

**Zoom links for all sessions will be shared via email to conference registrants**

**Who benefits from sweatshops? Looking at a social justice issue through a quantitative lens  
(Facilitated discussion)**

**Debasmita Basu and Carol Overby, The New School**

**Abstract**

As NNN has long advocated, basic quantitative skills are essential for a socially-engaged life. To promote this, a first-year Quantitative Reasoning course at The New School employs learning modules that apply basic mathematical concepts to socially and environmentally pressing topics such as corruption, child labor, and climate change. The activities in these modules encourage students to think critically and to engage ethically with these topics. In this session, we present a module on sweatshops, introducing ethical issues and using mathematical reasoning to quantify and visualize economic and social inequities. Then, session participants will work in groups in a similar process, identifying quantitative concepts and visualizations that might illuminate specific socially-responsible topics.

**Exploiting technology to adapt a QR course for a new reality**

**Nadia Benakli and Ariane Masuda, New York City College of Technology, City University of New York**

**Abstract**

In Spring 2020, when we made the sudden transition to teaching online due to the COVID-19 pandemic, our mathematics department faced a variety of challenges. The department had to make a host of adjustments, and a team of faculty members were tasked with reexamining ways we could better support the sense of community among instructors and students in a virtual learning environment. The team created a series of Course Hubs for our gateway courses. The Course Hubs gather a collection of open-source materials that are made available on the OpenLab, which is City Tech's open digital platform for teaching, learning, and collaboration. During the process of designing the Course Hub for our Quantitative Reasoning course, we collected several projects that various instructors had developed over the years. In this presentation, we discuss how these changes will possibly impact instructional delivery and student learning at City Tech.

**Teaching a 'Calling Bullshit' course (Keynote)**

**Carl Bergstrom and Jevin West, University of Washington**

**Abstract**

One of the most important skills that students can learn is the ability to spot and refute rot, especially the kind wrapped in data, statistics and fancy algorithms. Over the last several years, we have been teaching students from STEM and non-STEM backgrounds to question numbers in the same way they question clickbait news and propaganda. Our philosophy is to focus less on the black box algorithm or procedure and instead focus on the data entering and exiting the black box. That puts an emphasis on topics such as selection bias, correlation and causation. In this talk, we will present what we have learned over the past several years teaching 'Calling Bullshit'. Our hope is to make this content accessible to instructors wanting to integrate this kind of data reasoning approach into their own classroom. We will provide example modules from our class, discuss testing and evaluation, and reflect on the challenges of taking this course online during the pandemic.

***Math for the People: A textbook for teaching quantitative reasoning through social justice*****Mark Branson, Stevenson University; Whitney George, University of Wisconsin - La Crosse****Abstract**

*Math for the People* is a new project which seeks to create a collaboratively-written, open educational resource designed to replace a classic textbook for a first-year quantitative reasoning course. The text encourages students to explore how mathematics can be used to understand social justice concepts like generational wealth inequity, climate change, and racially-biased policing from a solutions-oriented perspective. Rather than learning a series of mathematical concepts, followed by applications of those concepts, *Math for the People* seeks to invert that structure, beginning with a problem that students are interested in and discovering the mathematics which can help to understand and even solve that problem. In this presentation, we will discuss the modular structure of the text, the current state of the project, and opportunities for collaboration across the community.

**Is teaching quantitative reasoning worth the effort?****Deependra Budhathoki and Greg Foley, Ohio University****Abstract**

In the spring of 2020, Budhathoki interviewed 6 Quantitative Reasoning (QR) instructors (3 male, 3 female) from two universities and three community colleges across Ohio. They had taught QR from one semester to 3 years. All 6 instructors stated that QR teaching is more challenging than teaching other mathematics courses. Nonetheless, 3 of them expressed their preference to teach QR. The other 3 explained that they had more experience and greater comfort in teaching other mathematics courses and that QR preparation is time consuming. In particular, they cited the challenges of selecting quantitative contexts and developing associated activities for students. For the first 15–20 min, we will report our findings. Then, we will engage the audience in Q&A: Are these findings typical? What can be done to support instructors as they transition from teaching traditional courses such as College Algebra to teaching QR? Well-designed QR student materials? Detailed notes for QR instructors? Learning communities of QR instructors? Professional development for QR instructors? How is QR scale-up dependent upon such factors?

**Student-generated data to address misconceptions and fallacies in introductory statistics****Andrew Bulawa and Kostas Stroumbakis, Queensborough Community College, City University of New York****Abstract**

Several guidelines (e.g., GAISE 2016) recommend using real data in an introductory statistics course to help students appreciate the relevance of statistical concepts in context. The project discussed below incorporates student-generated survey data into assignments with an emphasis on highlighting common fallacies in logical, mathematical, and statistical reasoning. We will give a project overview, discuss potential misconceptions and potential writing assignments based on students' responses.

