undergraduate & graduate

# RESEARCH SYMPOSIUM

## Fall 2024

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# Effectiveness of Exercise Therapy Compared to Corticosteroid Injections for the Treatment of Meniscus Tears: A Meta-Analysis

**Abbey Armijo**

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**Department: Health Science Professions**

The objective of the study is to determine if exercise therapy is a more effective treatment for meniscus tears compared to corticosteroid injections. This study evaluated, compared, and determined the effectiveness of corticosteroid injections and exercise therapy as nonoperative treatment options for meniscus tears. A literature search was conducted through the Angelo State Library databases for studies to be included in this study for statistical evaluation. The visual analog scale (VAS) pain measurements for the initial patient visit, the same measurement at a final follow-up visit, and the total time between pain scale measurements were compared between the interventions. Five studies with a total of 259 patients were evaluated. Four studies measured the effectiveness of exercise therapy, and one study evaluated the effects of corticosteroid injections. The time between pain scale measurements varied from 24 hours to 36 months. Boththreatment types yielded decreases in reported pain measurements. No significant differences were found between interventions for VAS pain score measurements or total elapsed time of treatment. Exercise therapy and corticosteroid injections are both effective as nonoperative interventions for meniscus tears. Individual treatment plans should be evaluated and determined by the physician and their patient, should they decide against or do not qualify for surgical intervention. Further research in this area is necessary to determine the most effective and efficient nonoperative treatment for meniscus tears.

Keywords: Meniscus tear, exercise therapy, corticosteroid injections

# The Use of Improvisational Comedy Classes to Improve DPT Student Clinical Confidence

**Amy Goode, Sebastian Lopez, Brittney Hoenshell**

**Faculty Mentor: Dr. Heidi Moyer, Dr. Jacob Burtch**

**Department: Physical Therapy**

Purpose/Hypothesis: The purpose of this quasi-experimental, quantitative, survey-based study is to investigate the confidence clinical management skills of first year Doctor of Physical Therapy students (DPT1s) prior to and after improvisational comedy classes (ICCs). Our hypothesis is that ICCs will improve student-reported confidence levels in clinical management skills. Subjects: DPT1s enrolled in PT 7651 Acute Care Management during the Spring 2024 semester at Angelo State University. On a Likert Scale of 1-5 rating familiarity with Improv Comedy, 92.3% reported being very unfamiliar or unfamiliar. Materials and Methods: Study participants completed two online surveys using Qualtrics XM software. Both surveys included Likert questions related to confidence in new clinical situations in acute care and general anxiety levels. Results: Participants completed an average of 4.88 out of the 5 required ICCs. Only 15.4% reported a positive impact of ICCs on their course performance while 42.5% reported a neutral outlook, and 42.3% reported a negative outlook. Conclusions: This study provides pilot data to support the claim that ICCs can be successfully implemented into entry-level DPT curriculum. ICCs and didactic curriculum alone were not enough to reduce student anxiety. Clinical Relevance: Physical therapy professionals must communicate proficiently and be flexible in the clinical setting. These attributes are vital in creating well-rounded health care professionals, yet they can be difficult to build in a didactic classroom environment. Improv comedy activities may be one way to develop these important interpersonal skills in entry-level clinicians.

# Nvidia's Strategic Position in the AI Revolution: A Competitive Analysis and Investment Outlook

**Andres Ybarra**

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**Department: Accouting, Economics and Finance**

As artificial intelligence (AI) continues to grow, understanding the companies that are leading or lagging behind is crucial. This study provides an in-depth analysis of the AI revolution, with a specific focus on Nvidia and how it compares to its competitors. Designed to help investors identify emerging opportunities, this research examines how Nvidia has effectively capitalized on AI advancements. Grounded in data analysis, the findings highlight Nvidia's strategies, market positioning, and competitive advantages within the evolving AI landscape. This study offers valuable insights for investors seeking to navigate the rapidly changing AI sector. Given its strong market positioning and advanced innovation, Nvidia presents itself as an attractive opportunity with the potential to deliver robust returns for investors."

