SIRC

2025 Theme: Serving Spokane

Spokane Intercollegiate Research Conference

- *Student research presentations*
- *Displays of creative works*
- *Panel Session: "Serving Spokane"*

Saturday, May 3rd, 2025

Gonzaga University Campus

Hemmingson Center

Contents

SIRC Mission Statement	Page 3
Schedule & Session Overview	Page 4
Session Evaluators & People's Choice Voting	Page 5
Hemmingson Ballroom Poster Placement Map	Page 6
List of Presenters-Alphabetical by Last Name	Pages 7-8
List of Faculty Sponsors	Page 9
Poster Session Summaries	Pages 10-15
Oral Session Summaries	Pages 16-17
Panel Session Bios	Page 18
Poster Session Summaries with Abstracts	Pages 19-43
Oral Session Summaries with Abstracts	Pages 44-51

Presentation numbers that align with this year's theme of "Serving Spokane" are marked with an asterisk.

Spokane Intercollegiate Research Conference

Gonzaga University – May 3rd, 2025
Hemmingson Center

Spokane Intercollegiate Research Conference (SIRC) Mission Statement

The Spokane Intercollegiate Research Conference (SIRC) provides an opportunity for students from all majors and disciplines to present their research and scholarship, receive meaningful feedback, and develop scholarly community. SIRC is an excellent opportunity for students at all levels of their academic career to gain practice speaking in a relaxed, friendly, conference environment while learning about the wealth of research and creative activity in our community.

SIRC is organized by Gonzaga University and Whitworth University, alternating between campuses each year. This celebration of primarily undergraduate research is open to all students in the Spokane area, with no cost to attend.

New this year, a panel discussion on the theme of "Serving Spokane" featuring people whose scholarly work involves working with or serving our local community. *Presentation numbers that align with the theme are marked with an asterisk *.*

We welcome you to SIRC!

For more information about SIRC, see www.gonzaga.edu/sirc or https://digitalcommons.whitwork.edu/sirc/.

Schedule & Session Overview

8:45-8:55am	Opening Remarks, *Hemmingson Ballroom (3rd floor)*		
Times	**Type**	**Session/Group (Rm. #)**	**Discipline(s)**
9:00-9:55 am	Poster	A (Ballroom)	Mathematics Computer Science Natural Science Education
10:00-11:00 am	Oral	B/Gp 1, La Storta (310)	Social Science
10:00-11:00 am	Oral	B/Gp 2 Firenze (312)	Engineering Computer Science Physics
10:00-10:55 am	Oral	B/Gp 3 Cali (308)	Humanities
10:00-10:40 am	Oral	B/Gp 4 Goa (306)	Business
11:05-12:00 pm	Poster	C (Ballroom)	Education Engineering Health Sciences Humanities Natural Sciences Social Science
12:00-1:00 pm	Lunch		
1:00-2:00 pm	Oral	D/Gp 1, La Storta (310)	Social Science
1:00-2:00 pm	Oral	D/Gp 2 Firenze (312)	Creative Works
1:00-1:40 pm	Oral	D/Gp 3 Cali (308)	Natural Science
1:00-1:55 pm	Oral	D/Gp 4 Goa (306)	Applied Mathematics
2:00-2:55 pm	Poster	E (Ballroom)	Artistic/Creative Work Education Health Sciences Natural Sciences
3:05-4:00 pm	Panel Session *Hemm. 004 (Auditorium)*	*Olivia Evans:* Visual Artist & Producer; Adj. Art Prof., Whitworth Univ. *Anna Marie Medina:* Dept. of Psychology, Gonzaga University *Christie Nepean:* Principal Assistant, Logan Elementary *Wendy Thompson*: Director of Tribal Relations, Gonzaga University *James Hunter:* School of Education, Gonzaga University	
4:00-4:15	Closing Remarks and Awards, *Hemmingson Auditorium, 004*		

Thank you to all of our moderators and evaluators.

Doug Addleman
Nichole Barta
Julie Beckstead
Gary Chang
Nigel D'Souza
Renee Geck
Scott Griffith
William Hayes
Jens Hegg
Julianne Jay
Luke Johnson
Kent Jones
Kate Kearney
Danny Kim
Lada Kurpis
Donna Mann
Madeleine Mathews
Philip Measor
Daniel Olivares
Trisha Russell
McCall Sarrett
Martin Schiavenato
Dave Schipf
Nicole Sheets
Kyle Shimabuku
Sean Swan
Maria Tackett
Ian Townley
Liz Wawrzyniak

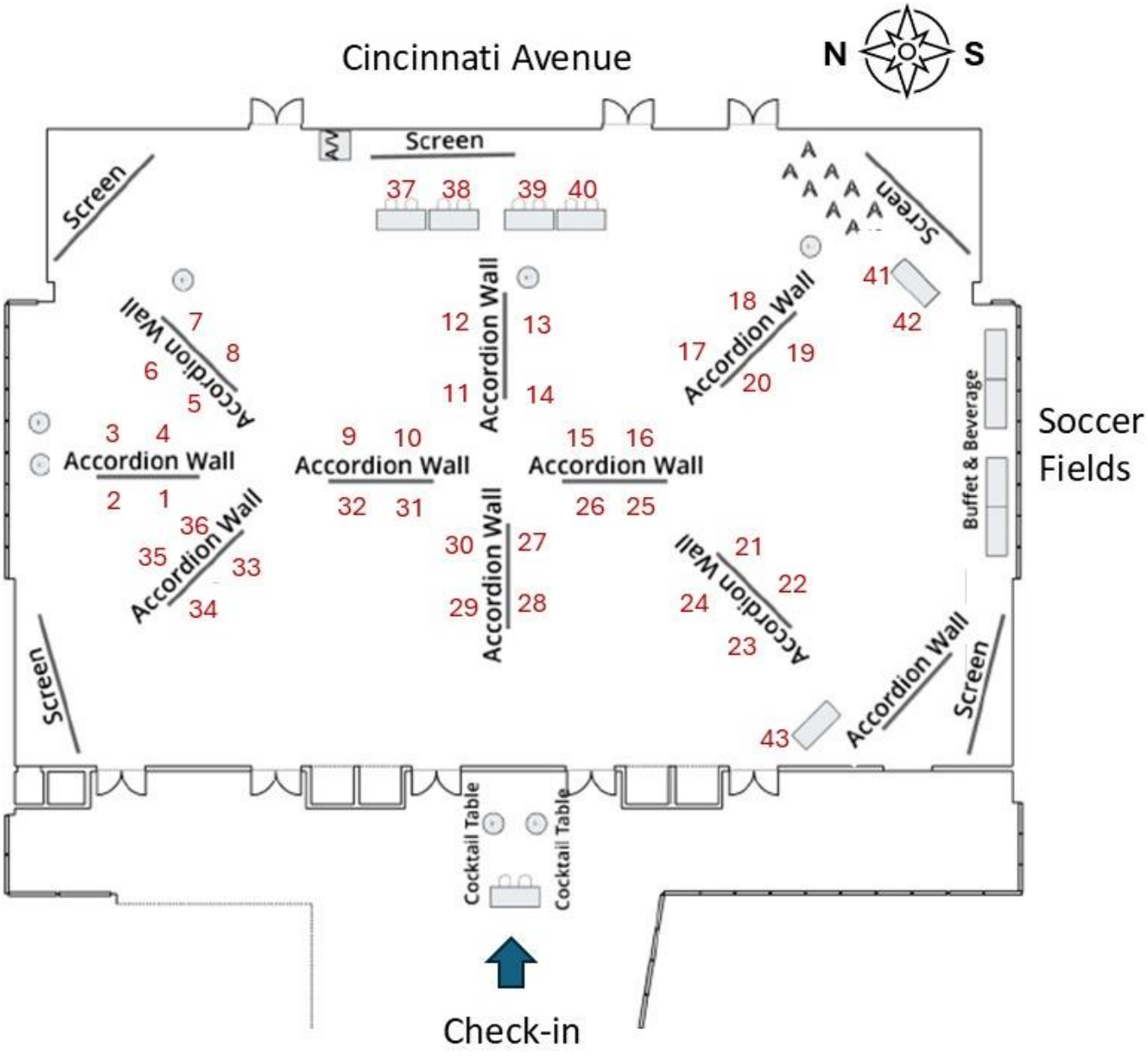
New this year: the People's Choice Award.

Please vote for your favorite presentations (poster and oral).

Or use this QR code to vote:

Hemmingson Ballroom

Poster Placement Map



ALL PRESENTERS – ALPHABETICAL BY LAST NAME

Alfaro, Kylie, Session A
Aloisoio, Annie, Session C
Anderson, Sydney, Session D, Group 2
Aoki, Yohei, Session A
Arinez, Daniel, Session B, Group 1
Arinez, Daniel, Session C
Arinez, Daniel, Session D, Group 1
Atwood, Conner, Session C
Austin, Gordon, session A
Beasley, Tate, Session B, Group 4
Beck, Ella, Session C
Bennett, Patrick, Session C
Bennington, Charles, Session A
Bergin, John, Session C
Bissett, Evan, Session A
Boercker, Lily, SessionA
Bortner, Karli, Session A
Bowen, Brooke, Session D, Group 1
Brandt, Lucas, Session A
Brenchly, Luke, Session C
Brennan, Colin, Session E
Cach, Alexa, Session E
Cameron, Abel, Session C
Caputo, Olivia, Session C
Carr, Paige, Session A
Cavallini, Juliana, Session D, Group 4
Cochran, Matt, Session A
Coney, Rylee, Session A
Conover, Ben, Session C
Consiglio, Giovanna, Session E
Cooper, Annie, Session C
Cooper, Liliana, Session C
Cordero-Johnson, Hannah, Session B, Group 1
Croft, Moab, Session B, Group 4
Davis, Lydia, Session A
Davis, Keegan, Session A
Davit, Aundrea, Session E
Do, Nguyen, Session A
Doughty, Andrew, Session C
Dudzik, Tereza, Session C
Dunham, Noah, Session A
Durbin, Lexi, Session C
Edstrom, Emily, Session A
Einhorn, Sydney, Session A
Eisenstat, Tommy, Session C
Eliason, Sophia, Session C
Elliott, Noah, Session C
English, Pierce, Session D, Group 3
Epefanio, Kamy, Session C
Erpelding, Zoe, Session D, Group 4
Espinosa, Kassidy, Session A
Farinati, Nicolo, Session A
Fernandez-Wagner, Bella, Session C
Fiermonti, Luke, Session C
Fijolek, Holly, Session C
Fleming, Henry, Session C
Flores, Faith, Session C
Ford, Alexa, Session C
Forrest, Leif, Session A
Frawley, Paige, Session A
Friesen, Andrea, Session E
Gandarias, Gabriel, Session C
Garda, Bodie, Session E
Gonzalez, Ruth, Session C
Garvey, Emmanuelle, Session C
Geiger, Sam, Session B, Group 4
Ha, Anh, Session A
Haley, Rachael, Session C
Hammers, Grace, Session E
Henke, William, Session B, Group 3
Hernandez, Dez (McKenzie), Session A
Hoang, Vinh-Khiem, Session B, Group 4
Hofmann, Kieran, Session C
Holmes, Maria, Session C
Holmes, Tucker, Session A
Honner, Morgan, Session A
Horsfall, Annabelle, Session C
Howlett, Amy, Session A
Hunsperger, Stella, Session C
Ireton, Jack, Session A
Jacobs, Jackie, Session E
Jacobson, Haley, Session E
Jaramillo, Gwen, Session D, Group 2
Jiang, Andre, Session E
Johnson, Sally, Session C
Jorgensen, Matthew, Session C
Juaire, Oliver, Session C
Kaleiwahea, Hayden, Session A
Kanae, Carissa, Session B, Group 3
Kary, Alex, Session A
Keane, Tristan, Session C
Kern, Krystal, Session A
Keyser, Alex, Session A
Khan, Nabi, Session A
King, Donovan, Session C
King, Pete, Session C
Knellhorne, Finley, Session A & C
Koerner, Isabel, Session C
Kornfeld, Elie, Session B, Group 4
Kreitlow, CJ, Session C
Kremer, Jordan, Session C
Lane, Karli, Session C
Laureano, Connor, Session A
Leathers, Emma, Session E

ewis, Ellen, Session C
Ling, Oliver, Session E
Loosmore, Jake, Session A
MacVicar, Ethan, Session A
Maldonado, Diego, Session C
Manning, Tanner, Session A
Manson, Katie, Session A
Mastrangelo, Mia, Session C
Maxwell, Delainey, Session A
McLoud, Michael, Session C
Meighan, Mia, Session A & C
Mercado, Aldo, Session E
Miranda, Caren, Session C
Miriy, Sabrina, Session C
Motschenbacher, Cassiopeia, Session E
Mouser, Maia, Session A
Moyer, Celia, Session E
Mullet, Melinda, Session B, Group 3
Mullin, Lauren, Session C
Myers, Ian, Session B, Group 4
Nguyen, Lyly, Session C
Nguyen, Tony, Session A
Nordberg, Rosalind, Session A
O'Hara, Audrey, Session A
O'Neill, Devon, Session D, Group 1
Ostlund, Wes, Session A
Ozuna Uriostegui, Lindsey, Session C
Page, Alexander, Session E
Park, Josh, Session C
Parzybok, Rowan, Session C
Patrick, Ainsley, Session A
Patterson, Ty, Session A
Peeler, Grace, Session C
Peterman, Madeline, Session C
Plowman, Reid, Session A
Powers, Ellie, Session E
Qian, Enqiao, Session B, Group 4
Robitaille, Michael, Session C & D, Group 3
Rose, Emma, Session C
Rosenberg, Caleb, Session A
Rovira, Megan, Session C
Ruhl, Allison, Session C
Sanchez, Brooke, Session E
Sande, Per, Session E
Savage, Sam, Session C
Schalkhauser, Sydney, Session C
Schleibinger, Hannah, Session C
Schlosser, Jacob, Session C
Schneider, Grace, Session A
Schoenauer, Nick, Session A & C
Schroeder, Henry, Session A & C
Schultheis, Matthew, Session D, Group 3
Sedano, Isabella, Session B, Group 1
Setiono, Anjanie, Session C
Sellers, Carson, Session C
Silbernagel, Raegan, Session E
Siler, Colton, Session C
Simmons, Matthew, Session D, Group 1
St. Jacques, Sophie, Session B, Group 1
Steinmann, Lleyton, Session A
Stevick, Hadley, Session C
Strohm, Erica, Session A & E
Suggs, Sydney, Session C
Tayyab, Rabi, Session C
Tilles, Isabel, Session A
Truong, Linh, Session A
Turner, Jordan, Session A
Twitty, Sam, Session
Vaccaro, Kate, Session D, Group 2
Vandergon, Mackenna, Session E
VanDerPuy, Owen, Session C
Wallace, Andrew, Session C
Watkins, Emma, Session C
Weiler, Emily, Session E
Werner, Jake, Session E
West, Andee, Session A
White, Kate, Session E
Whyte, Andrei, Session E
Willmarth, Alli, Session C
Woo, Victoria, Session D, Group 2
You, Zach, Session A
Zaugg, Jared, Session D, Group 4
Zastrow, Lauren, Session A & E
Zhou, Weichen, Session A

Faculty Sponsors

Prof. Doug Addleman, Gonzaga University

Prof. Kirk Anders, Gonzaga University

Prof. Betsy Bancroft, Gonzaga University

Prof. Marc Baumgardner, Gonzaga University

Prof. Julie Beckstead, Gonzaga University

Prof. Matt Bell, Whitworth University

Prof. Hector Botello, WSU

Prof. Patrick Carlin, WSU

Prof. Grant Casady, Whitworth University

Prof. Gary Chang, Gonzaga University

Prof. Anthony Clark, Whitworth University

Prof. Aaron Crandall, Gonzaga University

Prof. Jacqui Crissey, Gonzaga University

Prof. Eric Davis, Whitworth University

Prof. Nigel D'Souza, Gonzaga University

Prof. Bert Emerson, Whitworth University

Prof. Arturo Garcia Osorio, Gonzaga University

Prof. Renee Geck, Gonzaga University

Prof. Michelle Ghrist, Gonzaga University

Prof. Mark Gibson, WSU

Prof. Scott Griffith, Whitworth University

Prof. Joseph Haydock, Gonzaga University

Prof. Bill Hayes, Gonzaga University

Prof. Jens Hegg, Gonzaga University

Prof. Itohan Idumwonyi, Gonzaga University

Prof. Christina Isabelli, Gonzaga University

Prof. Luke Johnson, Gonzaga University

Prof. Kent Jones, Whitworth University

Prof. Harman Khare, Gonzaga University

Prof. Lada Kurpis, Gonzaga University

Prof. Mark Lange, WSU

Prof. Abdulla Mamun, Gonzaga University

Prof. Donna Mann, Whitworth University

Prof. Madeleine Mathews, Gonzaga University

Prof. Philip Measor, Whitworth University

Prof. Peter Moe, Whitworth University

Prof. Sammi Munson, Gonzaga University

Prof. Jen Neyman, Gonzaga University

Prof. Deanna Ojennus, Whitworth University

Prof. Daniel Olivares, Gonzaga University

Prof. Karla Parbon, Gonzaga University

Prof. Marianne Poxleitner, Gonzaga University

Prof. Rob Ray, Gonzaga University

Prof. Trisha Russell, Whitworth University

Prof. McCall Sarrett, Gonzaga University

Prof. Diana Schepens, Whitworth University

Prof. David Schipf, Whitworth University

Prof. David Schipf, Whitworth University

Prof. Jennifer Seo, Gonzaga University

Prof. Nicole Sheets, Whitworth University

Prof. Jennifer Shepherd, Gonzaga University

Prof. Kyle Shimabuku, Gonzaga University

Prof. Leslie Stamoolis, Gonzaga University

Prof. Nancy Staub, Gonzaga University

Prof. Adam Stivers, Gonzaga University

Prof. Sean Swan, Whitworth University

Prof. Maria Tackett, Gonzaga University

Prof. Ian Townley, Saint George's School

Prof. Jason Wollschleger, Whitworth University

Prof. Jay Yang, Gonzaga University

SESSION SUMMARIES

Session A – Poster Presentations

9:00-9:55 am, Hemmingson Ballroom

A1* *Freshwater Mussels as High-Resolution Recorders of Local Climate Data: Learning from an Imperiled Species*
Paige Frawley, (*she/her*) **Henry Schroeder**, (*he/him*), **Mia Meighan** -Gonzaga University

A2 *Understanding Endangered Sawfish Through Rostral Tooth Chemistry and Internal Structures*
Linh Truong, **Mia Meighan**, -Gonzaga University

A3 *The Evolution of the Major Regulatory Genes (FIH, VHL, CPD/P300, and PHD) for Hypoxia-Inducible Factor (HIF) in Verterbate Fish*
Zach You, (*he*), -Saint George's School

A4* *Buzzy Business: How does temperature affect abundance of European Wool Carder Bees (Anthidium manicatum)?*
Morgan Honner, **Nicolo Farinati**, -Gonzaga University

A5 *The Presence of Amylase in the Heads of Eurycea wilderae*
Ethan MacVicar, (*he/him*), **Ainsley Patrick**, (*she/her*), **Karli Bortner**, (*she/her*), -Gonzaga University

A6 *Acorn Woodpeckers, Helping Behavior, and Direct Fitness Benefits*
Caleb Rosenberg, (*he/him*), -Gonzaga University

A7 *Linear Recurrence Relations in Terms of Jordan Form Matrices*
Rylee Coney, (*she/her*), -Gonzaga University

A8 *Not Losing the Trees for the Forest: Mathematical Modeling of Trees Blowing in the Wind.*
Lucas Brandt, -Gonzaga University

A9 *Quantifying Differences between Quasiracemic Molecules in Inversion Structures*
Noah Dunham, (*he/him*), -Whitworth University