**Quantitative literacy/Statistical literacy/Quantitative reasoning/Data science: Fundamental components of the school curriculum****Gail Burrill, Michigan State University****Abstract**

Data have transformed the way we look at the world. The increasing need for statistical and quantitative thinking and reasoning makes it more important than ever to use mathematics and statistics to make sense of the world as a central component of students' schooling. Shouldn't this emphasis on data also impact what we teach both in mathematics and statistics? Students should be able to visualize data and make sense out of numbers. Students should understand what questions to ask when given mathematical information about a problem or confront a situation that needs a statistical lens. They should have the opportunity to construct formal and informal arguments to support their claims and to critique others' claims. They need a good understanding of how basic concepts such as ratio, linearity, and measurement are realized in contextual situations. The session will consider possible adjustments to the school curriculum to make this vision a reality in the contexts in which we teach, including an emphasis on important content and ways in which this content might be structured in course offerings.

**Connecting SL with social justice and human progress****Mark Earley, Columbus State Community College****Abstract**

Incorporating social justice discussions into introductory statistics courses requires more than just curating examples to show our students. In this presentation, I will discuss a process for incorporating discussions of social justice statistics into introductory statistics courses. I will introduce attendees to one model I use to set up, monitor, and assess these conversations so that all students feel a part of a supportive community of learners. I will also share how I incorporate statistical thinking and student self-reflection. No "right answers" for how best to do this are available, but through this presentation, I hope attendees walk away inspired to incorporate social justice into their courses, and I hope attendees begin to think about the complexity of this topic.

**How faculty support student quantitative skill development in online environments (Facilitated discussion)****Melissa Eblen-Zayas, Carleton College; Laura Muller and Jonathan Leamon, Williams College; Sundi Richard, Davidson College; Ellen Altermatt, Ellen Iverson, and Kristin O'Connell, Science Education Resource Center****Abstract**

Students arrive at college with a broad range of quantitative skills (QS) backgrounds and, yet, need to use those skills more frequently across the curriculum. Online modules for QS development offer opportunities for just-in-time or repeated interactions by students, but faculty often choose resources that support QS development within their disciplinary context rather than using resources that foster learners' ability to recognize and transfer their knowledge to analogous situations. We discuss the collaborative development (by faculty across disciplines and across institutions) of a set of online modules designed to review and strengthen QS within a course while facilitating cross-disciplinary transfer. Our discussion will then focus on how faculty frame these materials to promote student engagement, and we will invite participants to share their experiences with online QS resources and student engagement.

**Promoting statistical literacy through experiential learning to non-STEM majors**  
**Amanda Ellis, University of Kentucky**

**Abstract**

Students in non-STEM majors often struggle to see the applicability of analysis techniques taught in introductory quantitative courses to their core major area. Since this connection cannot be made explicitly for every student in the class, retention of these skills suffers, and students may not recall the methods when needed later in their studies or work. To aid Master of Public Health Students at the University of Kentucky in connecting statistical literacy with their discipline, CPH 603: Introduction to Data Analysis in Public Health was developed. The course was re-designed with a “holistic” approach to data analysis. Through experiential learning, students were exposed to data analysis elements from project initiation to dissemination while simultaneously learning the statistical methodology. Here we discuss the structure and implementation of the course as a model for redesigning traditional, introductory data analysis courses for non-STEM majors.

**Videos with assessments to develop QR concepts and skills**  
**Gregory Foley and Michael Lafreniere, Ohio University**

**Abstract**

Since fall semester, 2018, Ohio University has been developing a freshman-level Quantitative Reasoning (QR) course with just one or two sections offered each semester. In spring semester, 2021, the scale up of this course begins with five sections being offered—all using synchronous online instruction. Since fall semester, 2020, the authors have collaborated to develop videos and associated online assessments. These videos and assessments are used asynchronously by students to develop concepts and skills prior to engaging in related synchronous in-class group activities. We will share our development process and show clips from selected videos together with the associated online assessment questions. The material in the videos and assessments represents co-requisite content, including problem-solving strategies, software skills, and mathematical and statistical concepts. By completing this foundational work in advance, students can collaborate during class to process more complex, inquiry-focused tasks that require analysis, explanation, and justification.