# The Effects of GNRH Administration during Estrus on Progestrone Levels and Conception Rates in Recipient Cows

**Autumn Perryman**

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**Department: Animal Science**

Beef cows (n=79) from 4 different cow herds and two breeding seasons were stratified by age and time of estrus into treatment (TRT) and control (CON) groups. All cows received a controlled internal drug release insert (CIDR) and a 2 mL dose of GnRH on the day 0. On day 7, the CIDR was removed, and a 5 mL dose of Prostaglandin was administered to all cows. Cows were monitored and sorted into treatment groups as they presented estrus. Treatment cows received a 2 mL dose of GnRH 12 hours after the onset of estrus, and the control group received sham injection. All cows expressing a standing heat and an acceptable corpus luteum score at day of transfer, became the recipients to a transferred embryo. Fresh and frozen embryos were utilized, as well as in vivo or in vitro and notated for each recipient. Blood collected at time of embryo transfer was used to measure progesterone levels, measured in ng/mL. All samples were tested at TVMDL. The treatment, as a main effect, was a significant source of variation in these data. Blood progesterone levels in cows that received GnRH following observed estrus were higher than cows not receiving GnRH following observed estrus (4.66 ± .42; 3.18 ± .34; $P < 0.05$). Cows with CL scores of 3 tended to have higher progesterone levels than 2's and 1's ($P = 0.07$). While day, as a main effect, treatment by day and treatment by CL score were not different in this analysis.

# Immediate Effect of Shoulder EMG and Force After Mid-Thoracic Spinal Manipulation

**Bryon Geddes, Johnny Tran, Lindsay Krabbenhoft, William Bonham**

**Faculty Mentor: Dr. Teresa Huckaby, Dr. Jacob Burtch**

**Department: Physical Therapy**

**Introduction:** Research has explored the neurological effects of spinal manipulation, including increased neuromuscular drive and reduced pain. While studies indicate enhanced muscle activity following lumbopelvic manipulation and increased corticospinal excitability in elite athletes, the impact on muscular activation during maximum voluntary isometric contraction (MVIC) remains under-investigated. This study aims to assess the short-term effects of high-velocity low-amplitude thrust (HVLAT) mid-thoracic spinal manipulation on shoulder musculature using surface electromyography (sEMG) during MVIC.

**Methods:** Twenty-nine physically active adults (14 male) participated in the study. Using a seven-channel wireless sEMG system, we measured muscle activation in the anterior deltoid, infraspinatus, lower trapezius, middle trapezius, pectoralis major, serratus anterior, and upper trapezius. Participants performed a standardized ten-second MVIC before and after HVLAT manipulation.

**Results:** Post-manipulation, significant reductions in mean sEMG activity were observed in the infraspinatus ($t(25) = 2.709$, $p = 0.012$, $d = 0.5313$) and upper trapezius ($t(27) = 2.4691$, $p = 0.020$, $d = 0.4666$). Other muscle activations and force measurements showed no significant differences.

**Conclusions:** Mid-thoracic HVLAT significantly decreased activation in the infraspinatus and upper trapezius during shoulder flexion MVIC. While other muscle groups exhibited no significant changes, trends suggest a general decrease in activation. These findings indicate potential benefits of HVLAT for managing overactivation in specific shoulder muscles, warranting further research with larger samples.

# Exploring ChatGPT's Efficacy in Writing Novels

**Cole Ballard**

**Faculty Mentor: Dr. Kevin Garrison**

**Department: English and Modern Languages**

This research investigates the potential of using ChatGPT to write a novel that is indistinguishable from one authored by a professional writer. The project addresses ChatGPT's limitations, such as maintaining narrative coherence and emulating complex literary styles, by utilizing advanced prompt engineering and iterative storytelling techniques. Over a 15-week period, the research aims to refine prompt strategies, improve context retention for long narratives, and experiment with techniques for enhancing character development and narrative structure. The goal is to fully automate the novel-writing process, with the user providing only a summary prompt. The quality of the AI-generated novels will be evaluated through blind reviews by English major and minor students, using detailed metrics on narrative engagement, emotional impact, character visualization, and writing style fluidity. This evaluation will offer insights into AI's strengths and weaknesses in long-form creative writing. By bridging the gap between human creativity and AI, this project explores how AI can replicate the creative process behind novel writing. Understanding narrative structure, character development, and thematic depth enables more coherent and engaging AI-generated narratives. Ultimately, the findings will provide a deeper understanding of ChatGPT's potential in emulating professional-level writing and pave the way for its use in creative industries, with the possibility of scalable, personalized content creation.