A10 *VS Code as Community: The Coding Social Hub for Peer Engagement and Collaboration*
Charles Bennington, (*he/him*), -Gonzaga University

A11 *Temperature Control System Development for the Investigation of the Impacts of Climate Change on Freshwater Ecosystems*
Keegan Davis, **Wes Ostlund**, -Whitworth University

A12 *AI vs Cyber Threats: Measuring Insights, Accuracy, and Actionability in CVE Analysis*
Tony Nguyen, **Isabel Tilles**, **Anh Ha**, -Gonzaga University

A13 *Pulsed Electrospray Ion Mobility Spectrometry*
Emily Edstrom, -Whitworth University

A14 *Effects of Transition Metal Cofactors on the Activity of RquA*
Tanner Manning, -Gonzaga University

A15 *Investigating Rhodoquinone Prescence in Sponges Containing the rquA Gene.*
Paige Carr, (*she/her*), **Lily Boercker**, (*she/her*), -Gonzaga University

A16 *Enzyme Activity of the Recombinant Endopeptidase (PepO) from Lactobacillus helveticus*
Ty Patterson, **Jake Loosmore**, -Whitworth University

A17 *Activity Assessment of Lactobacillus Helveticus PepX C408F in Comparison with Wild Type*
Dez (McKenzie) Hernandez, **Krystal Kern**, -Whitworth University

A18 *Synthetic Biology - Using iGEM strategies to build gene constructs at GU*
Evan Bissett, **Lleyton Steinmann**, **Gordon Austin**, **Yohei Aoki**, **Alex Kary**, -Gonzaga University

A19 *Crystallographic Analysis of Enantiopure Rimantadine Salts Formed During Optical Resolution*
Nguyen Do, (*he/him/his*), -Whitworth University

A20 *How Viruses Grant Superpowers to Their Hosts: Investigating Prophage-Dependent Immunity in Cluster F Phages Through Genetic Engineering of the Immunity Repressor Gene*
Kassidy Espinosa, -Gonzaga University

A21* *Investigating TOR Signaling Through Experimental Evolution of Caffeine-tolerant S. cerevisiae*
Amy Howlett, (*she/her*), **Katie Manson**, (*she/her*), -Gonzaga University

A22 *Conversion of (4S)-limonene Synthase to Produce 1,8-cineole by Mutations of Residues in the Active Site*
Connor Laureano, (*he/him*), -WSU

A23 *Evaluating Calcium Binding Effects on an x-Prolyl Aminodipeptidase's (PepX) Activity*
Nabi Khan, (*he/him*), -Whitworth University

A24 *Investigating growth and photophysiology of the bloom-forming cyanobacterium Microcystis aeruginosa to warming climates*
Audrey O'Hara, -Gonzaga University

A25 *Differential Inhibition of Bacterial Growth by Tea Extracts, and its Implications for Soil Decomposition Studies*
Lydia Davis, (*she/her*), **Nick Schoenauer**, (*he/him*), -Gonzaga University

A26* *Phytophthora: isolating invasive plant pathogens in Spokane*
Jack Ireton, **Matt Cochran**, **Maia Mouser**, **Rosalind Nordberg**, **Jordan Turner**, -Whitworth University

A27* *Unraveling Wheat Disparities: A Comprehensive Analysis of Yield Parameters in Wheat Varieties*
Matt Cochran, (*he/him*), -Whitworth University

A28 *EEG Decoding Analysis of Lexical Competition in Second Language Learners*
Hayden Kaleiwahea, (*he/him/his*), -Gonzaga University

A29* *Investigation of Water Quality Trends in Spokane River Tributaries*
Grace Schneider, (*she/ her*), **Tucker Holmes**, (*he/ him*), -Gonzaga University

A30* *Investigating the Association of Heavy Metals with Hangman Creek Sediment*
Sydney Einhorn, -Gonzaga University

A31* *Investigating Phosphorus Sorption to Sediment in Hangman Creek*
Kylie Alfaro, -Gonzaga University

A32* *Evaluating the Health of the Latah Creek Tributary and its Impact on the Health of the Spokane River by Aquatic Macroinvertebrate Analysis*
Andee West, -Saint George's School

A33 *Water Quality Research*
Weichen Zhou, (*he*), **Weichen Zhou**, (*he*), **Zeyu You**, (*he*), -Gonzaga University

A35* *The Effectiveness of a Token Economy and Mystery Motivator System on Talking Out Behavior by a 3rd Grader with an Other Health Impairment in an Elementary Behavior Intervention Classroom*
Lauren Zastrow, -Gonzaga University

A36* *The Effectiveness of a Token Economy on Out-Of-Seat Behavior by a Ten-Year-Old Female with Autism in a Self-Contained Special Education Classroom*
Erica Strohm, -Gonzaga University

A37* *HazARd: Gerontechnology Room Scanning*
Leif Forrest, (*he/him*), **Delainey Maxwell**, (*she/her*), **Reid Plowman**, (*he/him*), **Alex Keyser**, (*he/him*), -Gonzaga University

A43 *House of Ilium: The Past, The Present, and Other Epic Cycles*
Finley Knellhorne, (*she/her*), -Gonzaga University

SESSION SUMMARIES

Session C – Poster Presentations

11:05am -12:00pm, Hemmingson Ballroom

C7 *La barrera lingüística del sistema de salad para los hispanohablantes en EEUU*
Emma Rose, (*she/her/hers*), -Gonzaga University

C8 *From The Monkey King to Jia Baoyu: Chinese Literature's Influence on Japanese Visual Media*
Andrew Doughty, -Whitworth University

C9* *Reimagining Equitable Access to the Spokane River*
Lauren Mullin, (*she/her/hers*), **Annie Cooper**, (*she/her/hers*), **Kieran Hofmann**, (*he/him/his*), **Bella Fernandez-Wagner**, (*she/her/hers*), -Gonzaga University

C10* *Creating a Sense of Place Through Ecological Interpretation: The Children of the Sun Trail*
Ella Beck, **CJ Kreitlow**, **Connor Robitaille**, (*they/them*), **Luke Fiermonti**, -Gonzaga University

C11 *Predictors of Academic Achievement*
Madeline Peterman, -Gonzaga University

C12 *Exploring Social Dilemmas in Board Games: Investigating Cooperation and Competition in Catan*
Alexa Ford, (*she/her*), **Karli Lane**, (*she/her*), **Annie Aloisio**, (*she/her*), -Gonzaga University

C13 *Learning to Look: An Eye Tracking Study of Generalization of Learning in Visual Search*
Olivia Caputo, (*she/her*), **Luke Brenchly**, (*he/him*), **Emmanuelle Garvey**, **Donovan King**, (*he/him*), **Rowan Parzybok**, **Sydney Schalkhauser**, **Anjanie Setiono**, -Gonzaga University

C14 *Motivations of Fantasy Football*
Faith Flores, -Gonzaga University

C15 *The Effect of Syntactic Expectations on Acoustic Encoding*
Oliver Juaire, -Gonzaga University

C16 *The Grzelak-Kuhlman Control Orientations Inventory*
Lyly Nguyen, **Grace Peeler**, **Liliana Cooper**, -Gonzaga University

C17* *Building a Low-Waste Culture: Navigating the Barriers to Waste Reduction in Spokane*
Megan Rovira, **Rachael Haley**, **Ellen Lewis**, **Henry Fleming**, -Gonzaga University

C18* *Addressing Science Education Disparities through Science in Action!*
Sydney Suggs, **Sam Twitty**, **Stella Hunsperger**, (*she/her*), **Colton Siler**, (*he/him*), **Ben Conover**, (*he/him*), -Gonzaga University

C19* *Monitoring Microplastics in the Spokane River: A Citizen Science Approach*
Hadley Stevick, **Annabelle Horsfall**, **Tereza Dudzik**, -Gonzaga University

C20* *Redesigning for Resilience: A Shift from Traditional Landscaping to Sustainable Xeriscaping*
Michael McLoud, (*he/him*), **Andrew Wallace**, (*he/him*), **Sabrina Miriy**, (*She/Her*), **Isabel Koerner**, (*she/her*), -Gonzaga University

C21* *Managing Invasive Grass Carp in a Man-Made Wetland: Ecological Impacts and Restoration Strategies for Reflection Lake*
Sam Savage, **Patrick Bennett**, J**ohn Bergin**, **Abel Cameron**, -Gonzaga University

C22* *Plant Restoration Planning for a Recreational Lake Ecosystem*
Mia Mastrangelo, (*she/her*), **Holly Fijolek**, (*she/her*), **Owen VanDerPuy**, (*he/him*), **Jordan Kremer**, (*she/her*), -Gonzaga University

C23* *Inspiring Ecological Engagement Through Environmental Education and Interpretive Media*
Sally Johnson, **Allison Ruhl**, **Sophia Eliason**, **Emma Watkins**, -Gonzaga University

C24* *Effects of Forestry Treatments on Upper Cemetery Fire*
Tristan Keane, **Conner Atwood**, (*they, them*), **Mia Meighan**, **Pete King**, -Gonzaga University

C25* *Fútbol: ¿Bueno o no?*
Kamy Epefanio, -Gonzaga University

C26 *El ciclo de abuso de sustancias para las trabajadores sexuales in México*
Hannah Schleibinger, (*she/her*) -Gonzaga University

C27 *Drug Misuse Among Hispanic Populations in the United States*
Noah Elliott, -Gonzaga University

C28 *Deep Diffractive Neural Network Simulation*
Jacob Schlosser, **Rabi Tayyab**, -Whitworth University

C29* *Wildfires Impact on Water Treatment*
Alli Willmarth, (*she/her*), **Matthew Jorgensen**, -Gonzaga University

C30* *Modeling and Testing Photopolymerization for Photonic Ceramic 3D Printing*
Josh Park, -Whitworth University

C31* *Smoke Ready Spokane Dashboard and Sensor Installation*
Diego Maldonado, **Gabriel Gandarias**, -Gonzaga University

C32 *Tribological Performance of Fe_2O_3 and Fe_3O_4 PTFE Composites on Steel and Aluminum*
Lexi Durbin, -Gonzaga University

C37 *The VTuber Market Case Study - Hololive Production as a Business*
Daniel Arinez, -WSU

C38 *From Street to Suit: The Effects of Adolescent Gang Involvement on Adult Economic Outcomes through the Life Course Theory*
Maria Holmes, -Gonzaga University

C39 *Machismo and Its Implications in the Hispanic Community*
Caren Miranda, -Gonzaga University

C40 *Cáncer de mama en mujeres hispanas*
Ruth Gonzalez, (*she/her*), -Gonzaga University

C41 *Diabetes in Hispanic Communities: Overcoming Cultural and Systemic Barriers*
Lindsey Ozuna Uriostegui, (*she/her*), -Gonzaga University

C42 *Measuring Forest Stand Resiliency and Health in the Face of Climatic Disturbances and the Implications for Future Forest Management Actions in the Dishman Hill's Nature Conservancy*
Carson Sellers, (*he/him*), **Henry Schroeder**, (*he/him/his*), **Tommy Eisenstat**, **Nick Schoenauer**, -Gonzaga University

C43 *House of Ilium: The Past, The Present, and Other Epic Cycles*
Finley Knellhorne, (*she/her*), -Gonzaga University

SESSION SUMMARIES

Session E – Poster Presentations

2:00-2:55 pm, Hemmingson Ballroom

E9* *Breakdown or Break-it-Down: Dance Movement Therapy for Dancers*
Raegan Silbernagel, -Gonzaga University

E10 *Stage Managing Tartuffe*
Andrei Whyte, (*he/him*), -Gonzaga University

E11 *How to Audition for Everything*
Alexander Page, (*he/him*), -Gonzaga University

E13* *The Effects of a Model, Lead, Test Procedure on the Comprehension of Safety Signs by Two High School Students with Disabilities in a Self-Contained Special Education Classroom*
Aundrea Davit, **Lauren Zastrow**, **Ellie Powers**, -Gonzaga University

E14* *The Effects of Copy Cover Compare on Spelling Nine CVC words by a Seven-Year-Old Female with Autism in a Self-Contained Classroom*
Aundrea Davit, -Gonzaga University

E15* *The Effects of a Guided Practice with Visual Direction Chart Instructional Package on Following Three-Step Instructions by a Preschool-Aged Female with Speech Delays in an Integrated Preschool*
Jackie Jacobs, -Gonzaga University

E16* *The Effectiveness of a Model-Lead-Test Procedure on CVC Word Identification by a First Grade Female with Autism in a Self-Contained Classroom*
Brooke Sanchez, -Gonzaga University

E17* *The Effectiveness of a Token Economy on On-Task Behaviors by a Middle School Male with Autism in a Self-Contained Special Education Classroom*
Mackenna Vandergon, **Erica Strohm**, -Gonzaga University

E18* *The Effectiveness of a Direct Instruction Flashcard System on Sight Word Identification by a Middle School Female with Multiple Disabilities in a Self-Contained Classroom*
Bodie Garda, **Brooke Sanchez**, -Gonzaga University

E19* *An Analysis Evaluating the Effectiveness of Direct Instruction Flashcards on Sight Word Identification for a Nineth Grade Male with an Other Health Impairment in a High School Resource Room*
Grace Hammers, **Jackie Jacobs**, -Gonzaga University

E20 *Through the Waters: An Occupational Therapy Aquatic Program for Polytrauma Recovery- A Capstone Project Proposal*
Emma Leathers, -Whitworth University

E21* *Fostering Stability: The Role of Occupational Therapy in Family-Cantered Shelter Programs*
Kate White, -Whitworth University

E22* *Fascia and Function: The Role of Myofascial Release in OT.*
Aldo Mercado, -Whitworth University

E23* *Building Outcomes of Student Thriving: Developing an On-Campus Occupational Therapy Program to Support Student Role Fulfillment*
Andrea Friesen, -Whitworth University

E24 *Strengthening Occupational Therapy in Maternal Health: Pathways for Skill Development and Practice Integration*
Alexa Cach, (*she/her*), -Whitworth University

E25* *Advancing Perinatal Health Equity to Reduce Racial Disparities in Maternal and Infant Mortality and Morbidity*
Giovanna Consiglio, -Gonzaga University

E26 *Unrealized Harmony: A Framework for Intentional Music Use in Occupational Therapy Practice*
Emily Weiler, -Whitworth University

E27 *Doctoral Capstone Project Proposal - Bridging the Gap: A Study of School-Based OTs and the Development of an Effective Practice Model*
Celia Moyer, -Whitworth University

E28 *Expanding the Role of Occupational Therapy in Hospice Care: A Doctoral Capstone Proposal*
Haley Jacobson, -Whitworth University

E29 *The Effect of Ribosome-Targeting Antibiotics on Breast Cancer Cell Proliferation*
Oliver Ling, -Saint George's School

E30 *Toxicity of Grapes on Dogs*
Andre Jiang, **Per Sande**, -Saint George's School

E31 *Effect of Soil Amended with Biochar on Growth Dynamics of Radishes*
Colin Brennan, **Jake Werner**, -Saint George's School

E37 *Stage Management for Stupid F**king Bird*
Cassiopeia Motschenbacher, (*she/they*), -Gonzaga University

E43 *House of Ilium: The Past, The Present, and Other Epic Cycles*
Finley Knellhorne, (*she/her*), -Gonzaga University

SESSION SUMMARIES
Session B – Oral Presentations

Group 1, Hemmingson 310, La Storta. Faculty moderator: Sean Swan

B1* *Unequal Pathways: Race, Religion, and Resettlement in Spokane's Immigrant and Refugee Communities*
Hannah Cordero-Johnson, (*she/her*) -Whitworth University

B2* *Los hablantes de herencia: The Realities of Heritage Language Learners in the United States*
Isabella Sedano, -Gonzaga University

B3* *Rewriting Representation: How Portland's Ranked-Choice Voting Transition Models a More Equitable Democracy*
Sophie St. Jacques, (*she/her*), -Whitworth University

B4 *The Economic and Geopolitical implications of Turkey's rise as a producer of affordable military drones in the global arms trade*
Daniel Arinez, -WSU

Group 2, Hemmingson 312, Firenze. Faculty moderator: Luke Johnson

B5 *Evaluating Heuristics for the Fitness of Random Linear Codes over the Binary Field*
Ian Myers, (*he/him*), -Gonzaga University

B6 *Multi-Station Tribometer Instrumentation*
Vinh-Khiem Hoang, -Gonzaga University

B7 *A 3D printed Microfluidic Device and Miniaturized Fluorimeter Towards Low-resource Environments*
Enqiao Qian, -Whitworth University

B8 *Visualizing Photons with Geometric Algebra*
Moab Croft, -Whitworth University

Group 3, Hemmingson 308, Cali. Faculty moderator: Nicole Sheets

B9 *The Use of Violent Language in the Quotidian*
William Henke, -Whitworth University

B10* *Examining the Similarities of Religious Traditions in Africa to East Asia*
Carissa Kanae, (*she/her*), -Gonzaga University

B11* *The Future of Hospice Care in Spokane County: A Christian Response*
Melinda Mullet, (*she/her*), -Whitworth University

Group 4, Hemmingson 306, Goa. Faculty moderator: Donna Mann

B12* *Accessories for Walking Assistive Devices to Improve Quality of Life in Elder Care*
Tate Beasley, (*she/her*), **Sam Geiger**, (*he/him*), -Gonzaga University

B13* *The Effectiveness of Trade Unions in Combatting Growing Income Inequality*
Elie Kornfeld, (*he/him*), -Gonzaga University

SESSION SUMMARIES
Session D – Oral Presentations

Group 1, Hemmingson 310, La Storta. Faculty moderator: Maria Tackett

D1 *The US Dollar Supply Crisis in Bolivia*
Daniel Arinez, -WSU

D2 *The Female Mortality Rate during Pregnancy and its Relationship to Poverty*
Brooke Bowen, -Gonzaga University

D3* *Rural Economic Resilience: Agricultural Adaptation in the Post-Pandemic Landscape*
Devon O'Neill, (*he/him*), -Gonzaga University

D4 *Poor Me a Cup of Crime*
Matthew Simmons, -Gonzaga University

Group 2, Hemmingson 312, Firenze. Faculty moderator: Lada Kurpis

D5 *Femininity Through the Colonial Patriarchal Gaze*
Gwen Jaramillo, (*she/her*), -Gonzaga University

D6 *Plastic Summers*
Sydney Anderson, -Whitworth University

D7 *399 Reasons to be Afraid*
Kate Vaccaro, (*she/her*), -Whitworth University

D8* *8Algorithmic similarities between music and language processing*
Victoria Woo, -Whitworth University

Group 3, Hemmingson 308, Cali. Faculty moderator: Julie Beckstead

D9* *Restoration Resilience: Identifying Seed Species Adapted to Reoccurring Wildfire*
Michael Robitaille, (*they/them*), -Gonzaga University

D10* *How do Variations in Macronutrient Content of Soil Affect Replanting Efforts in Central Washington?*
Matthew Longstreth, **Matthew Schultheis**, **Pierce English**, -Saint George's School

Group 4, Hemmingson 306, Goa. Faculty moderator: Michelle Ghrist

D11 *Analyzing One and Two-Step Free Parameter Predictor-Corrector Multistep Methods*
Zoe Erpelding, (*she/her*), -Gonzaga University

D12 *Analyzing the Stability and Performance of Two-Step Symmetric Multistep Methods*
Juliana Cavallini, -Gonzaga University

D13 *Examining Factors Contributing to COVID-19-Related Isolation Among Adults with Disabilities*
Jared Zaugg, -Gonzaga University

SESSION SUMMARIES

Panel Discussion: "Serving Spokane"

3:05-4:00pm, Hemmingson 004, Auditorium (lower level)

Olivia Evans *(Multi-disciplinary Visual Artist and Producer; Adjunct Art Professor, Whitworth University)*

Olivia Evans is a Mixed Race, Multidisciplinary Visual Artist, Producer, Whitworth Adjunct Professor, and owner of Mama Wolf Media, based in Spokane, WA. Working in photography, drawing, film/ video, beadwork, modeling, and consulting, her focus is to uplift & empower stories from BIPOC & historically underrepresented communities, including her own lived experiences. Olivia is driven by a belief in the power of storytelling to transform lives, and moves through this world with intention, trauma-informed values, and the hope that within community anything is possible.

