2022 Faculty and Students

Research Poster Session

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Book of Abstracts

2022 Minot State University Research Poster Session
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TABLE OF CONTENTS

Poster 1

RELATIONSHIP BETWEEN STRESS, EXECUTIVE FUNCTION AND EMOTIONAL REGULATION OF STUDENTS

Tomilola Racheal Awomokun and Charlotte Sophia Rammell, PhD

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This study examined the relationship between stress, executive function, and emotional regulation of undergraduate and graduate students. The ability to regulate emotions and their executive function skills were examined, in addition to how these two factors affected the stress they experienced. This study was carried out among undergraduate and graduate students in the North Dakota University System. Participants (N=99) completed the Perceived Stress Scale (PSS) survey to measure stress, a self-report measure of Executive Function (EF), and the Emotional Regulation Questionnaire (ERQ) to determine emotional regulation strategies.

The findings of this study revealed that (i) the majority of the participants had moderate stress and there were similar levels of stress for both groups. (ii) Graduate students reported higher EF skills than undergraduates. (iii) Overall, both undergraduate and graduate students make use of reappraisal as an emotional regulation strategy more than suppression. (iv) There was a negative correlation between stress and ERQ, indicating that a lower or reduced use of reappraisal as an ER strategy correlates with more stress. (v) There was a negative correlation between stress and EF, indicating that better EF skills correlated with lower stress. Based on the findings from this study, it was recommended that (i) the wellness center can offer sessions to students on how to deal with stress and (ii) students should be offered interventions that promote stronger emotional regulation and EF abilities.

Poster 2

RADIOSITY: DIFFUSION AND GLOBAL ILLUMINATION

Micah Bloom

Division of Art, Broadcasting and Professional Communication

An interdisciplinary venture, *Radiosity* weaves physics (specular reflection, global illumination, diffuse interreflection/color bleeding) and art (Light and Space, Minimalism, geometric abstraction) into a synergistic fusion, harnessing light to produce captivating color effects in various lighting situations. Implementing cutting-edge technologies, the project is generating a series of works to be shared in a fine arts exhibition in the summer of 2023.

By collaborating with Minot's local POEM fabrication shop, researchers began testing the effects of ambient and focused lighting on multiple artworks in different lighting scenarios. Seeking to control shadow density and color diffusion, the artworks were initially designed by hand, translated digitally, cut by digital fabrication machines (laser cutters, CNC, waterjet), and fine-tuned by hand. Exploring surfaces, pigments, and viewing angles, researchers were challenged to optimize visual effects while concurrently considering meaningful aesthetic compositions.

Radiosity was successful in identifying the wavelengths of visible light that radiated the most (red, pink and orange – the longest wavelengths) and those that radiated the least (blue, indigo, violet – the shortest wavelengths), but the optimization of improved effects for all wavelengths is still ongoing. The greatest existing challenge is that of shadow density and the diffusion of colored light in indoor settings, under artificial lighting. As a result of diffused light scatter, the color effect is most visible in outdoor settings, barring direct sunlight. This project is ongoing, and more funding is being sought to further research.

Poster 3

SOCIAL VALIDITY OF A WEB BASED PLATFORM FOR CHOOSING HIGHSCHOOL CLASSES

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While significant evidence indicates that making complex choices and decisions contributes to self-determination, there have been no studies of student choice-making related to selecting courses for high school students with disabilities. This phenomenological study explored social validity data from the perspectives of three key stakeholders on the feasibility of using a website as a tool for choosing classes. Study participants included 15 students with autism and other developmental disabilities, 6 special education teachers, 1 guidance counselor and 10 parents. Data sources included demographic information, direct observation of students interacting with the website, in-person interviews with students as well as parent and teacher focus groups. The main findings indicate the website had the potential to provide meaningful and accessible information when making decisions related to course selection for both students and parents of children with disabilities. Teachers reported the website had the potential to engage students in the class selection process and help students prepare for their Individual Education Program (IEP) meeting. The results of this study also suggest that the website may provide ownership and engagement of all three stakeholders in educational planning. Moreover, the website could be used as viable tool in conjunction with the student led IEP process and for promoting parent participation and input at these meetings. Recommendations for improving the website, limitations of the study as well as suggestions for future research will be presented.