# C.burnetii effector CinF upregulation of autophagy using qRT-PCR

**Estefany Reyes Villicana**

**Faculty Mentor: Dr. Crabill**

**Department: Biology**

Intracellular bacterial pathogens have evolved the capacity to invade host cells to establish a replicative niche, allowing them to be protected from the systemic components of the host innate immune system. They have learned to use host tools to their advantage, among these tools is the autophagic pathway. C. burnetii has learned to manipulate autophagy at the molecular level as a major component of their virulence strategy. One effector protein, CinF, appears to play a role in upregulating autophagy. We will monitor autophagic flux by qRT-PCR. We will test the levels of SQSTM1, which is an autophagosome cargo protein that targets other proteins to which it is bound for autophagy, with and without the expression of CinF, as well as the CinF catalytic mutant, and in the presence and absence of bafilomycin A. This will be done by immunoblot with SQSTM1- specific antibodies. To ensure the changes in SQSTM1 expression are due to changes in autophagic flux and not transcription, we will measure its mRNA levels by qRT-PCR for all the conditions tested.

# A New Algorithm for Approximating Polynomial Roots

**Euijin Jung**

**Faculty Mentor: Dr. Trey Smith**

**Department: Computer Science and Mathematics**

There are currently several algorithms that can be used to estimate roots for functions. Newton's method is probably the most well-known. Most algorithms – including the one prescribed by Newton's method – are limited to only finding real roots. Additionally, some *initial inputs* will yield chaotic or cyclic sequences that are useless for determining actual roots. The algorithm presented in this research uses a simply defined additive recursive sequence to find a real root for a given polynomial, if one exists. In the case where a real root does not exist, the algorithm will deliver the modulus of a complex root. There are, of course, limitations to this approach, but many of those can be addressed by the actual implementation of the algorithm.

# Immersive Learning: Teaching Cybersecurity Concepts to Children Through a 3D Card Game on Oculus Quest

**Euijin Jung, Luis Ocada, Luke Anderson**

**Faculty Mentor: Dr. Erdogan Dogdu, Dr. Roya Choupani, Leila Yarian**

**Department: Computer Science**

Cybersecurity awareness is becoming increasingly essential in the digital age, particularly for younger generations who are growing up with constant access to online platforms. To address the need for early education in cybersecurity, we developed an interactive 3D card game using Unity for Oculus Quest devices. This immersive game introduces children to fundamental cybersecurity concepts in an engaging and playful manner. We conducted user testing with children to assess the game's effectiveness in enhancing their understanding of these concepts. Preliminary results suggest that the game not only improves knowledge retention but also increases interest in cybersecurity. This poster presents our development process, game mechanics, and findings from the user study, highlighting the potential of virtual reality as a powerful educational tool in cybersecurity.

# Empowering Aging Well: Assessing the Efficacy of DPT Student-Led Exercise Program on Mobility and Fall Risk

**Jenna O'Dell, Molly Voskamp**

**Faculty Mentor: Dr. Heidi Moyer**

**Department: Physical Therapy**

**Purpose of Research:** This quasi-experimental single cohort study examined the effectiveness of an intensity-based exercise program conducted by DPT students on decreasing fall risk and improving mobility outcomes among residents of a senior living community.

Subjects: *N*=15 ambulatory older adults aged 65 and older (86±4.05 years; 73% female), all ambulatory with or without assistive devices in a local senior living community.

**Research Methods:** Participants were part of a service-learning opportunity for the Angelo State University Doctor of Physical Therapy Program. They were paired 1:1 with DPT students as part of an intensity-based exercise program created to address fall risk. DPT students were instructed to provide moderate to high-intensity interventions (7/10 or higher on the Omni-RES, Rate of Perceived Stability Scale, or modified RPE) thrice per week, 45 minutes per session, for a total of 6 weeks. Vitals were assessed before and after each intervention. Baseline testing included a comprehensive medical history review and the CDC Stay Independent Brochure. The Activities-Specific Balance-Confidence (ABC) Scale, 5-Timed-Sit-to-Stand (5TSTS), 10 Meter Walk Test (10MWT), Timed-Up-and-Go (TUG), Timed-Up-And-Go Cognitive (TUG-COG), and Timed Up from Floor Test (TUFF) were repeated measures.

**Data Analysis:** Data analysis was performed using IBM SPSS v26.0. Shapiro-Wilks test for normality confirmed parametric status of mobility measures, therefore paired *t* testing was utilized to determine differences between mobility performance measures with the exception of the TUFF test, which is non-parametric due to its nominal rating scale.