Anna Marie Medina *(Professor, Department of Psychology, Gonzaga University)*

Anna Marie Medina is a Professor Psychology at Gonzaga University.
She has used community-engaged learning for about 18 years in almost all of her courses.
She loves her job and drinks entirely too much coffee.

Christie Nepean *(Assistant Principal, Logan Elementary)*

Christie Nepean has worked as a public educator for over 35 years. She currently serves in the role of principal assistant at Logan Elementary School in Spokane Washington.

Wendy Thompson [*Confederated Salish and Kootenai Tribes*], *(Director of Tribal Relations, Mission Integration, Gonzaga University)*

Wendy Thompson has spent the past two decades advocating for Native students at Gonzaga and supporting Gonzaga in understanding and acknowledging itself not just as *having* a mission, but *being* a mission, one with a unique history and relationships with tribal communities.

James Hunter *(Professor, Teacher Education, Gonzaga University)*

James Hunter has taught ESL/EFL for over 30 years and is the director of TESOL Programs at Gonzaga University. He has a PhD in Applied Linguistics from the University of Birmingham, UK, and his research interests include Second Language Acquisition, corpus linguistics, instructional technologies, and teacher development.

POSTER PRESENTATIONS – Titles, Names, Abstracts

Session A (9:00 – 9:55am) Hemmingson Ballroom

A1* *Freshwater Mussels as High-Resolution Recorders of Local Climate Data: Learning from an Imperiled Species*
Paige Frawley, (*she/her*) **Henry Schroeder**, (*he/him*), **Mia Meighan**, Gonzaga University
Faculty Mentor: Jens Hegg
Abstract: Native freshwater mussels play a key role in aquatic ecosystems in the Inland Northwest, while their shells potentially record important local climate data in the growth rings and chemistry recorded through their 50-100 year lifespan. Growth chronologies quantified in a sample of Western Ridged Mussels from the Snake River in Southern Idaho showed a strong and statistically significant correlation with local winter temperature over a 29 year span. This result is the first to show such a location-specific climate correlation and indicates that native mussels may be an untapped resource of local climate data.

A2 *Understanding Endangered Sawfish Through Rostral Tooth Chemistry and Internal Structures*
Linh Truong, **Mia Meighan**, -Gonzaga University
Faculty Mentor: Jens Hegg
Abstract: Largetooth sawfish (Pristis pristis) are an endangered ray with a rostrum containing a large number of teeth. Due to population declines, live fish are difficult to study and track, limiting our understanding of their life history and behavior. Rostra are often preserved, providing a more accessible way to study life history compared to live fish. Internal tubule structure of 7 teeth, imaged using micro-CT, might reveal important information on fish length and age. Chemical analysis of 45 teeth, done via LA-ICPMS, provides information on movement through salinity and possible juvenile rearing areas that is crucial to conservation efforts. Studying preserved rostra might aid the development of non-lethal methods to obtain basic information that is crucial to understanding the species.

A3 *The Evolution of the Major Regulatory Genes (FIH, VHL, CPD/P300, and PHD) for Hypoxia-Inducible Factor (HIF) in Verterbate Fish*
Zach You, (*he*), -Saint George's School
Faculty Mentor: Ian Townley
Abstract: When oxygen becomes limiting, enzymes and pathways form an intricate regulatory network to maintain cellular homeostasis: cells reduce oxygen consumption, switch to glycolysis, and activate protective pathways called Hypoxia-inducible factors (HIFs). It involves a highly integrated network of genes and pathways to stabilize and activate HIF, including Factor Inhibiting HIF (FIH), Prolyl Hydroxylase Domain Proteins (PHDs), Von Hippel-Lindau Tumor Suppressor (VHL), CREB-Binding Protein/EP300(CBP/p300), etc. Fish live in an extremely oxygen-deprived environment, which means they have a complete system above. However, different fish species may have had different gene codes in these genes due to evolution and the different environments. The previous research has already found the evolution of HIF in different fish species, so I'm curious whether FIH, PHD, VHL, and CPB/p300 have the same evolution as HIF. I use common carp, zebrafish, mummichog, rainbow trout, and torafugu as samples to make a comparison.

A4* *Buzzy Business: How does temperature affect abundance of European Wool Carder Bees (Anthidium manicatum)?*
Morgan Honner, **Nicolo Farinati**, -Gonzaga University
Faculty Mentor: Gary Chang
Abstract: The European Wool Carder Bee (Anthidium manicatum) is an invasive and aggressive species that occurs on Gonzaga's campus. European Wool Carder Bee are particularly attracted to the Blue Sage (Salvia farinacea) on Gonzaga University's campus. Through looking at the previous four years of data there is consistent positive correlations between European Wool Carder Bee abundance and increasing temperatures over the summer months (2024, 2023, 2022, and 2021) of June, July and August. These correlations are consistent even with differentiation between the abundance of the European Wool Carder Bee over each of the four summers. Further research involves looking at minimum temperature for activity for the European Wool Carder Bee and their behavior (aggressive and mating behaviors) amongst the other local pollinators (Male Wool Carder Bees, Female Wool Carder Bees, Honey Bees, and Bumble Bees). Further understanding the

European Wool Carder Bee within Spokane can help with greater ecological and biodiversity understanding within the local Inland Northwest. This is especially important because of their invasive and aggressiveness with the other local pollinators within the community of Spokane, Washington.

A5 *The Presence of Amylase in the Heads of Eurycea wilderae*

Ethan MacVicar, (*he/him*), **Ainsley Patrick**, (*she/her*), **Karli Bortner**, (*she/her*), -Gonzaga University
Faculty Mentor: Nancy Staub

Abstract: We analyze and locate the glands present in heads of male and female Eurycea wilderae. In previous research the presence of digestive enzymes has been disputed; we provide the first look at the distribution of amylase throughout glands in the head using immunohistochemistry and other histological techniques. We have found evidence of amylase in the intermaxillary glands, choanal glands, buccal glands, brain, and nasal cavity.

A6 *Acorn Woodpeckers, Helping Behavior, and Direct Fitness Benefits*

Caleb Rosenberg, (*he/him*), -Gonzaga University
Faculty Mentor: Joseph Haydock

Abstract: This is an analysis of the effect that Helping Behaviors have on Acorn Woodpeckers' future inclusive fitness. Using data collated from years of study and analyzed with R, there does not seem to be a direct fitness benefit to being a helper, implying the ecological constraints theory of explaining helping behavior to be more true in Acorn Woodpeckers.

Linear Recurrence Relations in Terms of Jordan Form Matrices

A7 **Rylee Coney**, (*she/her*), -Gonzaga University
Faculty Mentor: Rob Ray

Abstract: Given an nth order linear recurrence relation with its associated companion matrix, the sequence generated by the recurrence relation can be generated in an alternative and potentially useful way, from the associated Jordan form.

A8 *Not Losing the Trees for the Forest: Mathematical Modeling of Trees Blowing in the Wind.*

Lucas Brandt, -Gonzaga University
Faculty Mentor: Michelle Ghrist

Abstract: We used fourth-order partial differential equations from beam vibration dynamics to model the motion of trees due to gusts of wind. After nondimensionalizing the problem, we solved analytically via separation of variables and eigenfunction expansion, using three different sets of boundary conditions with a variety of wind forcing functions. From these results, we examined the stress distribution along the trunk of the tree. We used Mathematica to perform calculations and visualize results. We also considered nonlinear damping forces as well as different functions for the taper of the trunk. In addition, alternate approaches and extensions such as branch-stem interaction will be discussed.

A9 *Quantifying Differences between Quasiracemic Molecules in Inversion Structures*

Noah Dunham, (*he/him*), -Whitworth University
Faculty Mentor: Diana Schepens

Abstract: Quasiracimates - pairs of near enantiomers - assemble within crystals into inversion structures that mirror those of true enantiomers. Previous research has shown that within crystal structures there is some tolerance for molecules to deviate from each other. The boundary on the difference in size and shape while maintaining a crystal structure is unknown. This poster develops an algorithm to compute the inversion center of pairs of molecules in a crystal structure, providing a means of computing deviance from a perfect inversion symmetry.

A10 *VS Code as Community: The Coding Social Hub for Peer Engagement and Collaboration*

Charles Bennington, (*he/him*), -Gonzaga University
Faculty Mentor: Daniel Olivares

Abstract: This study investigates how collaborative learning tools can enhance student engagement, motivation, and community-building in introductory computer science education. Research shows that novice CS students often experience isolation in traditional individual-focused coursework, and existing tools such as Discord or Replit lack the scaffolding, motivation, and social features necessary for effective learning. To address these gaps, we developed a prototype extension—Coding Social Hub (CSH)—for Visual Studio Code. CSH allows students to build user profiles, complete scaffolded coding challenges, earn gamified rewards, and communicate with peers via chat and forum-based features.

To evaluate the usability and potential educational benefits of this tool, we are conducting a usability study with undergraduate CS students. In preparation, we developed an IRB protocol, including a background questionnaire, task-based usability instructions, an exit survey, and informed consent documents. The study will be conducted in a reserved campus lab, and data will be collected through screen recordings, timing logs, and participant feedback. Results from this usability testing will inform future development and research on collaborative, community-focused tools for CS education.

A11 *Temperature Control System Development for the Investigation of the Impacts of Climate Change on Freshwater Ecosystems*

Keegan Davis, **Wes Ostlund**, -Whitworth University
Faculty Mentor: Scott Griffith

Abstract: This research project seeks to understand the impacts of climate change on local freshwater ecosystems. Our task was to implement a redesigned temperature control system used to simulate increased temperatures during ecological research experiments. The new system uses temperature probes and heaters connected to a distributed embedded computer system to regulate the temperature within aquarium tanks. This allows us to simulate future freshwater climates to investigate how they may impact the organisms living in them.

A12 *AI vs Cyber Threats: Measuring Insights, Accuracy, and Actionability in CVE Analysis*

Tony Nguyen, **Isabel Tilles**, **Anh Ha**, -Gonzaga University
Faculty Mentor: Jay Yang

Abstract: This study evaluates the reliability of ChatGPT when tasked with analyzing Common Vulnerabilities and Exposures (CVEs). We compare model outputs for known vulnerabilities published in 2020-2021 with emerging/unknown CVEs from 2024-2025. Using standardized prompts, we assess insightfulness, verifiability, relevance, and hallucination rates. Our results show that ChatGPT alone is useful for summarizing well-documented CVEs, but it becomes error-prone with newly disclosed issues. We recommend that, to analyze the vulnerabilities effectively, the LLM must be fetched with adequate references and provided with sufficient guidance as a pipeline to alleviate hallucinations and increase accuracy and insightfulness.

A13 *Pulsed Electrospray Ion Mobility Spectrometry*

Emily Edstrom, -Whitworth University
Faculty Mentor: Eric Davis

Abstract: Ion mobility spectrometry (IMS) is a technology commonly used in homeland security applications for trace detection of explosives and narcotics. In this work, a pulsed ionization source was developed as an alternative to the conventional gating method in IMS for sample introduction. By using an adjustable low-amplitude pulsing circuit, a 100-1,000 V pulse can be generated with sub-microsecond rise times. The Field-Effect-Transistor (FET) based pulser maintains the voltage below the onset threshold for ionization and rapidly pulses above this level to produce an ionization event. This method is demonstrated with Corona Discharge Ionization (CDI) and Electrospray Ionization (ESI) methods. Fourier transform IMS is also investigated for its use in improving the resolving power of spectra by reducing the presence of transient ion species.

A14 *Effects of Transition Metal Cofactors on the Activity of RquA*

Tanner Manning, -Gonzaga University
Faculty Mentor: Jennifer Shepherd

Abstract: This study investigates the effects of metal cofactors on the activity of RquA (an amino transferase necessary for the biological synthesis of rhodoquinone), with a focus on manganese, cobalt, and zinc. EDTA-treated RquA was exposed to varying concentrations of these metals, and binding interactions were quantified using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) to assess metal incorporation into the protein. Through a series of treatment and rescue assays, the conversion of ubiquinone-3 to rhodoquinone-3 was analyzed to explore the activity of these three transition metal cofactors. The results reveal distinct concentration-dependent trends in RquA activity, highlighting the differential impact of Manganese, Cobalt, and Zinc on the enzyme's function.

A15 *Investigating Rhodoquinone Prescence in Sponges Containing the rquA Gene.*

Paige Carr, (*she/her*), **Lily Boercker**, (*she/her*), -Gonzaga University
Faculty Mentor: Jennifer Shepherd

Abstract: Rhodoquinone (RQ) is an essential electron carrier used in anaerobic metabolism by certain eukaryotes, including sponges. Freshwater sponges possess the rquA gene necessary for RQ biosynthesis yet lack some of the known genes required for ubiquinone (UQ) synthesis, the precursor for RQ. Marine sponges lack the rquA gene. This study investigates the presence and biosynthetic origins of RQ and UQ in sponges containing the rquA gene. Lipid extractions were performed on both freshwater and marine sponge samples, followed by LC-MS analysis to quantify UQ and RQ levels. Results indicate that freshwater sponges have a higher RQ:UQ ratio compared to marine sponges, which exhibited high levels of UQ and only trace RQ. This suggests that freshwater sponges may utilize an alternative biosynthetic pathway or acquire UQ externally to meet metabolic needs. Further research is needed to identify the enzymes responsible for this pathway. This study advances the understanding of quinone biosynthesis in sponges and offers insights into metabolic adaptations in anaerobic environments.

A16 *Enzyme Activity of the Recombinant Endopeptidase (PepO) from Lactobacillus helveticus*

Ty Patterson, **Jake Loosmore**, -Whitworth University
Faculty Mentor: Deanna Ojennus

Abstract: PepO, an intracellular endopeptidase, plays a crucial role in the proteolytic system of Lactic Acid Bacteria (LAB). During dairy fermentation, LABs utilize PepO in conjunction with other peptidases to break down milk proteins into smaller peptides and amino acids. This process begins with a cell wall-bound proteinase that acts on the milk proteins before they are transported into the cell, where PepO then takes over. In this study, the L. helveticus PepO gene was cloned into a pET14b vector and overexpressed in E. coli BL21(de3)pLysS cells. Induction with IPTG produced a 73.6 kDa recombinant PepO protein with an N-terminal histidine tag. PepO's predicted zinc-dependent metalloproteinase activity stems from a conserved HEXXH zinc binding motif (residues 496-500). The research investigated the activity of the recombinant PepO on the substrate [MET5]-Enkephalin in cell lysate, as well as following purification with zinc and nickel columns.

A17 *Activity Assessment of Lactobacillus Helveticus PepX C408F in Comparison with Wild Type*

Dez (McKenzie) Hernandez, **Krystal Kern**, -Whitworth University
Faculty Mentor: Deanna Ojennus

Abstract: Prolyl aminodipeptidases (PepX) are responsible for the breakdown of peptide bonds (through hydrolysis) at the N-terminus, specifically penultimate proline residues. The focus of this research relates to the activity and functional specificity of Lactobacillus helveticus PepX when mutated at the C408 position (mimicking Lc. lactis PepX that has a phenylalanine). This is to determine how structural difference in the substrate binding site of Lb. helveticus PepX could explain its preference for alanine at the N-terminus of peptide substrates as opposed to arginine in the case of Lc. lactis PepX. PepX C408F was expressed and purified prior to performing an activity assay with the substrate mimic GPpNA. Activity was compared to wild-type PepX and a measured Km was compared to literature values. A slight decrease in enzyme activity and binding affinity of PepX C408F suggests position C408 is involved in determining binding specificity.

A18 *Synthetic Biology - Using iGEM strategies to build gene constructs at GU*

Evan Bissett, **Lleyton Steinmann**, **Gordon Austin**, **Yohei Aoki**, **Alex Kary**, -Gonzaga University
Faculty Mentor: Marianne Poxleitner

Abstract: Our team used gene parts provided by the iGEM consortium to build large gene constructs. The International Genetically Engineered Machine (iGEM) competition provides students with thousands of gene “parts” including ribosome binding sites, promotors, gene coding sequences, and terminators. Using advanced cloning techniques, we successfully created two different plasmids, each with the four “parts” in the proper order. Our work resulted in expression of a pink and a blue chromophore in E. coli. This is the first step (Level 1) of a multistep process to create a larger (Level 2) construct with four different expression systems under different promotor control.

A19 *Crystallographic Analysis of Enantiopure Rimantadine Salts Formed During Optical Resolution*

Nguyen Do, (*he/him/his*), -Whitworth University
Faculty Mentor: Trisha Russell

Abstract: The antiviral drug rimantadine has found applications in the creation of chiral ligands for nickel-based organometallic catalysts. Rimantadine is used medicinally as a racemic mixture with each enantiomer having similar bioactivity. However, rimantadine-based ligands for chiral catalysts require the use of enantiopure rimantadine. In this study, we are interested in analyzing the crystal structures of the diastereomeric salts formed in the optical resolution of rimantadine. We have isolated the (R)- and (S)-enantiomers of rimantadine using the resolving agents tosyl-L-proline and (R)-2-phenoxypropionic acid, respectively. The isolated enantiomers were then separately recombined with each of the resolving agents. X-ray quality crystals of the favored (S)-rimantadine·(R)-2-phenoxypropionic acid diastereomeric and (R)-rimantadine·tosyl-L-proline salts were grown using ethyl acetate or acetonitrile. Crystal structures of the two different salts will be presented. Optimization of the crystallization conditions for the non-favored (R)-rimantadine·(R)-2-phenoxypropionic acid and (S)-rimantadine·tosyl-L-proline salt diastereomeric salts is ongoing.

A20 *How Viruses Grant Superpowers to Their Hosts: Investigating Prophage-Dependent Immunity in Cluster F Phages Through Genetic Engineering of the Immunity Repressor Gene*

Kassidy Espinosa, -Gonzaga University
Faculty Mentor: Kirk Anders

Abstract: Using genetic engineering to clone the immunity repressor gene in Cluster F phages has provided insights into prophage-dependent immunity. My research builds on the work of previous students, offering a deeper understanding of how bacteriophages confer immunity to their bacterial hosts.

A21* *Investigating TOR Signaling Through Experimental Evolution of Caffeine-tolerant S. cerevisiae*

Amy Howlett, (*she/her*), **Katie Manson**, (*she/her*), -Gonzaga University
Faculty Mentor: Renee Geck

Abstract: Caffeine inhibits the protein TOR, which regulates cellular processes including growth and nutrient response. By investigating what mutations contribute to increased caffeine tolerance, we can learn about TOR regulation and parallel pathways that compensate for TOR inhibition. To do this, we conducted experimental evolution of yeast in caffeine: culturing yeast in increasing concentrations of caffeine until we observed increased ability to grow in high concentrations of caffeine due to selection for yeast with beneficial mutations. We conduct these experiments in collaboration with high school classes through yEvo (yeast Evolution) lab, so we have more replicates to study but also involve more Spokane-area high school students in authentic research. After isolating yeast with increased growth in caffeine, we sequenced their genomes to identify mutations responsible for their increased caffeine tolerance. We will look for patterns such as mutations affecting the same gene or genes in a related pathway. We anticipate that many of these will be in pathways related to TOR signaling. In the future, we will study these mutations to understand pathways connected to TOR in yeast, and also develop new projects with our high school collaborators to learn how other molecules effect yeast.