**“Pop” talks**

**Special session facilitated by Kate Follette, Amherst College**

**Abstracts**

Sharona Krinsky, California State University, Los Angeles

I will talk about two upcoming Mastery Based Grading Conferences that will be held online in June 2021. One conference is in early June and is focused on Mastery Based Grading in the University STEM classroom with a heavy focus on Math. The second conference is in late June and will be focused on Mastery Based Grading in the 7-12 STEM Classroom.

Jason Makansi, Pearl Street

I would like to talk briefly about Reverse Quantitative Analysis (RQA) as a methodology for teaching quantitative/numerical literacy to students. It is a way of turning the principles from my book, *Painting By Numbers: How to Sharpen Your BS Detector and Smoke Out the Experts* (I delivered the closing talk at NNN 2017 at Barnard College on this book) into a teaching methodology.

Matt Brown, Earlham College

As more and more colleges eliminate the requirement for the SAT or ACT for admission and the need for student retention increases, the issue of how to evaluate a student's quantitative literacy across the curriculum became paramount. Earlham College created an assessment for incoming students, which is a quick, effective method to evaluate a student's quantitative literacy across the curriculum and identify skill gaps that could be impediments to a student's success.

Jena Barchas-Lichtenstein and John Voiklis, Knology

We are currently completing a manuscript on what we call "number soup" - quantitatively dense journalism. In this larger study, we looked at four topic areas widely considered statistically rich. We found that economics and health stories were considerably denser and required more quantitative reasoning than science or politics stories. We'll present a single example and talk through all the quantitative concepts that are packed into one deceptively tiny little sentence.

Cat Sarosi, Derrick Newberry and Chloe Wohlgemuth, Amherst College

Three undergraduate members of the Quantitative Reasoning for College Science (QuaRCS) team will present brief descriptions of their work. Cat Sarosi will describe the design and implementation of summary reports designed to give instructors a course-level view of their students' numerical skills and attitudes toward mathematics at the start of the semester and a summary of any improvements in these quantities afterward. Derrick Newberry will report on development of our new public-facing database of anonymized data for all current and future QuaRCS administrations. Chloe Wohlgemuth will describe the broad data processing architecture that we have put in place to enable a large national study in 2022.

### **The role of affect and cultural competency in explaining achievement gaps in the Quantitative Reasoning for College Science (QuaRCS) Assessment**

**Kate Follette, Soon-Young Shimizu, Sanlyn Buxner, and Erin Galyen, Amherst College**

#### **Abstract**

How do affective variables such as numerical self-efficacy and math anxiety level vary between demographic groups? Can accounting for differences in affect explain any of the observed achievement gaps in quantitative reasoning (QR) skills? What role does cultural competency play in student performance on the QuaRCS assessment? We will present the results of a mediation analysis designed to inform the interrelationship between QuaRCS performance, demographics, and affective measures. Our results indicate that accounting for demographic differences in specific affective domains can explain up to 50% of observed gender, race/ethnicity, and socioeconomic status achievement gaps. At the same time, the interrelationships between affective domains are multi-faceted and the contributing factors and effect sizes vary greatly across demographic groups. We will discuss what we think this analysis tells us about possible approaches for closing QR achievement gaps, which are at least partially responsible for underrepresentation of certain demographic groups in STEM fields. We will also describe recent modifications to the QuaRCS instrument to gather cultural relevancy data, and our plans to design a more culturally competent assessment.

**Quantitative reasoning: Skills for making decisions in an era of fake news****Eric Gaze, Bowdoin College****Abstract**

Our current school curriculum is highly focused on developing analytical forms of intelligence as measured by IQ and SAT tests. The real world, however, requires much more than analytical thinking from our students, with a heavy emphasis on practical and creative problem solving skills. Knowing how to run a statistical test is often much less valuable than knowing when to run the test, why it is useful, and how to effectively tell a story from your data. These rhetorical skills can be actively fostered in robust quantitative reasoning (QR) courses. In this talk, we will discuss what such a curriculum looks like using spreadsheet modeling, and how this curriculum helps our students to think critically, embrace uncertainty and avoid cognitive biases that come from developing highly analytic modes of thinking. Current research on how being “smarter” leads to worse decision making will help make the case for a switch to QR courses!

**How to write papers for *Numeracy*: An Editor’s perspective****Nathan Grawe, Carleton College; Michael Catalano, Dakota Wesleyan University**

Authors sometimes lament, "I wish editors would just tell us what they are looking for!" This session is intended to do just that. Drawing on their experience guiding papers through the publication process, Numeracy co-editors Nathan Grawe and Michael Catalano will talk through the elements of successful submissions to the journal, including discussions of: powerful abstracts, clear organization, effective communication of results, insightful discussion sections, and productive citations (i.e., those which advance the conversation within the discipline by making meaningful connections to the ideas that have come before us). In addition to examining paper elements, Nathan and Michael will discuss successful paper types such as descriptions of new QL/QR programs, assessments of teaching interventions, discussions of previous Numeracy publications, notes on teaching tools, and book reviews. We will be sure to have plenty of time for Q&A at the end of the session.

