organizations/government agencies to get "real-world problems" so that students can do undergraduate research to solve open-end problems with analyzing the real data. The UNG engagement value "Promoting active involvement, intellectual inquiry and creativity, collaboration, and community partnership" [5] is also a project goal. Some of our students are first-generation college students and are unaware of career opportunities and benefits of studying math. This project opens a window to help expose them to these items. It develops community partnerships to connect our students to the outside world.

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Incorporating Data Analytics into 21st Century Business Education

Dr. Benjamin Garner

Associate Professor, Marketing & Management, Mike Cottrell College of Business

Abstract

Data analytics is an increasingly essential skill students need to be exposed to in the business classroom. Companies today are quickly turning to analytics and artificial intelligence (AI) to gain insights into everything from best management practices to consumer behavior. As business educators, it can be difficult to keep up with current technological advances in the industry. How can we teach students if we ourselves lack exposure to recent industry trends? This project will provide funding for me to participate in continuing education in a Marketing Analytics course offered through Cornell University in order to gain critical insights from analytics to bring back to the business classroom.

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Saving Lives from Suicide: Implementing safeTALK Training Throughout the Community

Dr. Christopher Pisarik

Associate Professor, Department of Counseling, College of Health Sciences and Professions

Co-Applicants - Dr. Harrison Davis, Associate Professor, Department of Counseling, College of Health Sciences and Professions, Cumming, Area of Specialization: Counseling

Abstract

Saving Lives from Suicide: Implementing safeTALK Training Throughout the greater UNG Community will be a multi-pronged project with the ultimate goal of educating the members of the greater UNG community on how to skillfully intervene and assist individuals in crisis and help them stay safe. Two UNG faculty members and two students from the Department of Counseling will complete the LivingWorks SafeTALK Training for Trainers Suicide Prevention Program. Equipped with this advanced skill that is based on best-practices research, these suicide prevention trainers will disseminate the knowledge and skill necessary to keep individuals safe from suicide.

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Physical Activity and Fitness Levels After a High-Intensity Interval Training Exercise Intervention in College Students

Mrs. Ashley Bruce

Lecturer, Kinesiology, College of Education

Abstract

The proposed project in this narrative is written for the 2020-2021 Presidential Innovation Award at the University of North Georgia (UNG) and includes measuring physical activity and fitness levels in college students with use of new wearable technology. The wearable technology described in this proposal, called the ActiGraph GT9X-BT, is a Bluetooth-capable accelerometer which provides the researcher time intervals spent in sedentary, low, moderate, and vigorous physical activity levels of the wearer. Moreover, this specific device has been validated in numerous physical activity-related research studies. Previously, the Department of Kinesiology has not been able to study physical activity time intervals to this level of detail as we do not currently own ActiGraph GT9X-BTs. By purchasing these devices, our students, faculty, and staff would be able to measure this significant information to improve our knowledge and practice of exercise intervention implementation.

The plans for this proposed project are to embed it into the following Kinesiology undergraduate course: Exercise Leadership and Lab (KINS 4430/L). By incorporating this project into this course, students would have the ability to provide an exercise intervention to participants with direct supervision from a qualified professional and faculty member with use of the ActiGraph GT9X-BTs. Specifically, desired exercise intervention participants would be students currently enrolled at UNG, have a body mass index (BMI) of ≥ 25 kilograms per meter squared, and have the capability to perform an exercise intervention twice per week at various intensities over a span of 12 weeks on the Dahlonega campus. Additionally, pre-assessments and proper screening will be done prior to any physical activity engagement to ensure best practices. By participating in this project, students enrolled in KINS 4430/L will have the opportunity to learn new technology while gaining practice in serving other students in the form of leading and creating an exercise intervention. Furthermore, students in KINS 4430/L will be able to use data collected from this project towards their capstone project which is a significant portion of this course.

This project would also allow for collaboration between faculty and students with use of new technology into the classroom, which is of great importance for higher learning. Additionally, the data collected could answer a variety of research questions while contributing to related literature in the field. For example, faculty and students may have the opportunity to attend related conferences and present what is learned from this project. Furthermore, participants of the exercise intervention would have the chance to learn more about physical activity, exercise, and fitness while possibly improving their health. Lastly, I believe that a project of this nature has the capability to continue each semester to further allow more assistance to our students.