A22 *Conversion of (4S)-limonene Synthase to Produce 1,8-cineole by Mutations of Residues in the Active Site*

Connor Laureano, (*he/him*), -WSU
Faculty Mentor: Mark Lange

Abstract: Monoterpene synthases bring about the first committed step in monoterpene biosynthesis. This class of secondary metabolites displays a great degree of structural diversity. Structural variability is dependent upon carbocation formation with the removal of pyrophosphate from its substrate, geranyl diphosphate (GPP). Recombinantly produced wild-type (4S)-limonene synthase (LMNS) produces ~ 97% (-)-limonene in assays with GPP. However, through active site manipulation, the enzyme can synthesize multiple products from GPP. This capability occurs via alterations to the enzyme active site, which subsequently influences carbocation formation and the resulting variety of terpene products, including stereoisomers.

In the present work, we are in the process of performing comparisons between LMNS and 1,8-cineole synthases from mint and other plant species. Sequence conservation patterns and protein structural modeling are used to guide the choice of mutations that alter product formation.

Mutagenesis is accomplished via PCR, recombinant protein production in E. coli, protein purification, and enzyme assays. Product specificity is characterized using Gas Chromatography. The variants studied display drastically less (-)-limonene, whereas product formation of other monoterpenes increases. At the end of the study, we will be able to determine the number of mutations required for the conversion of LMNS to produce 1,8-cineole as its primary output.

A23 *Evaluating Calcium Binding Effects on an x-Prolyl Aminodipeptidase's (PepX) Activity*

Nabi Khan, (*he/him*), -Whitworth University
Faculty Mentor: Deanna Ojennus

Abstract: PepX is a prolyl aminodipeptidase from Lactobacillus helveticus. PepX contains a calcium-binding site with a DxDxDG motif, a site heavily conserved between other lactobacilli. While this suggests calcium is important for PepX activity, such research is limited. Previous work showed that a double-mutation in the binding region (D194A/D196A) eliminated activity while the single-mutant (D196A) was nearly as active as the wild-type, but with potentially reduced calcium affinity. Additionally, previous attempts to strip calcium using EDTA did not affect enzyme activity. This study aimed to verify calcium's role in PepX activity by removing calcium from wild-type and single-mutant PepX with metal chelators and measuring enzyme activity. PepX wild-type and mutant (D196A) samples were prepared and dialyzed in egtazic acid (EGTA) to strip calcium. Results indicated that dialyzing in EGTA increased both wild-type and single-mutant PepX activity, but further work is needed to confirm calcium was removed in the dialyzed samples by atomic absorption spectroscopy or inductively coupled plasma optical emission spectroscopy (ICP-OES).

A24 *Investigating growth and photophysiology of the bloom-forming cyanobacterium Microcystis aeruginosa to warming climates*

Audrey O'Hara, -Gonzaga University
Faculty Mentor: Nigel D'Souza

Abstract: Cyanobacterial blooms are becoming more common in freshwater ecosystems due to climate-change induced warming and eutrophication. Some blooming-cyanobacteria produce toxins which are harmful to aquatic life, people, and animals, yet the role of toxin remains unclear. I hypothesize that the toxin is a response to cellular stress. My experiment investigates growth, photophysiology, and toxin production in a toxin-producing strain of Microcystis aeruginosa under thermal stress compared to a non-toxin-producing strain. Each strain was monitored at five different temperatures ranging from 20-40°C. Growth was measured via optical density. PAM fluorometry assessed in-vivo chlorophyll (F0,), maximum quantum yield of Photosystem II (QYmax, a proxy for photosynthesis efficiency and cell stress), and relative electron transport rates across PSII (a proxy for photosynthesis). The non-toxin-producing strain (NT) had higher biomass and grew at temperatures up to 35°C, with stable QYmax across temperatures, indicating low stress. The toxin producing strain (T) exhibited low biomass, limiting stress analysis. Ongoing work on quantifying toxin concentrations will determine if carbon was allocated to toxin production over growth. My study confirms an increased likelihood of M. aeruginosa blooms in a warming climate and is expected to clarify the role of cyanotoxins.

A25 *Differential Inhibition of Bacterial Growth by Tea Extracts, and its Implications for Soil Decomposition Studies*

Lydia Davis, (*she/her*), **Nick Schoenauer**, (*he/him*), -Gonzaga University
Faculty Mentor: Nigel D'Souza

Abstract: Decomposition is a process where CO2 is released by decaying plant matter into the atmosphere, and is heavily reliant on microbial interaction that occurs in the soil. The Tea Bag Index (TBI) is a method developed to understand how decomposition contributes to carbon emissions, and for years this has helped scientists quantify this process. This is done by burying bags of green and rooibos tea in the soil, and using weight change to indicate plant matter decomposition values. However, the use of tea as a standard for plant matter may cause discrepancies in the data collected through the TBI due to the possible antibacterial and antiviral components of tea that are impacting microbial communities in the soil used in the procedure. This research aims to analyze how different teas might impact the growth of two ubiquitous soil bacteria - A. globiformis and M. foliorum following exposure to tea extract. Through this process current data shows an inhibitory component of tea on certain bacteria, changing the implications of all prior TBI results from the past 13 years.

A26* *Phytophthora: isolating invasive plant pathogens in Spokane*

Jack Ireton, **Matt Cochran**, **Maia Mouser**, **Rosalind Nordberg**, **Jordan Turner**, -Whitworth University
Faculty Mentor: Grant Casady

Abstract: Phytophthora syringae is an Oomycete plant pathogen (commonly known as a water mold) that causes significant damage and economic loss in nurseries and agriculture, threatening natural ecosystems worldwide. Early and accurate detection of Phytophthora is critical for effective disease management and the prevention of widespread infection. Soil-baiting is a widely used technique for detecting Phytophthora, but its effectiveness can vary depending on environmental conditions and methodological parameters. We aimed to evaluate and compare the effectiveness of different variations of a standard soil-baiting method for detecting P. syringae in winter conditions. We used six different soil baiting protocols for detecting P. syringae in a specimen of Sequoia sempervirens, which tested positive for P. syringae in the fall of 2024. Indumentum and smooth rhododendron leaves were used as bait. After baiting P. syringae, we were able to evaluate the relative success of each isolation method and make conclusions about the activity of Phytophthora in the winter months. These results provide valuable data about Phytophthora dormancy and life cycle that can inform the development of future isolation and testing protocols.

A27* *Unraveling Wheat Disparities: A Comprehensive Analysis of Yield Parameters in Wheat Varieties*

Matt Cochran, (*he/him*), -Whitworth University
Faculty Mentor: Grant Casady

Abstract: As global temperatures rise, crops face escalating heat and drought stress. The productivity of crop and wheat varieties varies widely, and the factors influencing this variability are not yet fully understood. It is crucial to comprehend these factors to predict the impacts of climate change on crop systems effectively. Enhancing our understanding and ability to predict and enhance crop resistance to heat and drought would represent a significant breakthrough in improving food security amidst increasing environmental pressures. In eastern Washington, specifically in the towns of Lind and Othello, 30 varieties of wheat were planted across multiple plots. These included primarily Landrace varieties chosen for their genetic diversity and adaptation to varying climates. Each variety was evaluated for crop yield, seed vitality, and peroxisomal abundance. Peroxisomes, critical organelles in eukaryotic cells, play a pivotal role in responding to these conditions by detoxifying reactive oxygen species (ROS) that can harm cellular tissue. Seed measurements were conducted using ImageJ software, while peroxisome abundance was assessed via genetic sequencing techniques. Initial analysis revealed varied correlations between our measurements but not statistically significant ones. However, When considering the highest and lowest yielding varieties, specific yield parameters and peroxisomal abundance across different wheat varieties had higher P-values. Further investigation of the complex relationship between seed metrics, yield, and peroxisomal activity as well as focusing on specific Landrace varieties could provide valuable insight into how we can improve our agricultural productivity.

A28 *EEG Decoding Analysis of Lexical Competition in Second Language Learners*

Hayden Kaleiwahea, (*he/him/his*), -Gonzaga University
Faculty Mentor: McCall Sarrett

Abstract: With increasing globalization, more adults are interested in learning a second language (L2), yet research on adult L2 learners remains limited, particularly in regards to real-time spoken language skills. One key skill in this domain is lexical competition, where words with similar sounds compete for activation during spoken language processing. While previous studies have examined lexical competition within- and across-languages, little is known about how this process develops in adult L2 learners. The current study uses an electroencephalography (EEG) decoding paradigm to investigate lexical competition in Spanish L2 learners who are native speakers of English. Participants passively listened to words in both English and Spanish, responding to active probe trials (10% of total trials) in which participants identified the word they just heard. We analyzed within- and between-language competition using a machine learning model which was trained to decode which word participants heard directly from their EEG activity. We predicted stronger within-language competition when listening in the dominant language (English) and stronger between-language competition when listening in non-dominant language (Spanish). Moreover, we examine individual differences in competition dynamics related to language proficiency. This study provides insight into real-time language processing in L2 learners; implications for language learning strategies are discussed.

A29* *Investigation of Water Quality Trends in Spokane River Tributaries*

Grace Schneider, (*she/ her*), **Tucker Holmes**, (*he/ him*), -Gonzaga University
Faculty Mentor: Madeleine Mathews

Abstract: Phosphorus is critical for many biological processes but, high concentrations in river systems can cause eutrophication and deoxygenated water which are harmful to native plants and animals. Our lab monitors phosphorus, ion, and metal concentrations in Hangman Creek and The Little Spokane River and observes weekly, seasonal, and yearly trends. Our goal is to identify correlations between parameters, analyze when and how phosphorus enters the system, and how quickly phosphorus reaches equilibrium once present in the system. We use two methods for sampling: first weekly grab samples which have been collected every week since May 2024 and second, samples collected hourly from an autosampler during storm events. Methods for analysis include EPA Method 365.3 for colorimetric phosphorus analysis, and standard instrument methods for the auto titrator (alkalinity), ICP-MS (metals), and Ion-Chromatography Instrument (anions). From collected data in addition to historical data, we have noticed an increase in phosphorus levels in the spring when flow increases. Because of the observed relationship between flow rate and phosphorus, our current work with spring storm systems and phosphorus equilibrium aims to build a deeper understanding of phosphorus movement in rivers.

A30* *Investigating the Association of Heavy Metals with Hangman Creek Sediment*

Sydney Einhorn, -Gonzaga University
Faculty Mentor: Madeleine Mathews

Abstract: Hangman Creek, a tributary of the Spokane River, flows through various geological regions and historically supported a biodiverse ecosystem essential to Indigenous populations. However, human activities, such as agriculture, waste disposal, and economic development, have caused pollution, habitat loss, and increased water temperatures, severely impacting the creek's health. Heavy metals (e.g., As, Pb, Cd, Zn) can accumulate in fish and pose risks to both aquatic life and humans through the food chain. Despite the known risks of bioaccumulation, data for trace heavy metal concentration in Hangman Creek are only publicly available from one study in 2011. My project examines the trace heavy metals in Hangman Creek sediment in fall 2024, considering the impact of the local chemical environment on their release from sediment. I collected sediment sampling from a cross-section of the river. Samples were then freeze-dried, after which I conducted a sequential extraction based on Tessier's method (1979), including water-soluble, carbonate-exchangeable, reducible, and organic matter-bound conditions. Using an ICP-MS, I measured trace heavy metal concentrations, where detection of manganese and iron in the water-soluble fraction was observed. Scanning Electron Microscopy-Energy Dispersive X-ray Spectroscopy was used to investigate the surface interactions between the sediment and heavy metals.

A31* *Investigating Phosphorus Sorption to Sediment in Hangman Creek*

Kylie Alfaro, -Gonzaga University
Faculty Mentor: Madeleine Mathews

Abstract: Phosphorus (P) is one of many vital nutrients for aquatic systems, whose flow is modeled by the phosphorus cycle. Hangman Creek, a local tributary feeding into the Spokane River, has historically loaded aqueous phosphorus into the system, during periods of high flow, namely late winter and early spring, disrupting the natural ecosystem through eutrophication. Quantifying the phosphorus levels in Hangman Creek will help build a baseline understanding of the system and allow comparison against another tributary of interest, the Little Spokane River. The Standards, Measurements, and Testing (SMT) extraction Method, and EPA method 365.3 will be used to determine the levels of inorganic and organic phosphorus in the sediment. Preliminary findings suggest that Hangman Creek sediment contains more phosphorus than the Little Spokane River sediment, even in periods of low flow. This result aligns with historical data that suggests Hangman Creek is the major contributor of phosphorus to the Spokane River. Further experiments, which include an adsorption kinetic study, will be conducted to determine how phosphorus mobilization is affected by high flow and storm surges. Future work will attempt to build off these initial experiments and hopefully shed more light on the phosphorus cycle of the Spokane Watershed.

A32* *Evaluating the Health of the Latah Creek Tributary and its Impact on the Health of the Spokane River by Aquatic Macroinvertebrate Analysis*

Andee West, -Saint George's School
Faculty Mentor: Ian Townley

Abstract: This investigation examines the impact of the Latah Creek tributary on the health of the Spokane River. This study analyzed three sites around the conjunction point to determine the relationship of water quality in these two waterways. At each site, macroinvertebrates were sampled and categorized morphologically into family taxa. Different families of macroinvertebrates exhibit different tolerance levels to pollution, making them reliable and effective bioindicators.

This study found that the water quality was significantly worse after the conjunction point of the waterways; with a pollution index score of 9.78 out of 10, indicating sever contamination. This site exhibited the lowest macroinvertebrate diversity. These findings directly show that the Latah Creek negatively impacts the health of the Spokane River. This research emphasizes the influence of agricultural runoff, particularly pesticide and fertilizer contamination, on freshwater ecosystems.

A33 *Water Quality Research*

Weichen Zhou, (*he*), **Weichen Zhou**, (*he*), **Zeyu You**, (*he*), -Gonzaga University
Faculty Mentor: Ian Townley

Abstract: Water quality is impactful on human health, the environment, and daily life. Clean water is essential for preventing diseases in humans and animals and for the overall health of an ecosystem. This ongoing experiment, in collaboration with Dr. Matthew from Gonzaga, investigates water quality parameters each week in the Little Spokane River. We measured pH, water temperature, dissolved oxygen, and conductivity every Friday, beginning in October, along with the weather of that day. Through this ongoing experiment we hope to better understand how weather conditions and the seasons impact both water quantity and key water quality parameters

A35* *The Effectiveness of a Token Economy and Mystery Motivator System on Talking Out Behavior by a 3rd Grader with an Other Health Impairment in an Elementary Behavior Intervention Classroom*

Lauren Zastrow, -Gonzaga University
Faculty Mentor: Jen Neyman

Abstract: The study's purpose was to evaluate the effectiveness of a Mystery Motivator and Token Economy in decreasing the number of talk outs. The participant was nine and diagnosed with an Other Health Impairment. He was in an Elementary Self-Contained Behavior Intervention classroom due to extreme physical and disruptive behaviors. The data collection system for this study was an event measurement using a visual representation chart within the 10-minute session to score raised hands, talk outs, on-task comments, and off-task comments. An ABABC reversal design was used to monitor the participant's progress during baseline, intervention, and maintenance. The intervention involved using a Mystery Motivator and a Token Economy to encourage the participant to raise his hand rather than talking out. The researcher monitored the participant's behaviors using a t-chart, gave immediate reinforcement for correct responses, and provided rewards based on whether the participant met specific goals related to reducing talk-outs. The participant was able to reach mastery by having two or fewer talk outs in both intervention and fading phases showing progress in the skill. The contingent reinforcement within the Token Economy and the game-like reward in the Mystery motivator encouraged and motivated the participant to stay on-task reducing his talkouts.

A36* *The Effectiveness of a Token Economy on Out-Of-Seat Behavior by a Ten-Year-Old Female with Autism in a Self-Contained Special Education Classroom*

Erica Strohm, -Gonzaga University
Faculty Mentor: Jen Neyman

Abstract: The purpose was to evaluate the effectiveness of a Token Economy on out-of-seat behavior by a ten-year-old female with autism in a self-contained special education classroom. The participant attended a special education classroom where she demonstrated high rates of out-of-seat behavior. The dependent variable, out-of-seat behavior, was defined as her pockets out of her seat, standing, or kneeling in her chair for up to five seconds during a ten-minute timing. Frequency recording within a reversal design assessed the number of times out-of-seat behavior occurred. In the Token Economy, the participant earned up to ten unicorn pictures for being in-seat. If she was in-seat for one minute, a unicorn was given. If she

was out-of-seat, the researcher pointed to an "in-seat" picture for redirection. If the participant earned the same or more unicorns as her goal (8-10 unicorns), she was given her reward. During intervention, the results showed mastery at a near-zero level for five consecutive sessions and maintained in a shaping phase where check-ins happened every two minutes, instead of one. This study was effective because the regular check-ins, visual support, contingent feedback, and motivating reward provided instruction and incentive for the participant to stay in her seat.

A37* *HazARd: Gerontechnology Room Scanning*
Leif Forrest, (*he/him*), **Delainey Maxwell**, (*she/her*), **Reid Plowman**, (*he/him*), **Alex Keyser**, (*he/him*), -Gonzaga University
Faculty Mentor: Aaron Crandall
Abstract: Gerontechnological advancement using 3D scanning technology from the Meta Quest 3 XR headset.

A43 *House of Ilium: The Past, The Present, and Other Epic Cycles*
Finley Knellhorne, (*she/her*), -Gonzaga University
Faculty Mentor: Jennifer Seo
Abstract: House of Ilium is a work-in-progress graphic novel that takes a playful approach to Homer's Iliad, setting the story in a contemporary college town. As two soccer teams face off in a growing rivalry, the events of the Trojan War begin to unfold again, echoing an ancient, tragic past. The warrior Achilles is reimagined as a rising soccer star, and the cursed prophet Cassandra is forced to look to the past to predict the future. As these characters fight to break from their tragic fates, House of Ilium asks the inherent response to any ancient tragedy: does it always have to end like this? By recontextualizing this epic, House of Ilium bridges modern audiences with one of the oldest works of Western literature. While lighthearted and accessible, it also highlights the powerful emotion and humanity that has made the poem captivating for thousands of years.

Session C (11:05 – 12:00 pm) Hemmingson Ballroom

C7 *La barrera lingüística del sistema de salad para los hispanohablantes en EEUU*
Emma Rose, (*she/her/hers*), -Gonzaga University
Faculty Mentor: Arturo Garcia Osorio
Abstract: This presentation examines the effects of the language barrier that Hispanic patients face in the United States. This linguistic barrier has manifested into professional malpractice by healthcare workers, poor health outcomes after hospital discharge, and distrust in the US healthcare system. This research was conducted through a literature review about the language barrier throughout the US and real-life situations I witnessed as a nursing student during my clinical experience in Spokane, Washington. In addition, this presentation will offer long-term solutions to better support patients with limited English proficiency and support healthcare equity.

This poster will be primarily in Spanish, but I will present the information in Spanish or English.

C8 *From The Monkey King to Jia Baoyu: Chinese Literature's Influence on Japanese Visual Media*
Andrew Doughty, -Whitworth University
Faculty Mentor: Anthony Clark
Abstract: This research project explores how great works of Chinese Literature have created the foundation for the explosion of the popular Japanese visual media: anime and manga. Specifically, this project applies two of China's most influential novels: Journey to the West (Ming Dynasty: 1368-1644), and The Story of the Stone (Qing Dynasty: 1644-1911) to the Dragon Ball (Akira Toriyama) manga and Apothecary Diaries anime based on the novel and subsequent manga by the same name (Natsu Hyūga). It looks at religion, culture, narrative structure, character and philosophy present withing these works of literature in comparison to these global phenomena of popular culture. As anime and manga become increasingly prevalent in the Western world it is important to consider the roots these stories grow from, and the cultural crosspollination of Japan and China throughout their history in the literary world.