**Results:** Participation in class sessions ranged from 3/17 to 17/17. Average reported intensity across the 3 domains was 7.2/10 (Omni-Res 7.3, RPS 7.1, mRPE 7.2). Results of paired *t* tests demonstrated significance for improvements in 10MWT (mean=0.091, 95% CI 0.023, 0.16, *P*=.012). Significance was not obtained for ABC (*P*=.83), TUG (*P*=.09), 5TSTS (*P*=.96), TUG-COG (*P*=.18), or Dual Task Time (*P*=.20). Results of a McNemar Chi-Square test on the nominal data of the TUFF Test also indicated no significant difference (*P*=0.25) pre-and post-treatment. Results demonstrate a significant change in gait speed

performance between pre- (0.96 m/s) and post- (1.05 m/s) exercise class mobility status, indicating a group reduction in fall risk using the 1.0 m/s cut-off established in the United States. The 0.09 m/s improvement meets the MCID of 0.05 m/s for 10MWT performance in the general older adult population. Though results for the TUG were not significant, average scores improved from 19.7s to 14.7s, meeting the fall reduction threshold set by the World Falls Prevention Guidelines.

**Conclusion:** Participation in an intensity-based, DPT student-led exercise class over 6 weeks shows promise in improving gait speed and lowering fall risk among older adults. Further research is warranted to validate and expand upon these initial findings, including carryover of effects and optimal duration of training.

**Relevance:** Each year, 3 million older people are treated in the emergency room for falls or fall-related injuries, with falls being the leading cause of injury-related death for adults aged 65 and older. With constant reduction in insurance reimbursement for skilled therapy services, clinicians are turning to community programs to take a preventative approach to this issue. Student-led programs are one such innovative model to provide a safe and effective way to reduce fall-related injuries, reduce strain on the healthcare system, and greatly improve quality of life in the older adult population.

# The Impact of Compression Garments and Additional Cognitive Loading on Balance Control and Perceived Stability in Older Adults

**Kai Mason, Aurora Emmons, Kiernan Moody, Elizabeth Boudreau**

**Faculty Mentor: Dr. You-jou Hung**

**Department: Physical Therapy**

**Background and purpose:** Older adults are prone to exhibit balance control deficits, which can increase the incidence of falls. The purpose of this investigation was to examine the impact of waist-to-above-ankle compression garments (CGs) and additional cognitive loading on balance performance and perceived stability, and if wearing CGs could alter the impact of additional cognitive loading in community-dwelling older adults.

**Methods**: Sixty-one community-dwelling older adults (39 females and 22 males, aged 65–91) participated in the study. Participants were randomly assigned to start the testing in one of two conditions: with or without wearing CGs. In each condition, the Berg Balance Scale (BBS), the Timed Up and Go (TUG), and the Fall Risk test of the Biodex Balance System were used to examine balance performance in a random order. The Rate of Perceived Stability (RPS) scale was used to evaluate perceived stability and was administered at the end of each balance test. Additional cognitive loading was only implemented in the Fall Risk test. Participants were given a number between 70 and 99 at the beginning of each trial and were asked to continuously subtract numbers by 7 during the 20-second trial period. After the 3 balance tests, participants were allowed to take a break before switching to the second testing condition. The same testing sequence and procedure were repeated in the second condition.

**Results:** For the BBS, participants performed and rated their perceived stability significantly better with CGs than without CGs ($p$ = .005 and .015 respectively). For the TUG, there was no significant difference in the performance and perceived stability between with and without CG conditions ($p$ = .738 and .682 respectively). For the balance performance of the Fall Risk test, wearing CGs enhanced the performance ($p$ = .025) but additional cognitive loading did not change the performance ($p$ = .746). For the RPS of the Fall Risk test, wearing CGs enhanced perceived stability ($p$ = .024) but additional cognitive loading did not change perceived stability ($p$ = .452).

**Conclusions:** When wearing CGs, older adults exhibited better balance performance and perceived better stability in the BBS and the Fall Risk tests. These observations suggest

that providing additional cutaneous and proprioceptive feedback with CGs may provide an acute benefit in balance control and perceived stability in older adults. However, the impact of cognitive loading was not significant in both balance performance and perceived stability when extrinsic visual feedback was provided in the Fall Risk test.

**Clinical significance**: It may be beneficial for clinicians to incorporate wearing CGs as part of the treatment protocol to enhance balance control and perceived stability. Clinicians may also consider providing extrinsic visual feedback or instructing patients to focus more on environmental cues during balance training to enhance their balance control.