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Finally, the first outcome for this project includes providing KINS 4430/L students the ability to create a case study project from data collected with use of new wearable technology. Because of this, students and faculty would learn skills in how to utilize this technology with the application to an exercise intervention. In addition, students and faculty can develop related research questions from the data collected which may lead to further research projects. Lastly, a final outcome would be to provide the exercise intervention participants the opportunity to improve their health and fitness.

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2020 East Asian Studies Film Series: Hope and Social Change in East Asia

Dr. Robin O'Day

Assistant Professor, History, Anthropology & Philosophy, Arts and Letters

Co-Applicants - Dr. Candice Wilson, Assistant Professor, Communication, Media & Journalism, College of Arts & Letters; Dr. Yanfei Zhu, Assistant Professor, Visual Arts, College of Arts & Letters; Dr. Kyoungnye Kwon, Associate Professor, English, College of Arts and Letters

Abstract

If our application is successful we will use the Presidential Innovation Incentive Award to fund the East Asian Studies Film Series in Spring 2020. We plan to invite UNG students to watch East Asian films in the Hoag Auditorium for free in February, March, and April accompanied by focused faculty discussion of the films. A committee of faculty experts on East Asia from the departments of Communication, Media & Journalism, Visual Arts, History, Anthropology & Philosophy, English, and Political Science have selected three movies from Taiwan, Japan, and South Korea that speak to the theme of "hope and social change in East Asia." We will screen and lead a discussion of the South Korean film A Taxi Driver (2017). Winner of numerous international film awards including best film and best actor, the film tells the story of the 1980 uprising against a repressive military government through the perspective of a taxi driver inadvertently caught up in the protests. We will also screen another award-winning film Blue Gate Crossing (2002) that is a touching coming of age drama by Taiwanese New Wave director Yee Chin-yen. For our third film, we will screen and provide commentary on the recently acclaimed Japanese film Shoplifters (2018) that explores the meaning of family bonds that run into conflict with normative state laws and institutions. One of the main goals of our project is to contribute to UNG's mission of Global Engagement by providing students an opportunity to immerse themselves in East Asian culture without having to leave campus. Free film screenings provide an accessible opportunity to bring the richness of East Asian cultures to campus and allow UNG students to engage in meaningful and thoughtful discussion about the region with faculty guidance. To host this as a public event for UNG students we are requesting a total of \$960 to cover the copyright costs of the films and to print posters to advertise the event around campus.

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The Effect of Natural Products on The Growth of Docetaxel Resistant Androgen Independent Prostate Cancer Cells Expressing Cancer Stem Cell Markers.

Dr. Ramneet Kaur

Lecturer of Biology, Biology, College of Science and Mathematics

Abstract

Cancer is a devastating disease which is taking the lives of millions of people worldwide and affecting almost every family. Prostate cancer is the most common malignancy found in men. There are 2 stages of prostate cancer, androgen dependent and androgen independent. The only treatment available to treat androgen independent prostate cancer is FDA approved chemotherapy drug docetaxel. Patients initially respond to docetaxel and later become resistant to it. The prostate cancer cells resistant to docetaxel exhibit cancer stem cell markers like CD44 and represent the population of cancer stem cells. In this study the usage of natural products like turmeric, ginger, lemon peel, grapefruit and ashwagandha (herb) is being proposed to kill these docetaxel resistant prostate cancer stem cells. The docetaxel resistant androgen independent prostate cancer cells will be developed by exposing the prostate cancer cells to increasing concentrations of docetaxel. These resistant cells will be treated with natural products in the presence and absence of docetaxel and the cell proliferation will be studied by MTT assay. In this project the potential of these natural products is going to be checked to kill the docetaxel resistant cells and this is a new direction in the field of cancer biology as natural products which are well tolerated by human body are not much explored to solve the drug resistance problem in the field of oncology. This study will be a great contribution for developing an effective treatment to fight this deadly disease.