C9* *Reimagining Equitable Access to the Spokane River*

Lauren Mullin, (*she/her/hers*), **Annie Cooper**, (*she/her/hers*), **Kieran Hofmann**, (*he/him/his*), **Bella Fernandez-Wagner**, (*she/her/hers*), -Gonzaga University
Faculty Mentor: Betsy Bancroft

Abstract: The Spokane River is central to many groups as it has a deep cultural, historical, and personal significance, yet there is a lack of a collective voice to defend the river. The Spokane River Vision Plan (SRVP) is a continuous project by various stakeholders of the Spokane community to create a non-legal action plan. SRVP aims to promote safe and equitable access to the U-District section of the Spokane River for recreation, education, physical and mental health. To address this issue, our approach included identifying stakeholders of the river and U-District, and to apply for a National Parks Service Rivers, Trails, and Conservation Assistance (RTCA) grant with the intent to gain NPS support in the organization of a stakeholder meeting to ensure a collective vision is agreed upon. While the necessity of this vision remains, within an ever-changing physical and political climate, we faced significant challenges. Low collaboration amongst stakeholders resulted in a lack of collective effort towards the RTCA grant. In addition, changes to grant funding and instability at the federal level resulted in less confidence among stakeholders of the utility of applying for funding. Future efforts to promote collaboration must help the community build this shared vision.

C10* *Creating a Sense of Place Through Ecological Interpretation: The Children of the Sun Trail*

Ella Beck, **CJ Kreitlow**, **Connor Robitaille**, (*they/them*), **Luke Fiermonti**, -Gonzaga University
Faculty Mentor: Sammi Munson

Abstract: The current construction of US Highway 395 in Spokane divides many lower-income communities from schools and businesses. The Children of the Sun Trail aims to reduce the effects of this division, allowing residents to navigate the highway on bike or foot. However, it currently does not engage these communities with the ecological elements and history of where they live. Our project aims to create a sense of place through education and engagement for those that use the trail, which can connect their current experiences with the natural and cultural history of the area (Walker, 2014). To do this we created informational documents on urban wildlife, fire management, the North Market superfund site, ponderosa pine, geology of Mt. Spokane, flood basalts, urban fragmentation, and wetland habitat. These documents will be accessible online from the trail, increasing a sense of place amongst the community, which is further developed through the experience of engaging with the trail itself by walking or biking.

C11 *Predictors of Academic Achievement*

Madeline Peterman, -Gonzaga University
Faculty Mentor: Adam Stivers

Abstract: Predictors of Academic Success

This research examines key predictors of academic success, focusing on conscientiousness, mental health, sleep, social support, and social anxiety. Utilizing a self-report survey of Gonzaga University students, the study analyzes if these factors correlate with GPA.

Conscientiousness, defined by diligence, organization, and responsibility, is strongly linked to academic achievement. Using the HEXACO-60 measure of conscientiousness we test whether each of the four facets (organization, diligence, perfectionism, prudence) independently relate to academic achievement.

Mental health, including stress, anxiety, and well-being is another key factor. This research seeks to test whether diagnosis and/or treatment of psychological illness correlates to academic achievement.

Sleep is frequently studied in relation to academic success. It is important for memory, learning and cognitive function. This research looks into sleep duration, sleep timing and their association with academic achievement.

Social support, the network of close connections someone possesses, is shown to buffer against stress and positively impact wellbeing. This research explores students' comfort in discussing personal topics and their perceived support levels.

Social anxiety, the fear of judgement and discomfort in social settings, can lead to distress and avoidance. This research **seeks to understand the effect on academic performance and the level of social anxiety someone possesses.**

C12 *Exploring Social Dilemmas in Board Games: Investigating Cooperation and Competition in Catan*

Alexa Ford, (*she/her*), **Karli Lane**, (*she/her*), **Annie Aloisio**, (*she/her*), -Gonzaga University
Faculty Mentor: Adam Stivers

Abstract: Social dilemmas are defined as socially interdependent choices where a decision-maker must choose between benefitting a group (cooperation) or themselves (defection). These situations have frequently been studied with economic games like the Prisoner's Dilemma in laboratory settings that have limited ecological validity. In contrast, social dilemmas have also been researched in natural settings (e.g., public transportation) with limited experimental control. We are interested in whether research using board games can provide a "best of both worlds" approach; allowing researchers to manipulate game elements while using a methodology rooted in daily interactions. To test, our research team is using a Catan to see if groups that are prompted to be more cooperative vs competitive have different game results, testing whether it is a social dilemma.

Catan, a strategy-based board game, requires players to navigate through many complex decisions regarding trading and building while managing alliances and personal gain. Through observational analysis of gameplay, we examine player decision-making by tracking resource allocation patterns, trade behaviors, and overall game strategy. Social dynamics, including perceived alliances and competition, play a critical role in shaping trading behaviors. The study aims to contribute a broader understanding of strategic thinking and economic decision-making in game theory contexts.

C13 *Learning to Look: An Eye Tracking Study of Generalization of Learning in Visual Search*

Olivia Caputo, (*she/her*), **Luke Brenchly**, (*he/him*), **Emmanuelle Garvey**, **Donovan King**, (*he/him*), **Rowan Parzybok**, **Sydney Schalkhauser**, **Anjanie Setiono**, -Gonzaga University
Faculty Mentor: Doug Addleman

Abstract: People are remarkably good at finding what they look for. This is partly because our visual search skills improve rapidly with experience. Radiologists detect subtle signs of cancer in mammograms, and birders identify birds based on markings most people don't even see. We tested how experience affects visual search in an eye-tracking study. Participants completed an experiment in which they either repeatedly found a single object from a category (e.g., a specific armchair) or multiple objects from that category (e.g., four different armchairs) presented alongside other objects. Experience with one object made searches for that object faster but did not benefit search for other objects from the same category. In contrast, broader experience with several items from a category benefited searches even for all items from the searched-for category (e.g., it made people search even for armchairs they'd never seen before). Eye tracking data provides preliminary evidence into the mechanisms supporting these effects, suggesting learning changed how people moved their eyes during search but not the time it took them to respond to a target once their eyes landed on it. Ultimately, this research provides insight into the abilities—and limits—of learning in supporting everyday behaviors like visual search.

C14 *Motivations of Fantasy Football*

Faith Flores, -Gonzaga University
Faculty Mentor: Adam Stivers

Abstract: Fantasy Football has emerged as a widely popular digital sports activity, offering participants a unique blend of competition, strategy, and social interaction. While previous research has examined general motivations for sports engagement, less is known about the role of personality traits in Fantasy Football participation. This study explores how individual differences, as measured by the HEXACO personality model—Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience—predict Fantasy Football engagement. Using a survey-based, correlational design, participants' personality traits and levels of participation will be assessed. Descriptive and correlation analyses will identify relationships between specific HEXACO traits and Fantasy Football involvement. The findings will provide a deeper understanding of the psychological factors driving Fantasy Football participation, contributing to research on personality and digital sports behavior.

C15 *The Effect of Syntactic Expectations on Acoustic Encoding*

Oliver Juaire, -Gonzaga University
Faculty Mentor: McCall Sarrett

Abstract: Predictive coding is the mechanism through which the brain makes predictions about the world and integrates those predictions with new information. During spoken language comprehension, the brain must track multiple levels of

linguistic information. Thus, the brain constantly predicts what words or sounds come next. It must balance top-down expectations based on context with incoming bottom-up acoustic information. The N1 is an event-related potential (ERP) occurring 100 ms after a sound, which acts an index of acoustic processing. The present study seeks to measure predictive coding during comprehension of spoken sentences, using electroencephalography (EEG). Subject-verb agreement will set listeners' syntactic expectations, and we will measure whether these expectations shift acoustic encoding at the N1. Listeners will hear sentences where the subject predicts either a singular verb (e.g. ending in /s/) or a plural verb (no /s/). Pilot work from our lab has shown singular verb endings yield a larger N1, whereas plural verb endings yield a smaller N1. If listeners expect a singular verb (no /s/), we predict the N1 to an ambiguous /s/ will be smaller; if listeners expect a plural verb, we predict the N1 to an ambiguous /s/ will be larger, in line with their predictions.

C16 *The Grzelak-Kuhlman Control Orientations Inventory*

Lyly Nguyen, **Grace Peeler**, **Liliana Cooper**, -Gonzaga University
Faculty Mentor: Adam Stivers

Abstract: Social Interdependence Theory suggests that individuals make three key choices: which situations to engage in, whom to interact with, and how to behave. Most research has focused on the last question, particularly in social dilemmas where decision-making is studied through experimental games. Scholars have examined choices based on individual differences (Messick & McClintock, 1968), characteristics of other players, and situational factors (Rapoport & Chammah, 1965). Some studies also explore how individuals select group members based on traits like trustworthiness and similarity (Fischer, 2009; 2012). Our research expands on this by examining how people choose situations differing in social interdependence.

Kelley and Thibaut (1978) proposed that interdependent situations vary in outcome types (own vs. others') and control (self, other, or joint). Grzelak (2001) developed a 23-item scale to measure preferences for five types of outcome control: Autonomy (self-control), Passivity (partner-controlled), Respect (partner's control over their own outcomes), Dominance (control over a partner's outcomes), and Collaboration (joint control).

We provide evidence for the reliability and validity of these scales through correlations with personality measures (HEXACO, A-PQ), attitudes, and social value orientation. Our findings offer insight into decision-making in socially interdependent situations.

C17* *Building a Low-Waste Culture: Navigating the Barriers to Waste Reduction in Spokane*

Megan Rovira, **Rachael Haley**, **Ellen Lewis**, **Henry Fleming**, -Gonzaga University
Faculty Mentor: Sammi Munson

Abstract: Outdoor events are an optimal opportunity to bring the Spokane community together over sports, food, local culture and art. However, products such as utensils, plates, cups, napkins produce a significant amount of waste that is often not sorted properly and results in contaminated recycling or composting that goes to the trash. Washington state has reported 3.2 million metric tons of carbon dioxide emissions due to waste in 2021, contributing to global climate change. This fact led them to establish a goal to reduce the landfill disposal of organic materials by 75% (compared to 2015 levels) by the year 2030 and to commit to reducing greenhouse gas emissions by 95% by 2050. The goal of this project is to engage with local art and farmers markets, which are more informal, community-based settings and are therefore more flexible to adopt low or zero-waste programs. In order to create a low waste culture and encourage these behaviors at outdoor markets and events, a combination of education, communication, and incentivization is needed. This can be accomplished by utilizing existing volunteer programs that monitor waste stations and ensure proper sorting, visual materials to prompt desired waste disposal behavior, and creating hands-on activities to increase awareness about waste habits and reduction, as well as bringing people together to build sustainable communities.

C18* *Addressing Science Education Disparities through Science in Action!*

Sydney Suggs, **Sam Twitty**, **Stella Hunsperger**, (*she/her*), **Colton Siler**, (*he/him*), **Ben Conover**, (*he/him*), -Gonzaga University
Faculty Mentor: Betsy Bancroft

Abstract: Science education opportunities in Spokane Public Schools have decreased in recent years as funding for in-school programs is primarily funded by local property taxes and parent donations. Schools have also begun to shift their focus to English and mathematics to meet standardized testing requirements. Science in Action!, a program founded in 2007 and

operated by Gonzaga University, aims to address these educational disparities by bringing hands-on, inquiry-based science lessons to fifth-grade students at Spokane schools. Using current research on accelerated metamorphosis due to rising temperatures in Pacific Chorus frogs, we have developed a lesson plan for local elementary schools that incorporates these recent findings into students' education. This hands-on activity demonstrates how temperature fluctuations affect frogs' rate of development. Through participating in this lesson, students will learn the process of field sampling, notice trends in lifecycle distribution due to warming temperatures, and have the opportunity to engage with current, real-world research. This will allow students to develop a deeper understanding of both the scientific process and the impacts of climate change on local ecosystems.

C19* *Monitoring Microplastics in the Spokane River: A Citizen Science Approach*

Hadley Stevick, **Annabelle Horsfall**, **Tereza Dudzik**, -Gonzaga University
Faculty Mentor: Betsy Bancroft

Abstract: Microplastics are very small pieces of plastic, measuring less than 5mm in length, that are found across the environment. The Spokane River has been shown to carry microplastics, but the concentration of them in the river is unknown. The aim of this project is to educate and inform the public on a threat to the Spokane River and to involve citizens in the scientific process. Through analysis of previous literature on citizen science approaches and microplastic studies, a procedure was created for citizens to follow to collect river water samples that can be further analyzed for microplastic concentration. Trials of this procedure were carried out, including analysis of water samples with a PlanktoScope to count microplastics. To enhance the educational opportunity for the community, a website was published to showcase information on microplastics. Once the citizen science program is initiated, results will provide meaningful data that the Spokane Riverkeeper and the community can use to advocate for actions that will reduce the concentration of microplastics in the river.

C20* *Redesigning for Resilience: A Shift from Traditional Landscaping to Sustainable Xeriscaping*

Michael McLoud, (*he/him*), **Andrew Wallace**, (*he/him*), **Sabrina Miriy**, (*She/Her*), **Isabel Koerner**, (*she/her*), -Gonzaga University
Faculty Mentor: Sammi Munson

Abstract: Access to natural areas enhances human health and well-being. Furthermore, natural spaces hold immense ecological and economic value when introduced into human-dominated landscapes. For this project, we designed a natural green space for the Boise Cascade Lumber Company in Kettle Falls, Washington. The region receives low rainfall, driving our efforts to fill this company's space with xeric (low-water), yet aesthetic elements. Previous research supports the concept of xeriscaping designs as environmentally and economically beneficial alternatives to traditional landscaping methods. These designs prioritize native, drought-tolerant plants to both establish vital habitat for pollinators and other fauna while also reducing water costs. Our team collected research on budgeting, labor, and material costs to ensure the feasibility of our project. We engaged with site employees and maintained communication with our community partner to align our design with sustainability goals. Additionally, we compiled a curated list of native flora and media best suited for the site. Our work plan and resources were shared with the company so that our process is repeatable for this and future spaces. As the world and our perspectives change, utilizing native plants in a way that is water efficient, appealing, and low cost is paramount for a sustainable future.

C21* *Managing Invasive Grass Carp in a Man-Made Wetland: Ecological Impacts and Restoration Strategies for Reflection Lake*

Sam Savage, **Patrick Bennett**, **John Bergin**, **Abel Cameron**, -Gonzaga University
Faculty Mentor: Betsy Bancroft

Abstract: Wetlands across the world are facing pressures from climate change, invasive species, water pollution, droughts, and over-extraction of native species. Like many man-made wetlands, 54-acre Reflection Lake in northern Washington, has been subject to decades of trial and error in its management. Facing overgrowth of invasive weeds that inhibited the recreational use and ecological health of the lake, the Reflection Lake Community Association (RLCA) introduced nonnative grass carp as a way to combat this. Without proper management, grass carp eat large quantities of aquatic plants, which can severely disrupt the ecological community and destroy habitat for other fish and waterfowl. According to the RLCA, the grass carp population has turned Reflection Lake into an aquatic desert without any healthy hydrophyte communities. Responding to the request of the RLCA, using drone and baited camera trap surveys, we have confirmed the presence of a significant population of carp in the lake. We will create a management plan to address the carp population and rehabilitate

the lake ecosystem. This research will have greater implications for wetland restoration and invasive species management in man-made systems.

C22* *Plant Restoration Planning for a Recreational Lake Ecosystem*

Mia Mastrangelo, (*she/her*), **Holly Fijolek**, (*she/her*), **Owen VanDerPuy**, (*he/him*), **Jordan Kremer**, (*she/her*), -Gonzaga University

Faculty Mentor: Betsy Bancroft

Abstract: Freshwater lakes are a valuable resource for human recreation and ecosystem services, but this leaves their biotic communities vulnerable to land use changes. Reflection Lake of northeast Washington is a residential lake characterized by recreational use and over-management. As a result, the ecosystem has been degraded to a point of minimal vegetation and a large presence of invasive species. For this project, we aimed to assess the current state of the lake and establish a baseline inventory of existing plant communities. We conducted water quality measurements to understand the abiotic conditions, and took observations of the current lake flora. Measurements of chloride, nitrate, phosphate, and sulfate were collected and all fell within normal water parameters at the state and federal level. Observations were taken in the fall at the lake, and seed bank samples were collected and observed for growth in a greenhouse. Through these methodologies, we established the seed bank of various grasses, hardy shoreline plants, and multiple fully aquatic plant species for this ecosystem. Between an understanding of the plant community, our water quality measurements, and input from our community members, we are able to recommend a comprehensive restoration plan.

C23* *Inspiring Ecological Engagement Through Environmental Education and Interpretive Media*

Sally Johnson, **Allison Ruhl**, **Sophia Eliason**, **Emma Watkins**, -Gonzaga University

Faculty Mentor: Sammi Munson

Abstract: Outdoor education is a vital part of fostering a passion for the natural world and aiding in environmental conservation. For this project, we developed educational signs for the Dishman Hills Conservancy's (DHC) Wilson Property, in Spokane, WA. The DHC's mission is to connect people and nature through stewardship, conservation, education, and recreation. The first step in inspiring stewardship of a natural area is involving visitors in the workings of the ecosystem they are experiencing. Given the degradation threatening ecosystems, it is crucial to engage the public in maintaining an investment in the health of their social and ecological communities. Our research involved on-site visits to the property accompanied by Ruth Gifford, the executive director of the DHC, where we familiarized ourselves with the landscape and recorded observations on the biotic and abiotic aspects of the Wilson property's ecosystems. From there, we identified eight topics directly related to the property. These topics included plant species, signs of wildlife, bird species, scat identification, and wildfire management. Our eight completed signs offer an engaging and accessible way for a wide array of visitors to connect with the Wilson Property's ecosystem, inspiring curiosity, stewardship, and a deeper commitment to protecting local and global environments.

C24* *Effects of Forestry Treatments on Upper Cemetery Fire*

Tristan Keane, **Conner Atwood**, (*they, them*), **Mia Meighan**, **Pete King**, -Gonzaga University

Faculty Mentor: Betsy Bancroft

Abstract: Anthropogenic climate change and decades of total fire suppression employed by land management agencies has led to an increase in frequency and severity of wildfires in the western U.S. In response, land management agencies, including the Washington Department of Natural Resources, have been treating forested areas by thinning and reducing fuels in order to mimic natural fire regimes and reduce adverse impacts from wildfires. We surveyed a forest that had received a treatment in 2013 and 2024 prior to being burned by the Upper Cemetery wildfire in the summer and tested how these treatments affected forest health post-burn. Our team surveyed the impact of the fire by collecting tree, soil, and vegetation data. We saw a 7% increase in mature tree survival in old treatment areas compared to untreated areas. We also saw a decrease in 1-, 10- and 100-hour fuel loads across treatment types, as well as a decrease in high severity damage on trees within newly treated plots. We saw varying effects on tree mortality, abundance, damage severity, and fuel loading across treatment types. This contributes to our understanding of how these treatments alter the effects of wildfire, which is increasingly important in the face of climate change.

C25* *Fútbol: ¿Bueno o no?*

Kamy Epefanio, -Gonzaga University

Faculty Mentor: Arturo Garcia Osorio

Abstract: Piensen en la cultura hispana. La primera cosa que me viene a la mente es el presentador está diciendo "gooooooooooooooool". Para mucha gente, lo es la primera que se viene a la mente también. Fútbol no es solamente una deporte para ellos, es una parte de sus identidades. Este parte de salud no se puede ignorar. El fútbol es una parte fundamental de la cultura hispana, está arraigado en su identidad; esto puede ser excelente para aspectos de la salud física, pero al mismo tiempo puede dañar la salud mental de millones de personas. En este tiempo, es importante animar a los niños a salir la casa y practicar deportes afueras.

C26 *El ciclo de abuso de sustancias para las trabajadores sexuales in México*

Hannah Schleibinger, (*she/her*), -Gonzaga University

Faculty Mentor: Arturo Garcia Osorio

Abstract: For my research, I decided to focus on sex workers in Mexico and how this often leads to substance use. I want to discuss the environmental factors that contribute to this, such as their exposure to violence, workplace conditions, socioeconomic status, and lack of public health resources.