Poster 4

A NORTH DAKOTA CENTER FOR PERSONS WITH DISABILITIES (NDCPD) SCHOLARS PROJECT TITLED 'ACADEMIC INTERVENTIONS FOR DIVERSE LEARNERS: A GUIDE FOR FACULTY IN POST-SECONDARY EDUCATION'

Rebecca Daigneault, Jordyn Staples, Alexis Acevedo, Faith Hegstad

Department of Addiction Studies, Department of Psychology, and Department of Social Work

The purpose of this research project was to develop a guide for Minot State University faculty to support the academic success of students with mental health disorders and disabilities, and who may also be experiencing stigma and discrimination. This was accomplished by exploring faculty members' level of comfort and knowledge with supporting students who struggle with learning in and adapting to the classroom environment due to a variety of factors related to their diverse backgrounds, including mental health disorders and disabilities. Methods included a review of the literature, application to and approval from the Minot State Institutional Review Board for exempt research, and development and dissemination of an anonymous online faculty survey. Survey results helped determine the content, outline, and format of the guide. The survey (N=36) responses were representative of faculty from the four colleges across campus, although it must be noted that the number of responses were not representative of the total number of Minot State faculty. Respondents provided valuable feedback about their needs in the classroom to support diverse learners such as eligibility, contact information, and specific services provided by programs on campus (Counseling center, Access services, Tutoring center, and Power center). Other content ideas included universal design for learning strategies, how to support students with undiagnosed learning disabilities, and strategies for supporting Lesbian, Gay, Bisexual, Transgender, and Questioning (LGBTQ) students. Other feedback that was deemed outside the scope of the guide was shared with the Minot State University Diversity Council.

Poster 5

JUST TEXT ME: LET'S GET REAL WITH CLINICAL SUPERVISION

Erin Holt, Kayla Fisher, Robyn Walker, and Mary Huston

Department of Communication Sciences and Disorders

Providing efficient and effective real-time supervisory feedback in educational settings has always been challenging for clinical educators. Student clinicians and educators consistently indicate that specific, immediate feedback during clinical sessions is their preferred instructional method (Lorino, Delehanty, & Woods, 2016); however, providing this safely is difficult in the COVID-19 world. Maximizing safety and minimizing potential exposure to COVID-19 means educators no longer have the luxury of supervising clinical sessions nearby or using "in the room" modeling and teaching, making real-time instruction difficult. While observation via virtual meeting platform is sometimes used, this method is disruptive and distracting for both the student clinician and client. The use of wearable technology was piloted as an affordable, efficient, and safe method of providing less disruptive, real-time feedback in a university clinic setting. Novice and experienced CSD students enrolled in an on-campus clinical practicum participated in the A-B sequential design investigation. Short messages were sent from the supervisor's computer to the student during the session via a wrist worn pager. Preliminary results show the use of wearable technology to be an effective and efficient way to provide real-time "bug-in-the-eye" feedback to student clinicians and was viewed positively by both the student clinicians and supervisors.

Poster 6

A NATIONWIDE ASSESSMENT OF CRIMINAL JUSTICE STUDENTS' EXPOSURE TO COMMUNICATION DISORDERS

Mary Huston, MS, CCC-SLP and Maria Kerzmann, Ph.D.

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Recent media coverage of criminal justice professionals responding to individuals with mental health diagnoses, substance abuse issues, as well as communication disorders, has raised concern regarding the training requirements of these professionals. This study seeks to develop a better understanding of the current criminal justice (CJ) curriculum offered by 4-year universities throughout the United States, and to provide a series of recommendations for CJ education programs to address students' knowledge of communication disorders. A review of CJ programs across the U.S. was compiled and a survey of CJ students was conducted to assess students' knowledge and perceptions of individuals with communication disorders. Ultimately, the goal of this project is to showcase the need for an interprofessional curriculum between criminal justice and communication disorders programs nationwide.

Poster 7

EXTRACTION, CLASS, CONSCIOUSNESS: A CASE STUDY OF UNIONIZATION IN THE BAKKEN OIL SHALE REGION

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Sociology, Social Science Division

The purpose of this study is to examine the Bakken oil shale boom's effect on union density in western North Dakota to test if high labor demands assist unions in expanding their membership and winning concessions. Using a key informant approach with twelve respondents representing eight labor unions, we find that unions took advantage of the high demand for labor, but this growth encountered important barriers, including a lack of an activist approach, the organization of work, and a political climate in which labor's interests are perceived to oppose the demands of the environmental movement, that need to be surmounted before booming labor demands can turn into gains for labor.