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Contra Flow

Ms. Marie Graham

Limited Term Professor of Music Education, Music, College of Arts & Letters

Abstract

Contra Flow is a project in which music, community, dance, and culture are fused together through the experience of contra dancing. This project will support the objectives of UNG's chapter of the Collegiate National Association for Music Education (CNAfME). This project is important because of the Best Practices that will be modeled for movement, cultural, and historical contexts of dance to music education students. Three central focus areas of the National Core Arts standards include 1) The Arts as Culture, History, and Connectors 2) Arts as Means to Wellbeing and 3) The Arts as Community Engagement. Contra dance is a social dance form that is based in community, music history, and culture. Participants in this project will perform in various ways. Music education students will apprentice with expert instrumentalists who specialize in fiddle tunes, Appalachian, Celtic and Jazz genres and perform in live contra Dance bands. Music Education students will attend workshops on contra dance formations, dance patterns, and at Caller's Workshops. In dance and caller workshops, students will identify and demonstrate movement and dance strategies applicable to the general music classroom. This project will hold five Contra Flow events available to all UNG students for free admission. Contra dances are also available to outside participants for a minimal entrance fee of \$8.00. All proceeds from contra events will be designated to a UNG Music Education Merit Scholarship for the next Academic year.

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Improving Students Engagement and Readiness in Math Classes Through Innovative Use of Technology: A Flipped Section Approach

Dr. Ramjee Sharma

Associate Professor, Mathematics, College of Science and Mathematics

Co-Applicants - Dr. Dipendra Regmi, Assistant Professor, Mathematics, College of Science and Mathematics

Abstract

Research shows that learning is a continuous process and there is a positive correlation between the level of engagement and grade performance. If students are aware of the topics before coming to the class, they can perform better in the course [1]. Engagement prior to in-class study helps students develop foundational skills and prepares them better to grasp the subject content and practice during class leading to better retention of the learned skills. While there are several existing methods for student engagement outside the classroom, new and innovative methods need to be constantly developed and implemented to meet the growing needs of our students who have mostly grown up in the digital age. While fully online and hybrid teaching methods are on the rise to meet the special needs of students with busy schedules who cannot attend face-to-face classes on a regular basis, we will implement a mixed pedagogical approach in this project to make the traditional students in the face-to-face classes more engaged and better prepared in math classes through an innovative use of existing technology.

This project will be completed in two phases. The first phase will be implemented in the UNG's eLearning platform. During this phase, students will be asked to watch short online videos from the selected topics and complete related quizzes as part of their graded assignments. These formative and automated online assessments will measure the students' basic understanding of the topics, a step toward the first level of Bloom's Taxonomy which is within the UNG's mission. Existing research has shown that formative assessment can improve student learning [2]. The results of these quizzes will be analyzed and used to better prepare the instructional materials and activities for the class. The second phase will be implemented in the classroom. After the students have watched the online videos and completed the online quizzes, they will be asked to complete a short pre-quiz at the beginning of each class and collect their responses using the clickers. The result of the in-class quizzes will be analyzed by the built-in automated system within the clicker response system and presented to the class.

We expect that this intervention to the existing math pedagogy will make the students self-aware of their pre-knowledge, make them more prepared for the class, and help them improve their grade performance. We also expect better use of the UNG's existing online eLearning platform, D2L, to better engage students and improve their learning outcomes.

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An Innovative Course for Learning Programming with a LEGO Robot and MATLAB

Dr. Il Yoon

Assistant Professor, Physics and Astronomy, College of Science & Mathematics

Abstract

The 4th industrial revolution is bringing new emerging technologies that are expected to change our lives remarkably. Programming is one of the most important skills for new technologies in the 4th industrial revolution. Thus, it becomes important for students of STEM majors to learn programming so that they can have advantages in the future with the new technologies. However, it has been known that learning programming is boring, which causes students to avoid learning programming. Consequently, many students of STEM majors graduate without a good knowledge of programming. Therefore, this proposal is suggested to develop a new course to teach programming to students of STEM majors using the LEGO robot and MATLAB that help them feel the fun and excitement, not boring. This course will consist of an exercise part and a project part. In the exercise part, students learn the basic and foundational knowledge of programming by practicing many exercise problems using the LEGO robot and MATLAB. The students see tangibly how their computer codes work by observing the motion of the LEGO robot. In the project part, the students perform two assigned project and one open-end project that are related to the new emerging technologies in the 4th industrial revolution. From this course, it is expected that students of STEM majors learn programming and understand the new emerging technologies by learning-by-doing so that they are well prepared to be the leaders of the world in the 4th industrial revolution. After developing the course and offering it to students, it is expected to make a suggestion to faculty members in the computer science department to discuss developing a set of courses related to the new emerging technologies in the 4th industrial revolution for students in both STEM majors and non-STEM majors. This will help UNG students be prepared for the changes that the new emerging technologies are bringing so that UNG students can be the leaders in the future world with the new technologies.