C27 *Drug Misuse Among Hispanic Populations in the United States*

Noah Elliott, -Gonzaga University

Faculty Mentor: Arturo Garcia Osorio

Abstract: Drug misuse is a growing concern in the United States, and Hispanic communities face many unique risk factors and cultural barriers to treatment. This presentation will analyze the prevalence and various consequences that Hispanics face from substance use disorders. Several factors that contribute to this misuse of drugs include economic disparities, limited healthcare access, and immigration status. This presentation will also include possible strategies to improve substance use disorders within Hispanic communities.

C28 *Deep Diffractive Neural Network Simulation*

Jacob Schlosser, **Rabi Tayyab**, -Whitworth University

Faculty Mentor: David Schipf

Abstract: In 2018, researchers at UCLA proposed a method of training a deep learning model using the rules of coherent light diffraction and interference through layers of phase masks [1]. If the model was trained in a way that mirrored a physical model, then after training the neural network could be physically built by 3D printing phase masks and sending coherent light in the form of a laser through those masks into an array of CMOS light detectors. This would require a brief flash from the laser and a small microprocessor, like a Rasberry Pi, to coordinate and interpret the data from the CMOS's. This could reduce the power needed to make image inferences drastically if scaled up to complex models.

A limitation from this paper was that it didn't include non-linear activation function alternatives. A possible solution to this would be quantum dot films, which can absorb intensity non-linearly and eliminate small amounts of light while letting larger intensities through.

C29* *Wildfires Impact on Water Treatment*

Alli Willmarth, (*she/her*), **Matthew Jorgensen**, -Gonzaga University

Faculty Mentor: Kyle Shimabuku

Abstract: As wildfire becomes more frequent and severe, increasingly complex contaminants enter water systems, threatening water quality. Powder activated carbon (PAC) could become a key treatment technology to enhance the resilience of water systems to wildfire-related disruptions. PAC is widely used in water treatment systems to remove dissolved organic matter (DOM), a common precursor to harmful disinfection byproduct contaminants. This study evaluates PAC's effectiveness in treating water samples from the Pacific Northwest, including rivers like the Willamette and Deschutes in Oregon and the Coeur D'Alene in Idaho. Leachates from burned soil and ash samples collected from recently wildfire-impacted watersheds were also tested to determine the treatability of wildfire-derived DOM. Different PAC dosages were tested to determine DOM removal efficiency, and DOM was characterized by total organic carbon (TOC) measurements, ultraviolet absorbance at 254 nm (UV254), and fluorescence DOM (fDOM). Results showed that TOC concentration in the

untreated water impacted the PAC's efficiency in removing DOM. Preliminary evidence suggests that DOM from burned watersheds may be more easily adsorbed by PAC, with DOM adsorbability efficiency increasing as burn severity rises.

C30* *Modeling and Testing Photopolymerization for Photonic Ceramic 3D Printing*

Josh Park, -Whitworth University
Faculty Mentor: David Schipf

Abstract: Additive manufacturing (3D printing) enables manufacturing of difficult and complex shapes without expensive tooling and expertise. This study uses digital light projection (DLP) photopolymerization printing, which selectively solidifies (cures) photopolymer mixtures layer by layer onto a plate. The plate ascends and descends repeating the process for the desired number of layers. Using this form of manufacturing, piezoelectric ceramic-polymer composites can be printed.

C31* *Smoke Ready Spokane Dashboard and Sensor Installation*

Diego Maldonado, **Gabriel Gandarias**, -Gonzaga University
Faculty Mentor: Marc Baumgardner

Abstract: The Smoke Ready Spokane project aims to deploy air quality sensors and interactive dashboards to enhance community preparedness during wildfire smoke events. This study details the design, installation, and operation of particulate matter sensors, along with the development of informational dashboards for data visualization. Sensors were deployed in three city-owned community centers designated as cleaner air spaces, providing real-time air quality information for both public and staff use. The installation process, system performance, and lessons learned are discussed, offering insights into the technical and logistical challenges of deploying urban air quality monitoring systems for public health resilience.

C32 *Tribological Performance of Fe_2O_3 and Fe_3O_4 PTFE Composites on Steel and Aluminum*

Lexi Durbin, -Gonzaga University
Faculty Mentor: Harman Khare

Abstract: Wear testing of polymer composites with varying ratios of metal matrix to PTFE filler yields distinctive wear rates. α-Al2O3 PTFE is considered a gold standard for wear performance, displaying low wear rates when subjected to dry sliding against steel coupons (10-8 mm^3/Nm). This research investigates the tribological properties of PTFE filled with nanoscale Fe2O3 and Fe3O4, comparing the resulting wear rates against steel to assess their viability as low-wear composites. Research indicates that both iron oxides demonstrate similarly low wear rates on steel, at approximately 10-7 mm^3/Nm, with only slight variation between the two. For further analysis, subsequent testing has explored the hypothesis that α-Al2O3 PTFE tested on steel, and Fe2O3/Fe3O4 PTFE tested on aluminum coupons should exhibit comparable wear rates due to their respective surface interactions and transfer films. However, preliminary findings contradict this expectation, as Fe2O3 and Fe3O4 PTFE exhibited higher wear rates on aluminum, ranging from 10-5 to 10-6 mm^3/Nm. While potential explanations for this discrepancy have been investigated, a definitive conclusion remains forthcoming.

C37 *The VTuber Market Case Study - Hololive Production as a Business*

Daniel Arinez, -WSU
Faculty Mentor: Mark Gibson

Abstract: In October of 2020, a small Japanese production company Hololive Productions launched its English-speaking branch, marking a pivotal moment in the online media industry. Among its debut talents is Gawr Gura, who would reach an extraordinary milestone, reaching 1 million subscribers in one month. This achievement would not only cement Gawr Gura as one of the most popular VTubers to ever debut in the market but also established Hololive Production as a pioneering and a household name in the industry. This study investigates the business strategies behind Hololive's success as a virtual YouTuber (VTuber) agency, addressing the central question: What business strategies have driven Hololive's mainstream success?

Hololive, operated by COVER Corporation, shifted from developing video games to the emerging VTuber market, capitalizing in the advancements in Live2D animation and hiring a talented pool of content creators that perfected the art of audience retention and engagement. By employing a hub-and-spoke model, leveraging professionally generated content (PGC) and promoting user-generated content (UGC), Hololive fostered a loyal fan-base and maximized visibility. Key milestones-such as successful live concerts in Japan and the United States, licensing agreements with major brands and

collaborations with renowned music labels-demonstrate Hololive's ability to bridge cultural and linguistic divides effectively.

This research is guided with the hypothesis that Cover Corp operates three key business cycles to enhance visibility, marketing, and of its Intellectual Property (IP), creating a self-sustaining growth model. These cycles include:

1. The Creator Economy Cycle: Recruiting independent creators for professionally generated content to ensure high-quality production.

2. The PGC-UGC Synergy Cycle: Leveraging PGC to inspire UGC, amplifying visibility and audience engagement through fan-driven contributions.

3. The Global Reinvestment Cycle: Expanding the reach of PGC globally, fostering fanbases across diverse regions, and reinvesting in creators and technology.

The findings emphasize the potential of VTuber agencies as innovators in the global creator economy, showcasing their role in reshaping online media by combining creativity, strategic planning and cutting-edge technology.

C38 *From Street to Suit: The Effects of Adolescent Gang Involvement on Adult Economic Outcomes through the Life Course Theory*

Maria Holmes, -Gonzaga University
Faculty Mentor: Bill Hayes

Abstract: This poster presentation explores the long-term economic consequences of adolescent gang involvement through the lens of Sampson and Laub's Life Course Theory. While previous research has established links between gang membership and various negative life outcomes, there is still not an abundant amount of research to refer to. Using 20 waves of data from the National Longitudinal Survey of Youth 1997 (NLSY97), gang affiliated and non-gang affiliated people were propensity score matched (PSM) on a variety of factors. Using NLSY97 and PSM, this study examines how early gang affiliation influences employment attainment, income levels, education levels, government assistance in adulthood. Findings suggest that gang affiliation in adolescence have multiple negative factors on future adult economic outcomes. This study can be used to further research adolescent gang involvement to help adolescents desist from crime and better prepare for a more prosperous adult economic outcome.

C39 *Machismo and Its Implications in the Hispanic Community*

Caren Miranda, -Gonzaga University
Faculty Mentor: Arturo García- Osorio

Abstract: Machismo, a concept deeply rooted in traditional Hispanic cultures, referring to the attitudes, behaviors, and social expectations that promote male dominance and the subordination of women. This patriarchal ideology has influenced the Hispanic community for centuries, shaping the gender roles we know today, as well as the relationships, dynamics, and social norms we see in Hispanic families. Machismo is recognized as a symbol of strength and masculinity, specifically among men. It not only has implications for men, but also women, having lasting effects. Not only do they transmit this toxic mentality to future generations. The implications of machismo not only have a toxic effect on men, but on everyone around them. That is why it is important to explore the cultural foundations of machismo, its impact on gender relations, and the changing dynamics within the Hispanic community.

C40 *Cáncer de mama en mujeres hispanas*

Ruth Gonzalez, (*she/her*), -Gonzaga University
Faculty Mentor: Arturo Garcia Osorio

Abstract: El cáncer de seno es el tipo de cáncer que más frecuentemente afecta a las mujeres mexicanas o hispanas en general. Esta enfermedad desafía la cultura, nivel socioeconómico y el acceso a la atención médica en las mujeres. Este ensayo explorará el acceso a la atención médica en la comunidad hispana y resaltará la importancia de promover el cuidado y atención necesaria ante esta enfermedad. Es importante que haya campañas para la prevención del cáncer de seno para que las mujeres puedan educarse acerca del cáncer, hacer detecciones tempranas, y poder prevenir uno de los más comunes cánceres entre mujeres y esto tiene que ver con mejorar el seguro médico para todos.

C41 *Diabetes in Hispanic Communities: Overcoming Cultural and Systemic Barriers*
Lindsey Ozuna Uriostegui, (*she/her*), -Gonzaga University
Faculty Mentor: Arturo Garcia Osorio
Abstract: Diabetes disproportionately affects Hispanic communities due to cultural, socioeconomic, and healthcare access barriers. Traditional diets, overconsumption, and unhealthy eating habits increase diabetes risk, while cultural values often prioritize family needs over personal health. Many individuals work long hours with limited time for self-care, and a reliance on natural remedies over modern medicine can delay proper treatment. Financial limitations further restrict access to diabetes education and healthy foods, particularly for those living paycheck to paycheck. Immigration status presents additional challenges, including discrimination, cultural assimilation pressures, and ineligibility for healthcare programs.

This study aims to identify key barriers and assess the effectiveness of culturally tailored interventions in improving diabetes outcomes. Using a literature review and interviews with Hispanic individuals affected by diabetes, this research explores firsthand experiences and systemic challenges. Proposed solutions include multimodal and hybrid healthcare models, reduced eligibility requirements for healthcare programs, and increased access to affordable healthy foods. Findings suggest that culturally competent healthcare approaches and policy changes are crucial to reducing diabetes rates in Hispanic communities. By addressing these challenges, this research seeks to inform policy reforms and healthcare strategies that promote equitable diabetes prevention and treatment for Hispanic populations in the U.S.

C42 *Measuring Forest Stand Resiliency and Health in the Face of Climatic Disturbances and the Implications for Future Forest Management Actions in the Dishman Hill's Nature Conservancy*
Carson Sellers, (*he/him*), **Henry Schroeder**, (*he/him/his*), **Tommy Eisenstat**, **Nick Schoenauer**, -Gonzaga University
Faculty Mentor: Betsy Bancroft
Abstract: Due to changing climatic conditions, wildfires across the Pacific Northwest are increasing in intensity and frequency. Specifically, Washington State has seen the annual average acres burned increase from 189,000 acres to more than 488,000 acres since 2000. Washington's Department of Natural Resources (DNR) undertook a bid to provide hazardous fuels reduction work on 260 acres of land within Dishman Hill's Nature Conservancy. These treatments include thinning, pruning, and mastication to create an ecosystem less prone to extreme wildfire events. We conducted field surveys and collected pre- and post-treatment data on metrics of forest stand viability and soil health. We measured changes in species composition, average basal area, average fuel loads, potential burn hours, and litter and duff depth. We found post-treatment burnable hours were significantly higher than pre-treatment burnable hours ($p < 0.01$). These findings suggest a greater accumulation of ground-level fuel loads in post-treatment sites. While mastication and thinning may be effective in reducing individual trees' vulnerability to fire, the amount of ground-level burnable hours increased. We recommend a post-treatment prescribed burn to eliminate residual surface fuels and reduce the potential for a severe fire.

C43 *House of Ilium: The Past, The Present, and Other Epic Cycles*
Finley Knellhorne, (*she/her*), -Gonzaga University
Faculty Mentor: Jennifer Seo
Abstract: see A43 on p. 28

Session E (2:00 – 2:55 pm) Hemmingson Ballroom

E9* **Raegan Silbernagel**, -Gonzaga University
Faculty Mentor: Karla Parbon
Abstract: This article explores methods that enable former competition dancers to easily transition into the world of college dance. These methods are culminated in a short Dance Movement Therapy class that was conducted on Gonzaga University's campus. The research involved in this article is focused on somatic practices that encourage interoception and better awareness of the body in order to promote emotional regulation. Findings suggest that incorporating Dance Movement Therapy can help dancers navigate identity shifts, reduce stress, and foster adaptability in new movement environments. This study highlights the importance of integrating somatic awareness techniques into dance education to support dancers' overall well-being and long term artistic growth.

E10 *Stage Managing Tartuffe*

Andrei Whyte, (*he/him*), -Gonzaga University

Faculty Mentor: Leslie Stamoolis

Abstract: This project focuses on the experiences and outcomes over a three month process of rehearsals, production meetings and performances from the perspective of the stage manger. This project is also a cumlination and final assignment to conclude a bachelors degree in Theater.

E11 *How to Audition for Everything*

Alexander Page, (*he/him*), -Gonzaga University

Faculty Mentor: Leslie Stamoolis

Abstract: The presentation is about how to audition for any medium: theater, film, TV, voice acting, and other general tips to remember to work as an actor.

E13* *The Effects of a Model, Lead, Test Procedure on the Comprehension of Safety Signs by Two High School Students with Disabilities in a Self-Contained Special Education Classroom*

Aundrea Davit, **Lauren Zastrow**, **Ellie Powers**, -Gonzaga University

Faculty Mentor: Jen Neyman

Abstract: The study's purpose was to evaluate the effectiveness of a Model, Lead, Test technique on understanding comprehension questions about safety signs by two 16-year-old participants one who had a health impairment and one who had an intellectual disability in a Self-Contained Special Education classroom. The goal was for the participant to correctly answer six comprehension questions related to the street signs for at least three sessions in a row. A changing criterion design was used to display the results of event data collection showing the participants' progress across the three criterion levels. Model, Lead, Test provided faded instructional support as the participants developed skill mastery. Each safety sign rule was taught with explicit instruction. Both participants showed progress. Participant A ended the study in criterion level 2, and Participant B reached full mastery of the six signs in intervention and maintenance phases. The repetition, rule consistency, leveled instructional support, and explicitness are contributed to the participants growth throughout this study.

E14* *The Effects of Copy Cover Compare on Spelling Nine CVC words by a Seven-Year-Old Female with Autism in a Self-Contained Classroom*

Aundrea Davit, -Gonzaga University

Faculty Mentor: Jen Neyman

Abstract: The purpose of the study was to show the effects of Copy Cover Compare on spelling nine CVC words for seven-year-old female with autism in a special education self-contained classroom. The participant had trouble spelling CVC words. The dependent variable was after being told a spelling word, the participant wrote the correct letter order for the specific CVC word within a 10-second limited hold during 1.5-minute timing. A permanent product data system within a changing criterion design assessed the number of correctly spelled CVC words. For the independent variable, teaching began with a Model-Lead-Test introduction of the two target words. Then, Copy Cover Compare structured writing the CVC words. First, they copied the modeled word, covered the word, wrote it from memory, and compared it to the model. This intervention package incorporated modeling, fading prompts, repeated writing, contingent feedback, and self-assessment to develop the skill where the participant learned to correctly spell many CVC words.

E15* *The Effects of a Guided Practice with Visual Direction Chart Instructional Package on Following Three-Step Instructions by a Preschool-Aged Female with Speech Delays in an Integrated Preschool*

Jackie Jacobs, -Gonzaga University

Faculty Mentor: Jen Neyman

Abstract: The study's purpose was to evaluate the effectiveness of Guided Practice with visual supports on three-step directions by a four-year-old female in an integrated preschool. The participant had an IEP for speech and communication and showed difficulty completing directions in the classroom. The dependent variable was successfully completing all three tasks within a 5-second latency per step and within a 10-second limited hold per step during a 30-second timing. An event data collection system in a changing criterion design assessed the directed completed skills. The Guided Practice provided a model lead test and prompting based on the participant's responding and progress. Prompts were faded as quickly as

possible to yield independent responding. The number of steps taught consecutively built from one- to three-step directions. Plus, a visual showed a picture of each targeted direction. The results showed great success with the completed directions reaching mastery of 9 out of 9 points for three consecutive sessions and generalized into a different skill set. The skill building, varying levels of support, visual guide, and modeling combined into an effective instructional package.

E16* *The Effectiveness of a Model-Lead-Test Procedure on CVC Word Identification by a First Grade Female with Autism in a Self-Contained Classroom*

Brooke Sanchez, -Gonzaga University
Faculty Mentor: Jen Neyman

Abstract: The purpose of this study was to evaluate the effectiveness of a Model-Lead-Test procedure on consonant-vowel-consonant (CVC) word identification by a 7-year-old first grade female with autism in a self-contained classroom. The setting of this study was an elementary self-contained classroom in the Pacific Northwest. The dependent variable was correctly vocally read CVC words with a five-second limited hold in a one-minute timing. The experimental design was a changing criterion design that evaluated the effects of a Model-Lead-Test procedure intervention using event data collection. The Model-Lead-Test procedure involved three steps: modeling the correct pronunciation of a CVC word, guiding the participant to say it correctly, and then testing the participant's ability to say the word independently. After the intervention was implemented, the participant showed an increasing trend in correctly identifying ten CVC words. Mastery was reached in intervention at 10 out of 10 words across three consecutive sessions and in maintenance 9 out of 10 words across three consecutive sessions. The researcher concluded that a Model-Lead-Test procedure is effective in teaching a student with autism CVC word identification due to its explicitness, faded instruction, and repeated trials.

E17* *The Effectiveness of a Token Economy on On-Task Behaviors by a Middle School Male with Autism in a Self-Contained Special Education Classroom*

Mackenna Vandergon, **Erica Strohm**, -Gonzaga University
Faculty Mentor: Jen Neyman

Abstract: The purpose of the study was to evaluate the effectiveness of a Token Economy on On-Task Behavior by a thirteen-year-old male diagnosed with autism. An interval data recording was used to test the participant's ability to stay in his seat and work quietly. The researchers intended for the participant to be on-task for 36 out of the 40 15-second intervals in three consecutive sessions. A reversal design was used to display the participant's progress during baseline and intervention. At the start of the session, the researchers told the participant his on-task goal. During the 10-minutes, the researchers monitored the participant and recorded if he was on-task or off-task. On the Token Economy 10 square grid for each minute, a frowny face was drawn if the participant was off-task, or a smiley face was drawn if the participant was on-task. If the participant met his number of smiley faces goal, he received his reward. In both intervention phases the average number of intervals with on-task behavior was 34.8 and 35 reaching mastery in each. The Token Economy was successful due to its intermittent contacts during the session and the participant developing a sense of accomplishment from achieving his goal and earning his reward.