Poster 8

SONG TEACHING AND SINGING ACCURACY OF THIRD GRADE ELEMENTARY MUSIC STUDENTS: AN INVESTIGATION USING MULTILEVEL MODELING

Kateri Miller, PhD

Division of Performing Arts

The purpose of this study was to investigate song teaching approaches and their effect on the singing accuracy of third grade elementary students using an original song with no repeated phrases. Students (N = 318) and teachers (N = 22) were from a school district in the Western United States with a diverse demographic population. Three song teaching approaches (phrase-by-phrase, holistic, and combination) tested an original composed song with a through composed phrase structure (ABCD). Intact third grade classes were randomly selected from each of the 22 schools and teachers were randomly assigned a song teaching approach. Students were tested individually and recorded for post hoc analysis. The analysis includes two levels of data: student (level I) and teacher (level II). Results were not statistically significant but did indicate that the phrase-by-phrase approach is more likely to produce higher accuracy scores. Suggestions for future research is included.

Poster 9

IMPACT OF PLANT HORMONES ON WINTER DORMANCY OF A SPRING HERB

Joseph Pettit, Ph.D., and Sarah Upton

Department of Biology

Jack-in-the-pulpit (*Arisaema triphyllum*) is a common spring herb of eastern North America. Despite its prevalence, little is known about the dormancy physiology of this plant. Thus, this study was designed to examine if artificial winter dormancy is possible in Jack-in-the-pulpit and to determine which, if any, plant hormones encourage or inhibit dormancy and subsequent budbreak. Sixty-one Jack-in-the-pulpit plants were randomly placed into one of two growth hormone treatments (auxin or gibberellin) or a control group balancing on corm (stem) size. Plants were sprayed with 1 ml of hormone/control solution once per week during the first growing season to influence bud formation for the next growing season. Plants were kept in a greenhouse with appropriate water, light, and fertilizer during the first growing season. When plants began to senesce, they were put into a 3-month artificial dormancy treatment in a growth chamber. Artificial dormancy was induced with by subjecting plants to 5 degrees Celsius temperatures at night and 10 degrees during the day. After the wintering treatment, plants were placed in the greenhouse and budbreak was recorded. For data analysis we removed plants that did not emerge in 2021 (the first growing season of this experiment, 3 plants). Gibberellins appeared to marginally inhibit budbreak (chi-squared goodness of fit = 4, $p = 0.13$). In conclusion, artificial dormancy is possible in Jack-in-the-pulpit and auxins did not inhibit this dormancy.

Poster 10

SUPPORTING APPRENTICE MUSIC TEACHERS AND MUSIC EDUCATION THROUGH INSTRUCTION IN A BEGINNING COMMUNITY CONCERT BAND PROGRAM

David Rolandson

Division of Performing Arts

The purpose of this research project was to determine whether a beginning community band program can effectively contribute to the preparation of apprentice music educators. I used a case study approach to investigate seven music education majors who served as music teachers in the Minot Beginning Community Band (MBCB), a program designed to provide community members with beginning instrumental music instruction. In this embedded single-case study design, the MBCB served as the unit of study, or case, and the seven participants served as sub-units. The embedded single-case study allowed me to examine the VPLC as a whole and also from the perspectives of the individual participants. Based on the preliminary findings, I determined that conventional, university music teacher preparation programs may not provide sufficient time or practicum experience for pre-service music teachers to feel adequately prepared and confident as they enter the teaching profession. This is especially true when a considerable lapse of time occurs between practicum experiences and student teaching. I concluded that the MBCB (and similar programs) can successfully supplement university music teacher preparation programs by providing practical, real-world teaching experiences. However, proper guidance, supervision, and accountability measures should be embedded in the program design to increase the MBCB effectiveness.

Poster 11

WORKING BACKWARDS: DIGITAL TO WET PLATE COLLODION

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Division of Art, Broadcasting and Professional Communication

In the last 30 years, the photographic world has rediscovered its roots. Artists have revolutionized historic chemical processes by integrating new digital technologies. Fredrick Scott Archer's 1851 wet plate collodion process radically shifted the historical course of photography however, it has also remained staunchly traditional in image form, content, and process. This project endeavored to explore and expand this beautiful 19th Century process at Minot State.

Many artists have made collodion images from existing traditional negatives under a darkroom enlarger, however, few artists consistently work through new digital imaging processes into collodion. In the grant years 2021 & 2022, our team worked with the QuadTone Rip (QTR) shareware system to develop perfect digital negative for darkroom printing. The project focused on calibrating the software and digital negatives for wet-plate collodion and exploring various collodion formulas for timed printing

Students and faculty worked successfully to create an appropriate collodion profile for printing that yielded adequate tonal range and contrast while minimizing the digital artifacts. Our work has been published by Routledge Press in Christina Z. Anderson's *Digital Negatives with QuadToneRIP: Demystifying QTR for Photographers and Printmakers.* The digital negative allowed additional experimentations with timed exposure with various collodion formulas.