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IoT: An Emerging Technique to Promote Undergraduate Research and Embrace Learning Success

Dr. Mingyuan Yan

Assistant Professor, Computer Science and Information Systems, Mike Cottrell College of Business

Co-Applicants - Dr. Jianjun Yang, Associative Professor, Computer Science and Information Systems, College of Business

Abstract

In this proposal, the applicants propose to integrate Internet of Things (IoT) based project learning to promote undergraduate research and integrate IoT into our major courses to implement the best learning practice, including the design, analysis and implantation of IoT projects and the development for a learning module on IoT.

IoT is an emerging technology and it is essential in networking, communications, big data and many other fields in Computer Science. Projects over IoT are the best choice for undergraduate research. In particular, IoT is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. It utilizes various sensors (environment monitor sensor, healthy sensor, distance measure sensor, motion detection sensor, etc.) to automatically capture and transmit data about every object we normally see in our daily life to build intelligent systems and applications. The most representative application would be its usage in "smart home". Such as using smart device to control your light, heating, media and security system. As IoT technology is becoming increasingly ubiquitous, it becomes a very popular research topic among the undergraduate students. It is also crucial for computer science students to remain up-to-date with developments in this area.

While the concept of IoT has been mentioned a lot in higher education, to integrate this topic into classes is challenging. Because IoT projects incorporates concepts from many areas, including networking communications, computer architecture, embedded operating systems, programming, data management, application development and even security. There are also various theoretical issues around IoT which are challenging, especially for undergraduate students. However, research projects on IoT are very attractive among the undergraduate students because they are heavy hands-on and interesting. Introducing IoT to higher education is a popular trend due to its importance, popularity and extensive future usage. Many universities offer IoT classes. The number is increasing with a fast speed. It is urgent to integrate IoT into our program to keep our students competitive.

In this project, we are going to promote undergraduate research using IoT projects and integrate IoT based projects into our major classes to implement the best learning practice. To be specific, various IoT based research projects will be investigated and developed with collaboration of faculty members and participation of students. Upon the completion of this project, we expect that several undergraduate led IoT research projects can be presented and shared in internal and external research conferences. More

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importantly, we are targeting at the development of project-based learning module on IoT that can be used in various major classes to fill the blank in our curriculum, which will contribute to our final goal: produce stronger and more competitive graduates using emerging technique.

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Innovation Incentive Award

Multi-Scale Modeling of Deoxyribonucleic Acid (Dna) Methylation and a Computational Study of Orbital Interaction, Charge Transfer, Band Gap and Binding Energies Associated with the Process

Dr. Rosi Gunasinghe

Assistant Professor, Chemistry and Biochemistry, Science and Mathematics

Abstract

DNA encodes genetic instructions relevant to the development and functioning of living organisms and viruses. One of the primary regulators of gene transcription is DNA methylation.¹ DNA methylation occurs at specific sites in DNA, referred to as genetic hot spots or CpG islands. However, aberrant DNA methylation patterns such as hypermethylation and hypomethylation have been recognized in variety of human malignancies.¹⁻⁸ As a result, the process has become one of the most thoroughly investigated epigenetic modifications in mammals. Experimental evidence shows cancer-specific differential DNA-methylated regions correspond to the loss of sharply defined methylation boundaries at CpG islands.⁹ Developing effective cancer therapeutic requires a proper understanding of gene silencing and gene expression associated with methylation and demethylation. However, the relevance of methylation or demethylation to cancer is far from being well explained. There exists a paucity of systematic studies of charge transfer and orbital interactions for DNA methylation (Figure 1) and demethylation.

In this project, we plan to approach the relationship between cancer and DNA methylation from a different angle. The study will be based on multiscale modeling efforts ranging from first-principles calculations to force-field models. This study is intended to provide a systematic and theoretical guidance for the analysis of DNA methylation. We will study the energy gap between the empty and filled orbitals for both methylation and demethylation processes. Interaction between nucleic acids and graphene and the effect of methyl concentration in DNA on charge transfer, orbital interaction, and binding energy will be studied. The results of this investigation will be disseminated through undergraduate student presentation(s) at a chemistry conference and a manuscript submission to a peer-reviewed research journal.

