ALICE

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CURRENT POSITION

Ph.D. Candidate, Department of Statistical Science, Southern Methodist University.
Expected Graduation Date: May 2022

MAJOR RESEARCH INTERESTS

- Nested Dirichlet models of human microbiome studies.
- Sports analytics combining film and scoring methods.
- Undergraduate education and flipped classroom instruction.
- Nonlinear difference equation models of wildlife populations.

WORKING THESIS TITLE:

Modeling Rare Events Using Nested Dirichlet Distributions

EDUCATION

2008 *MS, Statistics,* Northern Arizona University, Flagstaff, AZ, 4.0 GPA
2007 *MS, Mathematics,* Northern Arizona University, Flagstaff, AZ, 4.0 GPA
2004 *BS Ed., Mathematics Education,* Northern Arizona University, Flagstaff, AZ, 4.0 GPA

OTHER EDUCATION

2011 *Certificate in Digital Filmmaking, Documentary Program,* Yavapai Community College, Sedona, AZ, 4.0 GPA
2009 *Certificate in Digital Filmmaking, Narrative Program, Yavapai* Community College, Sedona, AZ, 4.0 GPA

AWARDS

- SMU PhD Fellow (2018 – 2022)
- Walsh Award: Outstanding Performance on a PhD Exam, SMU (2020)
- Joan Reisch and John Boddie Endowed Scholarship, SMU (2020)
- Gunst Award: Outstanding Performance on a Methods Exam, SMU (2019)
- Lee Ann Lucero Award for Excellence in Screenwriting, Yavapai College (2011)
- Graduate Student of the Year, NAU (2008)
- Charles E. Little Mathematics Education Scholarship, NAU (2003)

REFEREED PUBLICATIONS

"Non-linear Population Models with Adult-based Density-dependence." *International Journal of Mathematical Modeling, Simulation and Applications* 3:2, (2010): 164-174 (with [redacted]).

"Relationship between Judges' Scores and Dive Attributes from Live Video in Diving Competitions" (2020). (with [redacted], submitted).

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2007 (June-August), *Mathematics Teacher*, Sedona Red Rock High School, Sedona, AZ

- Taught a full day summer school mathematics class to pre-algebra students.
- Developed games to teach basic math skills to younger students in a fun and entertaining way.
- Reinforced the connection between mathematics and arts thorough activities that investigated the geometry of tessellations and mandalas.

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To Whom It May Concern:

I have been teaching either as a graduate assistant or as a university instructor for 15 years and greatly enjoy the challenges of teaching new generations of students. I started teaching at the university level when I was twenty and have taught on and off since then. I have some unique traits that will make me an excellent choice for either the math lecturer or stats lecturer position. Please consider me for both positions when reviewing applications.

I have been a fixture in the NAU Department of Mathematics and Statistics since I was 17. From the department, I have obtained a bachelor's degree in education, a master's degree in mathematics, and a master's degree in statistics. I am currently finishing my PhD in statistics at Southern Methodist University and will be graduating with a PhD in August. My broad understanding of mathematics, education, and statistics, and how they relate to one another, means that I am qualified to teach a wide range of courses. I see my role in the department as a unifying force between mathematics and statistics. I typically teach the calculus series: Calculus I through differential equations. I rarely see other statistics professors at NAU teaching these courses even though calculus forms the backbone of many statistical techniques. It is important for instructors with expertise in statistics to teach these courses for three reasons. First, statistical applications should be introduced into calculus courses since students in introductory math courses may become interested in statistics later in their career. Secondly, statistics is rich with interesting calculus problems. Lastly, students in the mathematical statistics courses will have an easier time if their instructor points out that the concepts in math stat are not new but are an application of calculus. Having an instructor who can teach both math and stats classes can help bridge these gaps.

One of the listed preferred qualifications is interest in developing courses or curriculum. After examining the NAU course catalog, I realized that the department does not offer a course in Bayesian statistics. I am not an expert in Bayesian statistics, but I believe that having such a course at the master's level would have greatly increased my confidence in my PhD courses. Furthermore, it is impossible to deny that Bayesian methods have grown just as popular as frequentists methods. Knowledge of Bayesian statistics will be expected of our graduates in years to come. I would like to develop an introductory Bayesian course based on the book *Statistical Rethinking* by Richard McElreath. The title of the book is very accurate and will inspire our students to approach statistics in new ways.

Another listed preferred qualification is interest in teaching and coordinating multi-section courses. At NAU, I have taught numerous multi-section courses such as STA 270, Calculus I, Calculus II, Calculus III and modular precalculus. At SMU, I pushed for the coordination of our introductory statistics course. We now have a dedicated course coordinator. I have never coordinated a multi-section course, but after watching [redacted] coordinate STA 270 semester after semester, I believe I am up to the challenge

I would like to serve the department and community by helping to bring back our outreach programs for high school and middle school students. Specifically, I would like to reinstate High School Math Day and the Middle School Math Competition once the pandemic is no longer an issue. Based on the website, it looks like these programs are on hiatus

In terms of computer science experience, I have worked in R, Matlab, Mathematica, SAS, and JMP. Below are a list of the courses I have taught at NAU and an estimate of how many times I have taught that course.