Poster 12

COMPARISONS OF INSTRUCTIONAL MATERIAL DESIGN FOR PROBABILITY EDUCATION

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Probability problem-solving skills are important for academic success and for judgment and decision making about real-world situations. However, textbook analyses conducted in multiple other math domains showed that the ways relevant learning content is represented in U.S. math textbooks are often unbalanced and inconsistent compared to what empirical research suggests for effective learning. The present study aimed to examine how textbooks were designed for teaching probability by different educational goals (regular high-school level vs. advanced) and educational systems (that vary by math performance competence on international assessments like PISA).

This study compared three types of textbooks: U.S. regular high-school level, U.S. advanced level (AP/college-introductory), and Chinese regular high-school level. Problem instances from chapters on probability in representative textbooks were coded by representational format (textual, formulaic, and visual). Results showed that U.S. texts of both types almost always include textual representations for problem information, but Chinese text includes formulaic representations more often. U.S. texts also use visualizations more often but differ significantly by the types of visualization used. Where problems are visualized, regular U.S. text uses significantly more pictorial images, which research has warned to be ineffective for understanding and interpreting abstract mathematical structures. Advanced U.S. text and Chinese text both adopt significantly more diagrams, which are schematic visualizations matched with underlying problem structures, and at similar rates.

Comparisons of representational design for basic probability problems across different textbook types revealed qualitatively different patterns in representational format choices made by textbook authors for the teaching content in different educational settings and systems. Current findings shed light on evaluating the efficacy of instructional design components currently in use for teaching high school probability.

Poster 13

THE EFFECT OF SWIVL ROBOTIC TECHNOLOGY AND VIDEO ANALYSIS ON TEACHER CANDIDATES' REFLECTIVE ABILITIES AND INSTRUCTIONAL SKILLS

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Department of Special Education

Performance-based evaluation of teacher candidates is widely implemented in teacher education programs. Using video analysis, teacher candidates reflect on their instructional strategies and students' learning. This pilot study aimed to explore the use and impact of Swivl Robotic technology and guided video analysis to improve teacher candidates' clinical performance. The steps included purchasing the equipment, developing the video analysis protocol, and conducting three months of study with five special education majors in Methods block. Participants received a one-hour training on video analysis and reflection on their own practice. Four students used iPad or iPhone to record, and one participant volunteered to use the one Swivl device available in the SPED department. They recorded four video clips with four written analyses of their performance in the classrooms. Results showed that the Swivl device participant experienced no technical issues, while others had problems with sounds or capturing students' behaviors. Because of the body-tracking technology of Swivl, the participant using this technology was able to move to the back of the classroom without losing the images for observation, which improved the comprehensiveness of her reflection on her attentiveness to different students' needs. In the interview, the Swivl participant suggested that "SPED department could give more students the opportunity to use the Swivl. This way they would all be able to analyze their videos in a more advanced way." To conclude, the Swivl technology was supportive of performance-based evaluation using videos analysis.

Poster 14

INVESTIGATING THE ROLE OF THE RNA-BINDING PROTEIN RMB39/CAPER IN NEURON DIFFERENTIATION

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Department of Biology - MSU and Department of Biology - UCCS

The fruit fly species, *Drosophila melanogaster,* has been a model organism for biological research for over a century, leading to landmark discoveries in genetics, development, neurobiology, immunology, and circadian rhythms. In an ongoing study, *Drosophila* has been used to study a number of proteins with roles in neuron differentiation and function, including one known as CAPER/RMB39. In *Drosophila* abnormal forms of the CAPER protein are associated with ataxia (abnormal locomotion), shortened lifespan, and seizures. In developing flies, loss of CAPER results in abnormal neuron projection (neurite) growth. Parallel studies done in my lab are focused on corroborating the role of CAPER in neuron differentiation and function in a cell culture system using N2a mouse embryonic neuron cells. We have established a method for differentiating N2a cells with combined serum reduction and exposure to All Trans Retinoic Acid (ATRA). This differentiation includes an elongation of the cell body and production of projections similar to neurites, providing a model for in-vivo, CAPER-associated neuron development. In conjunction, we have measured expression of CAPER protein in undifferentiated N2a cells. Using Western Blot procedure, we have established baseline expression as well as cellular location of CAPER. In *Drosophila*, CAPER expression has been observed in the nucleus, our studies show CAPER expression in cytoplasm as well in N2a cells. These baseline experiments set the stage for testing the role of CAPER protein expression and location in differentiation of N2a cells, and for potential observation of CAPER interactions with other proteins such as the proteins noted to interact with CAPER in *Drosophila.*

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