E18* *The Effectiveness of a Direct Instruction Flashcard System on Sight Word Identification by a Middle School Female with Multiple Disabilities in a Self-Contained Classroom*

Bodie Garda, **Brooke Sanchez**, -Gonzaga University
Faculty Mentor: Jen Neyman

Abstract: The purpose of this study was to evaluate the effects of a Direct Instruction Flashcard System on sight word identification by a middle school female with multiple disabilities. There was one participant who was thirteen years old with diagnoses of autism, intellectual disability, and anxiety. The setting was a middle school self-contained classroom in the Pacific Northwest. The dependent variable was sight words read correctly within 3 seconds of them being presented. The experimental design used was a changing criterion design and evaluated the effects of a direction instruction flashcard intervention assessed through frequency data collection. The DI Flashcard System used a deck of target and mastered sight words to build identification skills while sustaining motivation to learn. The teaching procedure provided explicit instruction and contingent feedback to build reading skills. This study resulted with an increasing trend across four criterion levels reaching over 11 correctly read sigh words. The researchers of this study concluded that a Direct Instruction Flashcard System is effective in teaching a student with multiple disabilities sight word identification.

E19* *An Analysis Evaluating the Effectiveness of Direct Instruction Flashcards on Sight Word Identification for a Nineth Grade Male with an Other Health Impairment in a High School Resource Room*

Grace Hammers, **Jackie Jacobs**, -Gonzaga University
Faculty Mentor: Jen Neyman

Abstract: The purpose of this study was to evaluate the effectiveness of Direct Instruction Flashcards on sight word acquisition for a Nineth grade male with an Other Health Impairment (OHI). The participant was a fourteen-year-old male in a resource room for English instruction at a public high school. The dependent variable assessed was correctly identified said sight words within a three-second limited hold following the flashcard presentation. A changing criterion design was utilized to gradually shape the participant's target sight word accuracy increasing the amount of mastered words using frequency recording. Intervention consisted of three criterion levels, requiring the participant to master each level for three consecutive sessions prior to advancing.

Direct Instruction Flashcards taught 15 words with a mixture of 3 target words and 12 mastered words. With an embedded Model, Lead, Test procedure, the intervention provided repeated practice of the target words until mastery. Positive reinforcement was used in the form of a fixed ratio reward chart to motivate the participants' involvement throughout the study. The participant met the intervention goal of nine mastered target sight words in eleven sessions of intervention. The results of the study showed an increase in the participants' number of mastered sight words through the use of Direct Instruction Flashcards.

E20 *Through the Waters: An Occupational Therapy Aquatic Program for Polytrauma Recovery- A Capstone Project Proposal*

Emma Leathers, -Whitworth University
Faculty Mentor: Donna Mann

Abstract: Polytrauma, comprising Post-Traumatic Stress Disorder (PTSD), Traumatic Brain Injury (TBI), and chronic pain, is often linked to autonomic nervous system (ANS) dysregulation (Fonkoue, 2020). Occupational therapy (OT) approaches target symptom management and may overlook underlying neurobiological dysfunctions. One such factor is retained primitive reflexes, early movement patterns that may re-emerge after trauma, contributing to sensorimotor disorganization, emotional dysregulation, and maladaptive behaviors. Without holistic intervention, individuals with polytrauma may turn to self-destructive coping strategies, reducing their overall quality of life (James, 2014).

This capstone project proposes the development of an OT-led aquatic therapy program to support hippocampal neurogenesis and ANS regulation in polytrauma survivors. Assessment of PTSD symptoms, chronic pain, ANS function, and quality of life throughout the intervention will be included. A protocol manual and a case study will be developed.

There is a critical need for trauma-informed, OT-led protocols that integrate aquatic movement, reflex integration, and psychoeducation that address the root cause of this dysfunction as opposed to symptom management. This program seeks to fill that gap by offering a comprehensive, evidence-based approach that supports emotional regulation, reduces maladaptive behaviors, and enhances functional participation, advancing OT's role in trauma rehabilitation and sensory-motor recovery.

E21* *Fostering Stability: The Role of Occupational Therapy in Family-Cantered Shelter Programs*

Kate White, -Whitworth University
Faculty Mentor: Donna Mann

Abstract: Rising Strong is a holistic, family-centered shelter program offering on-site outpatient drug treatment, mental health services, and life skills coaching aimed at reducing substance use disorder and relapse while uniting families. This program incorporates OT principles like holism, but the absence of an OT on staff contributes to increasing relapse rates due to a lack of structured routines and hands-on interventions. Current literature lacks case studies and best practices outlining the role of OT in similar programs, highlighting a gap in knowledge and clinical skills.

This paper aims to demonstrate the value of occupational therapy in routine development, emotional regulation, and family stability. High relapse rates and challenges in regaining custody suggest that integrating OT into such settings has the potential to support long-term family healing and recovery.

The proposed doctoral project will include a case study following a selected family, with 12 weeks of observation and intervention trials with all families to assess effective OT strategies. Findings will contribute to clinical best practices, inform program development at Rising Strong, and support future research on OT's role in reducing relapse. The results of this study may serve as a foundation for hiring an OT at Rising Strong and further exploration of OT's impact in similar settings.

E22* *Fascia and Function: The Role of Myofascial Release in OT.*
Aldo Mercado, -Whitworth University
Faculty Mentor: Donna Mann
Abstract: Title: Fascia and Function: The Role of Myofascial Release in OT.

Background/Significance: Myofascial release (MFR) is a skilled manual therapy used to address fascial restrictions, improve mobility, and reduce pain. Although widely practiced by occupational therapists (OTs), there is a significant gap in documented research and recognition of this intervention within OT. This gap limits representation and awareness of MFR's benefits.

Purpose: This project aims to develop entry-level OTD skills while addressing the literature gap by producing a manuscript suitable for publication and contributing to MFR's recognition and integration in OT.

Methods: A case study will document patient responses to MFR within OT intervention, measuring changes in manual muscle testing (MMT), range of motion (ROM), and functional participation. Findings will inform manuscript development to support MFR's integration into OT practice.

Anticipated Results: MFR is expected to improve ROM, MMT, and functional participation, with reports of decreased pain. Findings may highlight barriers such as limited recognition and training gaps, reinforcing the need for greater awareness and research.

Conclusion: This project seeks to demonstrate MFR's value in OT. Anticipated results may support its benefits while identifying barriers, emphasizing the need for increased education, training, and research.

E23* *Building Outcomes of Student Thriving: Developing an On-Campus Occupational Therapy Program to Support Student Role Fulfillment*
Andrea Friesen, -Whitworth University
Faculty Mentor: Donna Mann
Abstract: Executive function (EF) skills such as organization, working memory, initiation, and emotional control are crucial for student role success in postsecondary education. However, during postsecondary education, the host of increased demands across life domains impacts EF, role success, and overall student health. The purpose of this occupational therapy doctorate (OTD) capstone project is threefold: to create a living lab program for Whitworth University (WU) OTD students, to establish a collaborative framework between the WU Student Success Team and the WU OTD program, and to gain clinical skills to support EF and student role fulfillment in postsecondary education.

This project builds on successful models such as Thomas Jefferson University's Greater Opportunity for Academic Learning and Living Successes (GOALS2) program. The living lab program will simultaneously provide individualized coaching for students to thrive while developing clinical competencies among OTD students. Furthermore, coaching programs between students across education levels improve student self-efficacy, identity, and belonging. Through supervised intervention, knowledge translation, and interdisciplinary collaboration, this project works toward increasing student retention, reducing mental health crises, and advancing best practices for occupational therapy to enhance student role fulfillment.

E24 *Strengthening Occupational Therapy in Maternal Health: Pathways for Skill Development and Practice Integration*
Alexa Cach, (*she/her*), -Whitworth University
Faculty Mentor: Donna Mann
Abstract: Matrescence encompasses the profound biopsychosocial changes experienced during the transition to motherhood (Orchard et al., 2023). Occupational therapists are uniquely positioned to provide support throughout this transformative journey, spanning the maternal care pathway from pre-conception to postnatal stages (Merkel et al., 2023; Davis & Lovegrove, 2019). Maternal health occupational therapy (MHOT) combines foundational OT principles with

specialized certifications and training to deliver comprehensive care for the complex needs of mothers. Despite the growing recognition of MHOT, this specialty remains underutilized and lacks widespread integration into healthcare systems. This doctoral capstone project aims to address this gap by developing a flexible framework, outlining essential training, skills, and certifications for MHOT practice, complemented by a business model to support entrepreneurial growth. The goal of the resources is to support occupational therapists in navigating the transition into maternal health care. Through skill acquisition, resource development, and business exploration, this project will expand OT's role in MH to improve client outcomes and overcome barriers to care. This capstone emphasizes the importance of advancing occupational therapy in MH while fostering professional growth and entrepreneurial opportunities to meet the evolving needs of mothers and families.

E25* *Advancing Perinatal Health Equity to Reduce Racial Disparities in Maternal and Infant Mortality and Morbidity*

Giovanna Consiglio, -Gonzaga University
Faculty Mentor: Jacqui Crissey

Abstract: Background & Significance: In the U.S., there are 18.6 pregnancy-related deaths per 100,000 live births (2014-2020). A Washington Department of Health study found that non-Hispanic Black women were over 2.5 times more likely to die from pregnancy-related causes than non-Hispanic White women, with 80% of these deaths preventable. A study of 1.8 million Florida hospital births (1992–2015) showed that when Black newborns were cared for by Black physicians, their mortality risk decreased by 50%. Studies show that the impacts of racism affect midwifery's lack of racial diversity, acting as a barrier to people of color completing midwifery education programs and contributing to the profession. These studies highlight the value of diversity in maternal healthcare and the health benefits of racial concordance in patients and providers. A racially diverse midwifery and doula workforce can improve healthcare access, patient-provider trust, and contribute to better health outcomes for marginalized communities. Purpose: To complete a literature review to inform a community-driven research project. Through listening sessions, we will collaborate with the Shades of Motherhood Network to investigate whether midwives and doulas of color improve perinatal health outcomes and reduce racial disparities in maternal and infant mortality and morbidity.

E26 *Unrealized Harmony: A Framework for Intentional Music Use in Occupational Therapy Practice*

Emily Weiler, -Whitworth University
Faculty Mentor: Donna Mann

Abstract: Music has a profound impact on health and well-being (Leon et al., 2023), and its improved use in occupational therapy (OT) will enrich the profession by enhancing client engagement and improving functional outcomes in all areas of life (Kayser, 2018; MacRae,1992). This doctoral capstone project aims to address the critical lack of a standardized framework to guide music intervention decision-making and implementation within OT practice. It will establish a clinical framework to integrate music as a primary therapeutic modality for a target population, through a structured, evidence-based approach that bridges the gap between OT research and practice. A mixed-methods study will be used to refine the framework, combining quantitative data on client outcomes with qualitative feedback from the student clinician to illustrate the clinical utility for OT practice. Study findings will demonstrate the effectiveness of music in improving client outcomes and reinforce the value and applicability of music as a modality within the OT scope of practice through the proposed framework. Ultimately, this project aims to establish a foundation for the intentional integration of music as both an occupation and therapeutic modality in OT practice, to maximize the therapeutic benefits of music for improved client outcomes and overall well-being.

E27 *Doctoral Capstone Project Proposal – Bridging the Gap: A Study of School-Based Ots and the Development of an Effective Practice Model*

Celia Moyer, -Whitworth University
Faculty Mentor: Donna Mann

Abstract: The doctoral capstone experience (DCE), planned for Spring 2026, aims to provide research to add to the literature related to school-based occupational therapy (OT) and effective service delivery. The DCE will equip the OTD student with essential OT practice skills to navigate both medical and educational models in the school setting. Due to limited guidance in the literature, this project seeks to clarify OT's role within the Multi-Tiered System of Support (MTSS) and develop practice guidelines for OT services in schools. The DCE will examine current OT practices, define what constitutes successful service delivery, and explore how service delivery could be improved. It will also gather insights from

educational professionals regarding their perceptions of OT services and any barriers to effective service delivery. Ultimately, the findings will provide valuable evidence for better utilization of Ots within schools, empower educators, and enhance student outcomes, while fostering clarity for practitioners navigating the school system.

E28 *Expanding the Role of Occupational Therapy in Hospice Care: A Doctoral Capstone Proposal*

Haley Jacobson, -Whitworth University
Faculty Mentor: Donna Mann

Abstract: As the demand for hospice services grows alongside an aging population, occupational therapists (Ots) have the potential to play a larger role in enhancing quality of life at the end of life. OT services remain underutilized in hospice care due to limited research, lack of awareness among healthcare professionals, lack of evidence of OT's efficacy, and barriers to reimbursement. This capstone project focuses on program development, with the goal of identifying unmet needs in hospice settings and exploring how OT can be more effectively integrated into interdisciplinary teams.

The project involves conducting needs analyses across multiple hospice settings to evaluate current service delivery and identify gaps in care that could be addressed through OT intervention. Based on these findings, recommendations will be made to guide the development or enhancement of OT services in hospice care. By emphasizing a holistic, client-centered approach and advocating for the role of occupational therapy in end-of-life care, this project aims to support more comprehensive, meaningful, and person-centered care for individuals and families facing terminal illness.

E29 *The Effect of Ribosome-Targeting Antibiotics on Breast Cancer Cell Proliferation*

Oliver Ling, -Saint George's School
Faculty Mentor: Ian Townley

Abstract: Triple negative breast cancer (TNBC) strains are notably more difficult to treat in clinical settings because of their immunity to oft-used hormone therapies. As such, researchers are constantly looking for alternative metabolic pathways in these strains that can be targeted. In this project, the antibiotics gentamicin and chloramphenicol were tested on a TNBC cell line to see their effect on its growth. To do this, four experimental groups and two controls were set up, comparing the effects of these antibiotics on cancerous vs. normal cells. A proliferation assay was run to determine the growth of each line.

Gentamicin had a minimal effect on the growth of either cell line in comparison with the controls while chloramphenicol had a very noticeable effect, and a greater one on the cancer cell line that was used, with there being 3.41x more inhibition, indicating treatment specificity. In conclusion, chloramphenicol, but not gentamicin, was effective in inhibiting TNBC cell growth, which could be due to the targeting of 50S ribosomes within bacteria in standard treatment with chloramphenicol, as well mitochondrial inhibition by chloramphenicol. There are many avenues for further research beyond this project, such as exploring the mechanisms of growth inhibition and testing other antibiotics.

E30 *Toxicity of Grapes on Dogs*

Andre Jiang, P**er Sande**, -Saint George's School
Faculty Mentor: Ian Townley

Abstract: Grapes and most grape products are toxic to dogs and can cause a wide range of symptoms from diarrhea to life threatening kidney failure, but the exact reason for this toxicity is unclear. The hypothesized culprit is the tartaric acid present within grapes, but no research has been done to support this hypothesis. The aim of this research project is to understand which group(s) of dog species and weight classes are affected and what symptoms appear due to the consumption of grapes. Through networking and crowd sourcing data on grape toxicity from nearby veterinarians, we endeavor to find patterns relating dog breeds and size to grape toxicity.

E31 *Effect of Soil Amended with Biochar on Growth Dynamics of Radishes*

Colin Brennan, **Jake Werner**, -Saint George's School
Faculty Mentor: Ian Townley

Abstract: How do different percentages (15%, 10%, 5%, 0%) of biochar in soil affect the initial growth rate and final mass of radish plants (Raphanus sativus). We used 15%, 10%, 5% biochar, and using pure soil as our control group. For each soil type, we prepared 12 samples, totaling 48 samples across all conditions. After germination and initial plant growth, the number of leaves and the plant's height from the top of the plant to the soil (in centimeters) were recorded every school

day. The purpose of this study is to better understand if biochar is an effective way to stimulate plant growth in radish, producing healthier and faster-growing plants.

T1 *Stage Management for Stupid F**king Bird*
Cassiopeia Motschenbacher, (*she/they*), -Gonzaga University
Faculty Mentor: Leslie Stamoolis
Abstract: This project is a semester-long effort focused on all aspects of stage managing a theatre production. It involves the collection of all materials generated by the SM team, including rehearsal reports, blocking notation, props and scenic tracking, and calling scripts, as well as examining the presenter's unique philosophy she brings to the SM team.

ORAL PRESENTATIONS – Titles, Names, Abstracts

Session B – 10:00-10:55 am

Group 1, Hemmingson 310, La Storta.

B1* *Unequal Pathways: Race, Religion, and Resettlement in Spokane's Immigrant and Refugee Communities*
Hannah Cordero-Johnson, (*she/her*) -Whitworth University
Faculty Mentor: Jason Wollschleger
Abstract: This study explores the lived experiences of immigrants and refugees in Spokane, Washington, with particular attention to the role of evangelical Christian organizations in their resettlement and integration. While existing literature highlights paradoxes in evangelical attitudes toward immigration—balancing compassion with law-and-order frameworks—there remains limited research on how these dynamics are perceived by those receiving aid. Through in-depth, semi-structured interviews with five participants from refugee and immigrant backgrounds, this research employs thematic analysis to identify key barriers to integration, including language obstacles, employment restrictions, unequal access to education, and limited transportation. There were also uneven experiences with faith-based support systems that should be explored more in depth. Social belonging and economic survival emerged as central themes, often shaped by race, legal status, and religious identity. This study contributes to gaps in the literature by disaggregating immigrant and refugee experiences and centering participant voice in understanding structural inequities. A survey is currently being conducted to supplement qualitative findings with broader quantitative data. Ultimately, this project seeks to inform more equitable, culturally sensitive, and effective refugee and immigrant support systems within faith-based and civic institutions in Spokane.

B2* *Los hablantes de herencia: The Realities of Heritage Language Learners in the United States*
Isabella Sedano, -Gonzaga University
Faculty Mentor: Christina Isabelli
Abstract: This project explores the experiences of third-generation Mexican Americans regarding their acquisition and maintenance of heritage Spanish in the United States. First, I consider the role of native and bilingual speakers in the initial transmission of the heritage language and the impact of generational attitudes on whether they decide to transmit the language to younger generations. Next, I discuss the realities of some heritage language learners (HLLs) such as personal motivations to learn the heritage language, the role of language in forming a shared cultural identity, and the current resources available to support HLLs in academic contexts. Finally, I investigate the linguistic phenomenon of Spanglish in the United States, and the ways it may be used by some Mexican American HLLs to express the diversity of their cultural identity. I draw upon research that presents the perceived needs of heritage language learners from an academic standpoint and studies that provide primary accounts from learners themselves. The results of this study indicate a strong connection between intergenerational language transmission, the realities of the heritage language learner population, and an example of a hybrid language to present an important linguistic phenomenon that occurs across the United States, including within the Spokane community.

B3* *Rewriting Representation: How Portland's Ranked-Choice Voting Transition Models a More Equitable Democracy*
Sophie St. Jacques, (*she/her*), -Whitworth University
Faculty Mentor: Sean Swan
Abstract: This paper examines the potential for expanding the Single Transferable Vote (STV) system as an alternative to traditional electoral methods, specifically focusing on Portland, Oregon, as a case study. By evaluating Portland's first implementation of ranked-choice voting (RCV) and comparing it to the broader use of STV in U.S. jurisdictions like Maine and internationally in countries such as the United Kingdom, this paper highlights the system's ability to promote more proportional representation, reduce political polarization, and offer voters a wider range of choices. The paper also contrasts STV with the traditional first-past-the-post (FPTP) system, which often leads to unrepresentative outcomes and perpetuates the dominance of two major political parties. While there are challenges in implementing STV, including the need for voter education and the complexity of vote counting, the paper argues that the advantages of STV, such as more accurate representation and reducing the "lesser of two evils" mentality, significantly outweigh these drawbacks. By analyzing Portland's experience and the adoption of STV in other regions, this paper advocates for the wider implementation of STV in the U.S. and other democracies to improve the electoral process and better reflect the diverse preferences of voters.