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Innovation Incentive Award

Effects of Bite on Multi Task Core Muscle Function in Healthy Individuals

Dr. Reza Nourbakhsh

Professor, Physical Therapy, Health Science Professions

Co-Applicants - Dr. Leila Rahnama, Visiting Professor, Physical therapy, Health science and professions

Abstract

Background: Biting is habitually performed during forceful or precise activities. One reason behind this might be the fact that mouth motor function is strongly interrelates to cortex excitability and leads to better motor performance of the upper and lower extremities. For instance, improvements in single tasks such as hand motor function and ankle plantar flexors strength were reported during biting. However, it is not yet clear if biting improves the performance of core muscles.

Objective: In the present project we aim to evaluate the effects of biting on core muscles function. Examining such an effect will shed light on the rehabilitation programs for motor functional improvement after neurological conditions like stroke or even spinal cord injury (SCI).

Materials and Methods: This study is a cross-over study in which a total number of 20 subject will be participated. Participants will be asked to perform a modified side plank task while they are lying on two separated force plates. Then, they will be asked to lift their hips up and maintain the position as long as they can. This task will be performed in 4 conditions including no biting, right and left unilateral biting and bilateral biting. The electromyographic activity of core muscles including abdominals, erector spinae and hip adductor and abductors will be recorded using surface electromyography (EMG). The core muscle strength will be assessed using a loadcell which is placed on an adjustable frame and located just above the participants' hips. The functional performance/ability of core muscles will be investigated with measuring the height that participants can lift their hips up using a motion analysis system.

The outcome measures include the core muscles strength, functional performance and activity.

Repeated measure ANOVA will be used, to analyze the collected data.

Discussion: Based on the existing literature, we believe that the activity, strength and functional performance of the core muscles will differ in different biting conditions.

The findings of this study will help clinician and researchers to develop effective indirect exercises for patients with neurological conditions such as spinal cord injury and stroke. In addition, athletes will benefit of them to improve their performance in sports.

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Innovation Incentive Award

Creating a Culture of Wellness

Ms. Meri-Leigh Smith

Associate Director, Wellness and Health Promotion, Campus Recreation and Wellness, Student Affairs

Co-Applicants - Dr. Sabrina Maginnis, Asst. Professor of Athletic Training, Kinesiology, College of Education; Ms. Nina Myer, Lecturer, Nursing, College of Health Sciences & Professions

Abstract

Chronic disease includes conditions such as obesity, heart disease, diabetes, cancer, and stroke and is the leading cause of death and disability in the United States. According to the Centers for Disease Control, six in ten Americans live with a chronic disease.² The World Health Organization reports that globally, more than 70% of deaths are due to chronic disease. In comparison, in the United States, 87% of deaths are due to chronic disease.³ Preventable chronic conditions are major contributors to increased healthcare costs, decreased employee productivity and the economy. Chronic disease is one of the leading drivers of the nation's \$3.3 trillion in healthcare cost, encompassing 90% of annual health care expenditures.⁴ Full time employees that have chronic health problems miss approximately 450 million more days of work each year, than their healthy peers, resulting in \$153 billion in lost productivity each year.⁵

UNG has a unique opportunity to engage the campus community in their health with a focus on an integrated approach to health and wellness, creating an environment of health and well-being in which students, faculty, and staff can flourish. If employees are healthy and happy, students reflect that behavior and if students are healthy and happy, they grow to be successful, contributing members of the community.

The Departments of Kinesiology, Nursing, and Campus Recreation and Wellness are collaborating to create an integrative approach to provide participants with the knowledge to increase risk perception, reinforce positive behaviors, increase knowledge of support and needed services and to empower participants to change or improve their health and well-being by offering interactive wellness fairs on the Dahlenega (Spring 2020) and Gainesville (Fall 2020) campuses. Students, faculty, and staff will be given the opportunity to attend an event that will offer health screenings, educational findings poster presentations, and community connections to further their toolbox for health and wellness, while Kinesiology and Nursing students will be given the opportunity to use the skills they acquire in the classroom, in practical application.

This success of this project will be measured by the experience students receive in educating and providing services to diverse populations on health and wellness behaviors, the number of participants, the number of participants who actively participate in a health screening, and results of a follow-up survey, ultimately improving future events and continuing the work to create an optimal culture of wellness for the UNG community.