Course	**Number of Times**
Algebra for Precalculus	1
Quantitative reasoning	5 - 10
Precalculus	4-5
Principles of Mathematics I (MAT 150)	4-5
Introductory Statistics	5 – 10
Calculus I	5 - 10
Calculus II	5 – 10
Calculus III	4 - 6
Differential Equations	3 - 4
Finite Mathematics	3 - 4
Discrete Mathematics	3-4

As a math instructor, I have taught a wide array of classes to a wide array of students. My pupils have come from all over the world and have ranged in age from twelve to seventy-two. I have experience teaching math, statistics, and math education courses. Because of my enthusiasm for the subject and my familiarity with NAU, I feel that I am an excellent match for this position.

Thank you for your consideration.

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DEIJ STATEMENT

One of the joys of spending most of my life in a university is that I have met people from all over the world. At NAU a large proportion of my students were from China or the Middle East. I also had many Native American and Hispanic students. Thrown into this mix were older students who were approaching college again later in life and PhD candidates. As a student at SMU in the statistics department, most of my colleagues are international students, primarily from China. It has been a pleasure working with these students and professors and having the opportunity to learn more about life in China.

To broaden my own cultural understanding, I have taken a few semesters of Spanish and six Japanese classes. As a student getting my bachelor's degree in mathematics education, I took a few courses about diversity and inclusion in the classroom that I have put into practice.

As a lecturer at NAU, I would like to work with our neighbor, the Native American Cultural Center, to provide outreach to our indigenous students. In the past, I have failed this group of students at disproportionately high rates. I would like to find more effective ways of teaching this group of students and increasing their interest in STEM fields.

I am also interested in participating in the Navajo Nation Math Circles Project (NNMCP) which provides after-school programs, teacher development, and summer camps in mathematics and statistics. The math circles typically provide instruction in non-traditional, hands-on group learning settings. One problem faced by the NNMCP is that there are few professional mathematicians and statisticians near the locations where the math circles take place; NAU is 170 miles away. I would like to volunteer my time to the NNMCP with the goal of attracting more indigenous people to STEM fields and learning new teaching methods to better reach this group of individuals.

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FUTURE CAREER PATH

My most pressing career goal is to finish my PhD in statistics from SMU. At the time of writing, I am currently about a third of the way done with my dissertation. I have given my prospectus and have this final hoop to jump through. My progress is in line with my cohort. We were all deeply affected by the isolation caused by the three semesters of online only instruction followed by dissertation research and none of us will be graduating at the end of four years.

Once I have my PhD, I would like to advance to the rank of teaching professor. Many of my classmates have opted to for the higher pay of working in industry. This is not for me. I have little interest in sitting at a desk from 9:00 to 5:00. I would much prefer the variety, flexibility, and fun of teaching learners. These past four years have been difficult for me. I miss being in the classroom and I miss my students. I can't imagine a job more suited for me than teaching at the university level. I am also not interested in being a "traditional" professor. I am very happy teaching, but not so happy doing research. I am an extrovert and find interacting with students intrinsically rewarding.

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TEACHING PHILOSOPHY

Learning math and statistics is a participatory sport. It is akin to learning other skills like playing a musical instrument, cooking, sewing, or repairing a car. The best way to learn math and statistics is by doing. Flipping through a PowerPoint slide deck while students look on is not an effective way to teach statistics. When a student is taught to play the piano, they do not listen to a lecture on how to play the piano. Instead, hands-on learning is required. Students experiment while the instructor guides them to try more efficient techniques. There should be no difference with how we teach math and statistics.

In an ideal world, teaching in a classroom setting would mirror how I teach students individually during office hours. When a student brings a problem to my office, I first ask them to attempt solving the problem using their current knowledge for five to ten minutes. After this time, I have them explain the problem in their own words and how they attempted to solve the problem. If they are still struggling, we agree to consult expert knowledge on the problem. This usually means pointing out resources online or in a textbook where similar problems have been solved. The student then applies the new method on a practice problem before working on the initial problem. At this point, the student can usually solve the original problem on their own. Lastly, we check over the work and address any outstanding concerns.

How would this look in a class of 40 students where it is difficult to provide individual attention? A flipped classroom approach has many features I think are important in teaching and learning. At the end of a class session, students would go home with a new problem and resources to read and watch that demonstrate the method to be used with that problem. The next class period would be focused on solving the new problem and similar problems. In a statistics setting, students would most likely be working on solving problems using R, SAS, or JMP. Since there is only one of me and 40 or more students, it is important that a community of learners is created. In this community, students actively work with each other until the class understands how to solve the new problem.

Statistics is also its own language. A large part of understanding statistics is about understanding definitions and symbols. Statistics, just like Japanese or Chinese, has its own massive set of symbols to memorize and master. When a foreign language is taught, most of the class time is spent practicing speaking with peers. In my class, I have adopted the peer edit. I place a strong emphasis on communicating statistics to clients and balancing the logical, mathematical side with creativity. Communicating statistics is about telling the story of the data. Hence, before a student turns in a piece of work, they spend five to ten minutes trading papers and editing each other's work. This is an especially good exercise when they have worked on different problems. If the classmate they are working with has questions for them while reading their paper, then they know they have not explained their work thoroughly. Peer editing also helps students recognize common mistakes and misconceptions.

In another strategy I employ, “I, we, everyone”, each student is given five minutes to work on a problem alone. After the five minutes, they get into small groups to discuss issues they had, errors they may have made, and to teach students who were unsure of how to solve the problem. After another five minutes, we talk about the problem as a group and correct any remaining misconceptions. Students are expected to be actively doing statistics every class period.

Understanding statistics should be a hands-on process and one of discovery. Students do not learn when they are being force fed information through a lecture. They learn by doing.