B4 *The Economic and Geopolitical implications of Turkey's rise as a producer of affordable military drones in the global arms trade*
Daniel Arinez, -WSU
Faculty Mentor: Patrick Carlin
Abstract: The global arms trade has been significantly reshaped by Turkey's emergence as a leading producer of affordable military drones, particularly the Bayraktar TB-2. This paper examines the economic and geopolitical implications of Turkey's growing presence in the drone market, which challenges the dominance of the United States and China. By offering cost-effective yet highly capable drones with fewer export restrictions, Turkey has positioned itself as a key supplier for smaller nations seeking military autonomy. The study explores how Turkey's drone industry has influenced global conflicts, particularly the Russo-Ukrainian War, where TB-2 drones played a pivotal role in countering Russian forces. The success of Turkey's drone program has spurred competition from nations like Iran and Russia, leading to a broader shift toward lower-cost drone warfare. Additionally, the paper discusses the strategic motivations behind Turkey's military-industrial expansion, including potential state subsidies and geopolitical maneuvering. As the demand for accessible military drones increases, Turkey's role in the international arms trade continues to grow, raising questions about the ethical and strategic consequences of widespread drone proliferation.

Group 2, Hemmingson 312, Firenze.

B5 *Evaluating Heuristics for the Fitness of Random Linear Codes over the Binary Field*
Ian Myers, (*he/him*), -Gonzaga University
Faculty Mentor: Luke Johnson
Abstract: Random Linear Codes contain minimum distances that help determine their fitness for biometric data encryption. Calculating the minimum distance of all random linear codes is computationally infeasible. Therefore, heuristics are used to analyze the fitness of codes based on their generating matrices.

B6 *Multi-Station Tribometer Instrumentation*
Vinh-Khiem Hoang, -Gonzaga University
Faculty Mentor: Harman Khare
Abstract: This project aims to improve the functionality and reliability of a four-station tribometer for undergraduate research in tribology—the study of friction, wear, and lubrication. The tribometer performs reciprocating sliding between two materials of interest, while recording forces in real time. The main components of this instrument include a motor interfaced to the sliding track (which holds the first sample) and load actuation through pneumatic thrusters (to which the second sample is mounted). Current work focuses on calibrating the pneumatically actuated thrusters to apply consistent normal force across all four testing stations. This ensures more reliable and repeatable test results. In addition, the pin holders that secure the test samples are being redesigned to improve sample alignment and better accommodate mounting geometries. Finally, the motor housing is also being redesigned to accommodate a new motor setup, enhancing

integration with LabVIEW GUI and improving overall usability. These upgrades are based on feedback and limitations observed in the original design and are intended to make the tribometer more suitable for future student-led experiments and research. This presentation will cover the goals of the project, the design changes made, and the challenges faced during implementation, with a focus on applying engineering principles to improve experimental reliability.

B7 *A 3D printed Microfluidic Device and Miniaturized Fluorimeter Towards Low-resource Environments*
Enqiao Qian, -Whitworth University
Faculty Mentor: Philip Measor
Abstract: A 3D printed microfluidic device and corresponding miniaturized fluorimeter was demonstrated with inexpensive components towards the use in a low-resource environment. The microfluidic device (channels approximately 150 µm wide, 100 µm high and 8.5 mm long) was 3D printed on a standard 3 × 1 inch glass slide using a custom SLA 3D printer. The fluorimeter housing was made using a commercial FDM 3D printer that included slots for the associated excitation/emission filters, a blue LED source, an inexpensive 12MP CMOS camera and a raspberry pi controller. A limit of detection of 85 nM fluorescein dye was shown.

B8 *Visualizing Photons with Geometric Algebra*
Moab Croft, -Whitworth University
Faculty Mentor: Kent Jones
Abstract: This talk presents a summary of the author's recent publication, "The Wigner Little Group for Photons Is a Projective Subalgebra". Using a mirror-based view of the Spacetime Algebra, the Wigner little group is seen to induce a projective subalgebra. Due to the dimension-agnostic properties of Geometric Algebra, there are (n+1)-dimensional generalizations, termed little photon algebras. The lightlike transformations in these little photon algebras leave the (pseudo)canonical electromagnetic field bivector invariant. Geometrically, this corresponds to Lorentz transformations that do not change the intersection of the spacelike polarization hyperplane and the lightlike wavevector hyperplane. This is a demonstration of a powerful geometric and algebraic framework that unifies the analysis of symmetries and structures of Spacetime geometry.

Group 3, Hemmingson 308, Cali.

B9 *The Use of Violent Language in the Quotidian*
William Henke, -Whitworth University
Faculty Mentor: Peter Moe
Abstract: Modern language has become violent in a way that abstracts our words from their actual meanings. Phrases like "slay" "break a leg" "you're killing it" and many others reveal how violence has settled into quotidian linguistics. This reorientation towards violence desensitizes people to its larger social implications and promotes inadequate communication. Language that was once, and by dictionary definition still is, seen as violent or harmful is now utilized in neutral or even uplifting ways. Desensitization towards larger problems in society like gun violence, racism, global warming, etc. engenders an escalation of language in order to gain an appropriate reaction to said issues. This indicates a vicious cycle of desensitization and escalation which leads to general ignorance about the importance and severity of relevant problems on the global, national, and community levels. Even mundane language has the ability to reshape the world we live in, but people are largely unaware of what we are actually communicating to one another—our language is often unintentional.

B10* *Examining the Similarities of Religious Traditions in Africa to East Asia*
Carissa Kanae, (*she/her*), -Gonzaga University
Faculty Mentor: Itohan Idumwonyi
Abstract: This study uses my lived experiences to examine how African Religious Traditions may share common traits with, or contrast, religion of Asian Americans as well as East Asian practices. This presentation also has a comparison of African Religious Traditions to what I have learned about Kanaka Maoli religious traditions, as an Asian-American living in Hawai'i. Similar themes include musical and dance worship practices in Africa and Hawai'i, Shamanism in Korea compared to Mediums of African Religious Traditions, and monotheism in Africa in comparison to the Asian-American Christian experience.

B11* *The Future of Hospice Care in Spokane County: A Christian Response*
Melinda Mullet, (*she/her*), -Whitworth University
Faculty Mentor: Bert Emerson
Abstract: Aging Americans and their caregivers should have easy access to dignifying end-of-life care. The rapid increase in the 65+ population requires policy innovation in current Medicare regulation concerning hospice. Coordinated, intentional efforts between government and private sector providers, insurance navigators, community organizations, and houses of worship are also needed to change public attitudes towards hospice care, encourage referrals, increase uptake, and offer emotional, psychological, and spiritual support. Such partnerships and policy innovation will lower hospital costs, decrease financial and physical strain on caregivers, and increase the dying person's quality of life. Hospice began as a volunteer run service, and that foundation in community support must be emphasized and reimagined for the challenges ahead in American elderly care. Therefore, the American church, formed by the story of Jesus's life, death, and resurrection, must speak openly about the reality of dying, advocate for policy reform, and practice solidarity with the dying and their caregivers.

Group 4, Hemmingson 306, Goa.

B12* *Accessories for Walking Assistive Devices to Improve Quality of Life in Elder Care*
Tate Beasley, (*she/her*), **Sam Geiger**, (*he/him*), -Gonzaga University
Faculty Mentor: Lada Kurpis
Abstract: The U.S. population age 65 and over reached 55.8 million or 16.8% of the population of the United States in 2020 and continues growing (U.S. Census 2020). As the numbers of older consumers continue increasing, so does the proportion of older adults in need of various assistive devices. For our marketing strategy project, we researched the needs of the users of walkers and rotators. We designed and administered a survey to better understand the needs of the elderly disabled residents of an assisted living home in regard of their assistive walking devices. Our research identified a number of shortcomings of the existing products. We developed a product concept that consists of a line of walker/rotator attachments that differ from existing offerings. The key differences of the proposed product are as follows: attachments face the individual so ensure easy access; they attach to all sides of the walker for the purpose of greater security and fall prevention; attachments can be customized. Marketing strategy for commercializing the line of attachments is discussed. The proposed product will benefit the society by improving quality of life of older disabled adults in need of assistive walking devices.

B13* **Elie Kornfeld**, (*he/him*), -Gonzaga University
Faculty Mentor: Maria Tackett
Abstract: This presentation will investigate whether trade unions are an effective means of combating the growing percentage of income going to the top 10% of earners. With income inequality growing both domestically and internationally, many workers are facing increased debt burdens, stagnated wages, and reduced economic mobility. Sustained and growing income inequality can lead to political unrest and an inability to invest in human capital which can threaten economic stability. I will use a multivariable regression to control for GDP per capita, education, trade, and unemployment to isolate the effect trade unions have on the share of income going to the top 10% of earners. While labor institutions research is not a new field, the analysis of a wide spectrum of economies emphasizes the international importance of collective bargaining in an increasingly globalized economy. This research aims to provide an empirical examination of how the share of income going to top earners relates to the growing financial struggles of workers around the world, and to provide policymakers with evidence of how labor unions may counteract income inequality.

Session D – 1:00-2:00 pm

Group 1, Hemmingson 310, La Storta.

D1 *The US Dollar Supply Crisis in Bolivia*
Daniel Arinez, -WSU
Faculty Mentor: Hector Botello
Abstract: The Bolivian economy has been facing one of its most unique crises in modern memory, and that is the dwindling supply of US Dollars in its reserves. This crisis would come to be as a result of almost two decades of long-standing government policies, economic mismanagement and external factors that would contribute to an inflationary period in the FOREX markets. This paper aims to examine the root cause of this crisis, tracing it back to the most popular nationalization policies that were implemented by the Movimiento Al Socialismo (MAS) party since 2006. The introduction of subsidies aimed to lower prices, particularly for gasoline, created fiscal burdens that combined with declining foreign investment and rising global fuel prices, would begin to drain Bolivia's dollar reserves.

The crisis deepened during the COVID-19 pandemic and the Russo-Ukrainian war, which further restricted dollar inflows and led to a widespread loss of confidence in the Bolivian financial system. The government's attempts to address the crisis—such as issuing dollar-denominated bonds and auctioning diesel—have proven largely ineffective due to structural economic weaknesses. As Bolivia grapples with dollar scarcity, an expanding black market, and growing inflationary pressures, this paper argues that meaningful economic recovery requires reducing subsidies, attracting foreign investment, and implementing broader market-oriented reforms. Without these changes, Bolivia risks prolonged economic instability and a deepening financial crisis.

D2 *The Female Mortality Rate during Pregnancy and its Relationship to Poverty*
Brooke Bowen, -Gonzaga University
Faculty Mentor: Maria Tackett
Abstract: This study investigates the relationship between poverty and female mortality rates during pregnancy across U.S. states from 2018 to 2022. In light of rising maternal mortality rates in the United States, particularly in economically disadvantaged southern states, this paper examines how poverty influences these outcomes through the lens of socioeconomic determinants of health. Using a linear regression model, the analysis evaluates how average state-level poverty, cesarean delivery rates, and educational attainment relate to pregnancy-related mortality. This research offers an economic perspective on maternal mortality, emphasizing the systemic impact of socioeconomic inequality on women's health and broader societal wellbeing.

D3* *Rural Economic Resilience: Agricultural Adaptation in the Post-Pandemic Landscape*
Devon O'Neill, (*he/him*), -Gonzaga University
Faculty Mentor: Maria Tackett
Abstract: The COVID-19 pandemic significantly disrupted the U.S. agricultural industry, exacerbating existing financial pressures and accelerating farm closures. However, agritourism has emerged as a potential strategy to enhance farm resilience by diversifying revenue streams. This study examines how county-level migration patterns from 2017 to 2022 influenced agricultural business survival and agritourism development in selected U.S. states. Grounded in risk management theory, the analysis explores whether increased migration to rural areas provided new consumer markets for agritourism, thereby supporting farm viability. Prior research highlights agritourism's role in stabilizing small and mid-sized farms, the influence of consumer proximity on its success, and the pandemic-driven rural migration surge. By integrating these insights, this study fills a gap in understanding the connection between demographic shifts and agricultural adaptation. Findings will contribute to the broader discussion on rural economic resilience, informing policy and business strategies that support sustainable agricultural development.

D4 *Poor Me a Cup of Crime*

Matthew Simmons, -Gonzaga University
Faculty Mentor: Maria Tackett

Abstract: This paper aims to study how poverty rates influence crime rates at the state level using cross-sectional data from 2022. It investigates whether increased poverty rates are related to higher crime rates. by controlling factors such as population, geography, gender, age, type of crime, and race. Ordinary least squares regression is employed to estimate which states have the strongest link between poverty and crime. This research deepens the understanding of what crime is associated with, and it brings attention to where policy reform should focus. Although future research could explore what legislative measures could be taken on a state level, this paper focuses on determining the underlying relationship between poverty and crime.

Group 2, Hemmingson 312, Firenze.

D5 *Femininity Through the Colonial Patriarchal Gaze*

Gwen Jaramillo, (*she/her*), -Gonzaga University
Faculty Mentor: Itohan Idumwonyi

Abstract: Femininity has been shaped and constrained through the colonial patriarchal gaze across different cultural and religious contexts. By cross analyzing religious narratives, we can reveal how much colonialism has imposed these rigid ideals of women hood. This piece reflects and investigates the ways in which these narrative have, and continue to influence gender roles today, while also highlighting spaces of resistance and reimagination. This poses a question: If cultural narratives can be constructed to constrain, can they not also be deconstructed to liberate? This is both a reflection and a call to action, a calling to reimagine femininity beyond this landscape painted by the colonial patriarchy.

D6 *Plastic Summers*

Sydney Anderson, -Whitworth University
Faculty Mentor: Nicole Sheets

Abstract: Plastic Summers is a creative non-fiction essay that blends research and narrative. The essay outlines basic child psychology research that supports the benefits of adolescent play, and is supported by scenes told in narrative form.

D7 *399 Reasons to be Afraid*

Kate Vaccaro, (*she/her*), -Whitworth University
Faculty Mentor: Nicole Sheets

Abstract: 399 Reasons to be Afraid is a creative nonfiction piece that combines personal narrative, research on bears, scenes of bears in the wild, and anecdotes about the Pixar movie Brave. It emphasizes the conflict between caring about animal conservation and having an unrealistic fear.

D8* *Algorithmic similarities between music and language processing*

Victoria Woo, -Whitworth University
Faculty Mentor: Matt Bell

Abstract: My research and work experience integrate computational creativity with practical application development in music and language. I have explored algorithmic music composition by applying sorting techniques to generate structured musical pieces. This approach reflects a fundamental similarity to natural language processing, where structured patterns and rule-based transformations govern linguistic computation. Recognizing si milarities, I am particularly interested in the intersection of AI, human-computer interaction, computational creativity, and natural language processing. Through hands-on research, I aim to apply data-driven techniques and advanced programming methodologies to further explore these connections and develop innovative solutions.

Group 3, Hemmingson 308, Cali.

D9* *Restoration Resilience: Identifying Seed Species Adapted to Reoccurring Wildfire*
Michael Robitaille, (*they/them*), -Gonzaga University
Faculty Mentor: Julie Beckstead
Abstract: The resilience of grasses and forbs in the sagebrush landscape of the Inland Northwest is shaped by their fire-adaptive traits and ability to recolonize after disturbances. While some species possess heat-resistant seeds or resprouting capabilities, increasing wildfire frequency and intensity often driven by invasive grasses challenge their persistence. I hypothesize that certain native grasses and forbs exhibit enhanced germination under high heat conditions. To test this, seeds of six restoration species were exposed to four heat treatments (80°C, 100°C, 140°C, and 160°C) for five minutes. Germination was monitored three times per week for 21 days, and germination percentages were calculated. Western yarrow showed the highest germination rates across all treatments, with increasing success at higher temperatures. At 140°C, its germination rate exceeded that of the second-highest species, Sandberg bluegrass, by 24.8%. Lewis flax exhibited significantly lower germination rates, with an 181.1% difference compared to Western yarrow. However, all six seed species failed to germinate under the 160°C treatment, suggesting a temperature threshold at which heat exposure inhibits germination. These findings provide insight into species' post-fire regeneration potential, informing restoration strategies for more resilient landscapes.

D10* *How do Variations in Macronutrient Content of Soil Affect Replanting Efforts in Central Washington?*
Matthew Longstreth, **Matthew Schultheis**, **Pierce English**, -Saint George's School
Faculty Mentor: Ian Townley
Abstract: Pheasants Forever is an organization focused on creating suitable habitats for native wildlife across the United States. They noticed discrepancies in the plant growth of two similar areas they replanted in central Washington. Our group is helping to find a reason for these discrepancies by performing soil analysis experiments by looking at the macronutrients of soil, specifically, nitrogen, phosphorus, pH, and potassium. Our group will compare the data of one plot in central Washington, where the plants are not growing, to another nearby plot where the plants are growing. Our group is hopeful that this work will help Pheasants Forever determine what sort of soil conditions are necessary for the specific plants they use to create pheasant habitats.

Group 4, Hemmingson 306, Goa.

D11 *Analyzing One and Two-Step Free Parameter Predictor-Corrector Multistep Methods*
Zoe Erpelding, (*she/her*), -Gonzaga University
Faculty Mentor: Michelle Ghrist
Abstract: Multistep methods can be used to approximate solutions to initial value problems, but increasing accuracy usually results in worse stability. By purposefully not maximizing the order of accuracy, we can instead add free parameters and use these to optimize other properties such as stability. A stability domain is a graph in the complex plane that shows the differential equations and stepsizes for which a particular method will give stable solutions, i.e., roundoff error grows no faster than linearly in time. A predictor-corrector method first approximates the function value and then refines that estimate, typically resulting in an explicit method with better stability, i.e., a larger stability domain.

This project extends previous work on explicit and implicit free parameter multistep methods for first-order differential equations. Here we present our analysis of the properties of stability domains of one-step and two-step free parameter predictor-correctors, studying how varying the free parameters affect the size and shape of the stability domains, including the extent along the real and imaginary axes. We find some intriguing results, including disconnected stability domains for a particular domain of the free parameters for the two-step family of methods.

D12 **Juliana Cavallini**, -Gonzaga University
Faculty Mentor: Michelle Ghrist
Abstract: We explored the implementation and analysis of symmetric multistep methods for approximating solutions to initial value problems. We first show that symmetric, antisymmetric, and mixed-symmetric methods for equations of the form y'=f(t,y) are not robust. We then focus our analysis on differential equations of the form y''=f(t,y).

For this project, we examined various two-step symmetric methods. We first show that to maximize the order of accuracy, the only explicit method is Stömer's method, which has order 2, and the only implicit method of maximal order is Numerov's method, which has order 4. Our main focus is on analyzing a family of implicit two-step methods of order 2 with one free parameter, comparing their stability and accuracy properties. We show that all of these methods are only stable for differential equations with periodic solutions. One interesting discovery is that for some interval of the free parameter, this method is stable for any stepsize, which is not the case for Störmer and Numerov's methods.

To validate their practical efficacy, we apply each method to some test problems and examine their accuracy, efficiency, and stability in approximating equations with periodic solutions via MATLAB.

D13 *Examining Factors Contributing to COVID-19-Related Isolation Among Adults with Disabilities*
Jared Zaugg, -Gonzaga University
Faculty Mentor: Abdulla Mamun
Abstract: This study investigates key factors contributing to isolation among adults with disabilities during the COVID-19 pandemic. To identify the most influential variables, we applied multiple feature selection methods, including forward selection, backward elimination, stepwise regression, and the least absolute shrinkage and selection operator (LASSO), evaluating models using Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). Additionally, we utilized machine learning algorithms, specifically decision trees, to analyze the data and extract meaningful insights.

This year's Spokane Intercollegiate Research Conference is sponsored by:

Gonzaga University's Center for Undergraduate Research and Creative Inquiry,

www.gonzaga.edu/curci

curci@gonzaga.edu

Dr. Michelle Ghrist, Director

Angie Hinz, Program Manager