***Keywords***: compression garments, cognitive loading, older adults, balance, proprioception

# Too Many Demands, Not Enough Support: Barriers in Preventing Vicarious Trauma Among Mental Health ProfessionalsÂ

**Lauren Brooks**

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**Department: Psychology**

With frequent exposure to psychological trauma, mental health professionals may experience vicarious traumatization (VT), which is associated with emotional distress, physiological symptoms, and interpersonal conflict (Jimenez et al., 2021). While previous research has identified measures that can be utilized to help prevent the development of VT (Branson, 2018), there is limited research on barriers that clinicians experience when engaging with these protective factors. This study explored how clinicians cope with their work as well as potential barriers that have hindered their ability to protect their psychological well-being.

The study sampled licensed mental health professionals (n=394) recruited through purchased email lists (Nebraska, Texas) and APA clinician-oriented listservs. Most participants (*n*=316) identified as female; and were white (*n*=324). The average age was 45.15 (SD = 14.10), with an average of 16.48 years (SD=12.95) clinical experience. Participants answered open-ended questions about their experiences with supervision, self-care practices, organizational support, and questions about potential barriers that affect their ability to preserve their psychological well-being.

Thematic analysis (Braun & Clark, 2019) was used to analyze responses. Participants identified several areas that prevent them from tending to their well-being including professional demands, personal/caregiving responsibilities, and feelings of empathy/guilt for needing to care for themselves. When asked what they would need in place to better support them in their work, they reported measures such as administrative support, consultation/supervision, increased workplace connection, and adequate compensation. Overall, these results contribute to literature that identifies the tendency for practitioners to neglect their personal well-being due to systemic and personal demands.

# Simulation of Large-Scale Warehouse Operations Using SIMUL8 Software

**Mia Kilman**

**Faculty Mentor: Dr. Andrew Tiger**

**Department: Management and Marketing**

**Principal Industries Warehouse Overview** My research focused on simulating a 100,000 square foot warehouse utilizing SIMUL8 software at Principal Industries in San Angelo, Texas. The warehouse, designed for storing, receiving, and shipping items to customers, features a quality control area at its core and 24 picking zones. With approximately 2,000 pickable bins, including 350 "fast bins," the warehouse employs eight pickers who manually select items following a structured process.

**Simulation Logistics** The simulation operates continuously until completion. Eight pickers, executing orders in sequential order, move through the warehouse aisles, with travel and pick times calculated based on simulation parameters. While the simulation mirrors the ideal picking process, real-world deviations, such as package handling and restocking, are not factored in.

**Simulation Results** Comparative analysis between the original model inputs and inputs with additional aisles showcases the impact on total time, highlighting the significance of deviations from the ideal process. Average travel time remains relatively stable, while average pick time varies significantly due to real-world deviations.

**Conclusion** My research provided valuable insights into warehouse operations and analytics, emphasizing the importance of bridging theoretical concepts with practical application. The simulation outcomes underscore the necessity for adaptive strategies to optimize workforce productivity and operational efficiency in dynamic environments.

# Exploring the Effects of Sustainability Knowledge Towards Purchase Intent for Green Products

**Agustin Kairoh, Miko B. Ramos VI**

**Faculty Mentor: Dr. Justin Munoz**

**Department: Management and Marketing**

This research investigates the impact of internal and external influences of consumer behavior variables, specifically the effects of consumer knowledge towards sustainability, social norms, and an organizations sustainability effort, towards the willingness to pay a premium for green products and further into the actual purchase intent of green-prestige products. While there are statistical studies that reveal how consumers are willing to pay an additional prestige surplus towards products that businesses claim to have been made sustainable and are more eco-friendly, there are still similar studies that reveal a disconnect between intent to purchase and actual purchase transactions. To explore this gap, the methodology of this portion of the research focuses on my efforts directed towards utilizing the best unrefined scales to develop a measurement to use for a comprehensive survey. These scales will gather the data, which still needs to be collected, which will be the first step into identifying the construction of this problem.

The methodology focuses on understanding the variable components: Sustainability Efforts, Social Norms, Consumer Knowledge Regarding Sustainability. Structural Equation Modeling (SEM) will then be used to analyze the relationship between these variables in relation to Purchase Intent. A result of a high positive strength between these variables would support our hypotheses that consumers with knowledge of sustainability and companies marketing green products will increase the behavior of purchase intent on the part of B2B buyers.

