**MathFest 2021 Invited Paper Session (moved from MathFest 2020)**

<https://www.maa.org/node/2750058/>

**Session Title:**

Supporting Student Success in Introductory Statistics through Evidence-Based Practices

**Description:**

Each academic year, over 600,000 students enroll in college introductory statistics courses, according to the 2015 CBMS survey. Enrollments have more than doubled since 2000. Although many of the new statistics students have sufficient mathematics fluency to succeed, many others struggle with algebra, numeric operations, and logic, leading to poor course outcomes.

In this session, speakers will present evidence-based results from projects about supporting students enrolled in introductory statistics courses. Projects include identifying students in need of extra assistance with mathematical fluency and/or statistical content, and then implementing one of several ways to provide that assistance, including instructor-led sessions, computer-based support, and undergraduate-led supplemental instruction. Session speakers work at a variety of institutions, small and large, public and private. Though the context for the presentations is Introductory Statistics, the innovations and pedagogical practices presented are adaptable to any introductory college level mathematics course and have broader implications for supporting student success in first-year college level mathematics and statistics.

**Other information:**

Invited presentations will all include data to support their proposed interventions. Speakers come from both private and public universities, small, medium, and large.

Oral Roberts, 3500 student private, computer-based with required tutoring

Longwood, 4000 student public, math diagnostic with required tutoring

Cal State Monterey Bay, 7000 student public, instructor led corequisite

Oklahoma State, 20000 student public, math diagnostic, optional tutoring, and corequisite

We plan to follow the traditional format, with 20 minute talks, but we propose that we only have 5 minutes for discussion/questions directly after each talk and a remaining 20 minutes of time for open discussion at the end to talk about the topic more broadly. We are of course willing to maintain the status quo if the committee wishes.

**Session Organizers:**

Judith Canner, California State University Monterey Bay

Adam Molnar, Oklahoma State University

**Session Sponsors:**

SIGMAA on Statistics Education

ASA-MAA Joint Committee on Undergraduate Statistics and Data Science Education

### Abstracts and Authors

**Provided in order of presentation**

***M. Leigh Lunsford, Phillip L. Poplin, Leah N. Shilling-Stouffer***

Longwood University

*Title:* Implementation and Continuation Issues for Supporting Underprepared Introductory Statistics Students Using an Assessment and Peer Tutoring Intervention Program

*Co-Authors*

M. Leigh Lunsford (Department of Mathematics and Computer Science, Longwood University),

Phillip L. Poplin (Department of Mathematics and Computer Science, Longwood University),

JoEllen G. Pederson (Department of Sociology, Anthropology, and Criminal Justice Studies​, Longwood University),

Leah N. Shilling-Stouffer (Department of Mathematics and Computer Science, Longwood University)

*Abstract:*

Based on results from a previously published study (Lunsford and Poplin 2011), we used an assessment tool to identify underprepared students in our introductory statistics course and subsequently required those students to attend peer tutoring, early in the semester, as an intervention. While we saw a significant increase in student success for all students compared with the previous study, the underprepared students who completed the required tutoring had a significantly higher increase (Lunsford, Poplin, and Pederson 2018). Despite these successes, continuation of the assessment and peer tutoring program has been a challenge. Unfortunately COVID-19 interrupted our planned intervention using our new Quantitative Reasoning Center for the Spring 2020 semester and this academic year. In this talk we will provide background information from our previous studies, discuss logistical and institutional hurdles, and share what we have learned (despite the COVID interruption) as well as our future plans. ​

***Dr. JayneAnn Harder***

Oral Roberts University

*Title*: Computer-based Learning plus Tutoring in Essentials of Statistics

*Abstract:*

Oral Roberts University offers a 1-hour co-requisite course for elementary statistics, designed to support required mathematical skills and provide opportunities for students to receive more personal support. Students participate in a web-based diagnostic and learning tool called ALEKS that uses artificial intelligence to direct students through ready-to-learn modules based upon an initial assessment. Modules include the broad categories of numbers, algebraic expressions, linear equations, lines in the coordinate plane, descriptive statistics, and counting and probability. The ALEKS system provides targeted review of topics, without having to spend time on areas students have already mastered. Students are also required to log 120-minutes per week in a web-based attendance system. Minutes can be earned by attending classroom discussion sections run by a faculty member or by attending peer tutoring opportunities with trained undergraduate tutors. This talk will present results on the effectiveness of this approach, based on two years of implementation.

***Dr. Adam Molnar***

Oklahoma State University

*Title:* Large Scale Peer-Assisted Tutoring, Corequisites, and Other Math Support for Introductory Statistics

*Abstract:*

Non-calculus, non-business introductory statistics is a large and growing course at Oklahoma State University, with about 1550 enrollments in calendar year 2019. Many students know mathematics well, but many others struggle to recall arithmetic and algebra needed in the course. Additionally, a statewide initiative has encouraged reductions in prerequisite requirements. Over the past two years, the department has introduced a number of support initiatives, including corequisite sections with extra instructional time, a start-of-semester mathematics diagnostic to identify weaker areas in all students, and undergraduate-led supplemental peer instruction. In this talk, I will present results from about 400 students in calendar year 2019 who consented to external publication, showing which initiatives showed promise and which did less well.

***Dr. Alana Unfried***

California State University, Monterey Bay

*Title:* Corequisite Statistics Courses for Equitable Support of All Students

*Abstract:*

In 2018, CSUMB began offering corequisite courses alongside general education mathematics and statistics courses, in place of students beginning in mathematics remediation courses. This change has broadened student access to introductory statistics since the barrier of remediation is removed, but it has also created a more academically diverse introductory statistics course. This talk will discuss the design of corequisite courses for supporting introductory statistics students, and provide results from the first two years of implementation, showing that this course structure has allowed all students, including those who were not adequately prepared through prior experiences, to be successful in introductory statistics.