# What Psychological Factors Predict Employee Retention?

**Lucas A. Elliott and Tyler N. Livingston**

**Faculty Mentor: Dr. Tyler N. Livingston**

**Department: Psychology**

## Problem

Job hopping refers to the tendency to serially enter and exit employment positions (Lake et al., 2017). Job hopping is increasingly common due in part to the availability of remote work (Pandey, 2019). Organizations have an interest in retaining productive employees who achieve organizational goals. However, productive goal seeking may be related to job stress, which could in turn predict job hopping. This research tested whether job stress could provide a pathway linking goal seeking to job hopping among a sample of employed U.S. adults.

## Method

Participants were 137 full-time employees recruited from a nationwide U.S. sample ($M_{age}$ = 35.71 years, *SD* = 11.20 years; 65% men). Participants responded to a 10-item measure of goal seeking (Gollwitzer, 1996), a two-item measure of job stress (Bolino & Turnley, 2005), and a seven-item measure of job hopping motivation (Lake et al., 2017).

## Results

Mediation analysis tested whether job stress provided a pathway linking goal seeking to job hopping. The total effect of goal seeking on job hopping was significant (*c*-path; $b = 0.40$, $p < .001$, 95% *CI* [0.26, 0.54]). The indirect effect through job stress trended toward significance (*ab*-path, $b = 0.06$, $p = .056$, 95% *CI* [-0.001, 0.11]). Goal seeking was positively associated with job stress (*a*-path; $b = 0.16$, $p = .04$, 95% *CI* [0.01, 0.32]), and job stress was in turn positively associated with job hopping (*b*-path; $b = 0.34$, $p < .001$, 95% *CI* [0.20, 0.48]). The size of the direct effect of goal seeking on job hopping was diminished after controlling for job stress ($b = 0.34$, $p < .001$, 95% *CI* [0.21, 0.47]).

## Conclusions

Findings supported the hypothesis that job stress could provide a link between goal seeking and job hopping. The positive relationship between goal seeking and job hopping suggests that organizations should provide leadership and promotional opportunities to highly motivated employees to facilitate retention. However, we caution organizations not to overwhelm highly motivated employees with excess responsibility, as higher levels of

stress were associated with job hopping in the current study. Organizations could encourage compassionate leadership, which address employee overwhelm to relieve stress (Oruh, 2021). Interventions that reduce job stress may promote employee retention.

# Teaching Financial Literacy to College Students

**Minh Anh Tran**

**Faculty Mentor: Dr. Jeremy St. John**

**Department: Management and Marketing**

This paper examines the importance of financial literacy education and its impact on students' financial behaviors, academic performance, and role as responsible citizens. Financial literacy encompasses the skills needed to manage personal finances effectively, such as budgeting, saving, and debt management (Kalwij et al., 2019; Zhu, 2021). The research highlights that financially literate students are better prepared to navigate financial challenges, reduce stress, and achieve long-term stability through informed decision-making.

In addition to improving personal financial well-being, financial literacy encourages civic engagement by promoting responsible economic participation and fostering autonomy (Cambridge Financial Education Review, 2023). However, the inconsistent implementation of financial literacy programs, lack of educator training, and challenges introduced by media and technology remain significant barriers (OECD, 2023; Trellis Research, 2022).

This paper emphasizes the need for comprehensive financial education that balances theoretical knowledge with practical skills, ensuring students are prepared to navigate evolving financial landscapes. Recommendations include standardized curricula, professional development for educators, and partnerships with financial institutions to deliver impactful learning experiences. Financial literacy not only benefits individual students but also supports broader social and economic development.

# Formation of a silicon-carbon hybrid material from reacting silicon nanoparticles with acetylene

**Lexter Canlom**

**Faculty Mentor: Dr. Gregory Smith**

**Department: Chemistry**

In this study we expose silicon nanoparticles (Si np) to pressurized acetylene gas. The goal is to create a silicon-carbon hybrid material for potential use in more efficient lithium-ion batteries. Graphite is a common material used as the anode in these batteries, but silicon can load more lithium, and thus has an increased charge capacity. The silicon greatly expands and contracts in a charge cycle, however it will pulverize itself, drastically reducing its efficiency. Silicon-carbon hybrid materials offer a middle ground. Here we investigate a potential method for forming such a material by reacting Si np with acetylene gas to form a conductive cross-linked network.