**Ethnomathematics, art, culture, and social justice (Facilitated discussion)****John Jungck, University of Delaware****Abstract**

To address the continuing need to engage students with how mathematics can contribute to issues of equity versus equality, civil rights, social justice, and the historical contributions to mathematics from cultures around the world, ethnomathematics educators have developed numerous educational materials. Activities from a recent first year, general education course which applied mathematics such as fractals, tessellations, cellular automata, groups, symmetries, graph theory, and game theory are illustrated with various student projects. Arts were emphasized primarily by examining friezes, quilts, weavings, landscape paintings, games, and puzzles from non-Western countries. Some social issues that were addressed in a variety of courses included school integration with Voronoi tessellations, gerrymandered districts with fractal geometry, population policy with population pyramids and modeling, gender equity in sports, and a historical look at slave breeding with demography and maps. I argue that by engaging students in “Brave Spaces” (Jungck & Manon, 2019; Jungck, 2012) with mathematical tools and data, students will tackle difficult complex issues with minimal professorial facilitation. This discussion will be facilitated by having participants discuss products from student presentations and soliciting ideas for using ethnomathematics as a vehicle for better addressing social justice and equity issues.

**Lessons from Calling Bullshit: Using “mathematical essays” for quantitative literacy****Erin Kiley, Massachusetts College of Liberal Arts****Abstract**

This presentation will describe the curriculum of the “Calling Bullshit” course at the Massachusetts College of Liberal Arts (MCLA), based on the pilot of the same name offered at the University of Washington. MCLA’s curriculum explores quantitative (il)literacy as the backdrop for the way contemporary rhetoric has developed, highlighting in particular the contrast between QL and literacy in the English/language arts. One of the typical assignments in this course—the “mathematical essay”, an analogue to the English/Language Arts essay—will be described in detail. Guidelines for successful design and implementation of Mathematical Essay assignments will be presented, including tips on gaining student buy-in, scaffolding in the background material, providing useful feedback, and using rubrics for holistic assessment. Examples of student work pre-and post-revision will be shown.

**Connecting QL/SL/QR with Diversity, Equity and Inclusion (DEI) (Facilitated discussion)****Larry Lesser, University of Texas at El Paso****Abstract**

Recent salience of social justice has implications for making our pedagogy responsive to DEI considerations in (F2F or online) courses with QL/SL/QR aspects. Informed by best practices in DEI and mathematics literature, the introductory portion of the session will overview DEI principles, pitfalls (e.g., inadvertent microaggressions), and best practices in statistical courses to offer attendees a shared foundation for discussion. The discussion will be loosely structured as a concrete sequence of items posed for brainstorming, discussion, or sharing. Examples of items include referencing famous (and infamous) statisticians, choosing datasets (and acknowledging their context), creating spaces for group work, identifying/assessing inequity, compiling syllabi, addressing the assembly of data, and addressing “neutrality” in one’s teaching.

**Making numerical literacy (NL), quantitative literacy (QL), and quantitative reasoning (QR) part of the origin story for a new high school (Facilitated discussion)****Jason Makansi, Pearl Street; April Wiley, Steve Brown, and/or Sevi Wheatley, Desert Sage School Initiative****Abstract**

The Desert Sage School Initiative ([www.desertsageschool.org](http://www.desertsageschool.org)), Tucson, AZ, seeks to *intentionally* embed NL/QL/QR into all aspects of its curriculum and programs, and solicits an interactive discussion with the NNN community on concepts, experiences, and recommendations on how best to achieve this. To engage our session participants, after a 10-15 minute introduction to the initiative, the presenters will (1) imagine with our audience that we are participating in a brainstorming session to revise the relevant sections of our public charter application to the state (essentially the five-year plan for how the school will educate students, which must be approved for the allocation of public funds), and (2) review section by section (vision, mission, philosophy, educational plan, academic systems, courses, assessments, interventions, outcomes, teacher training, etc).

**The interplay between data literacy and numeracy: Evidence from an online economics module**  
**Diego Mendez-Carbajo, Federal Reserve Bank of St. Louis****Abstract**

This presentation documents the interplay between data literacy and numeracy displayed by high school and college students of economics. Data are collected from an online instructional module produced by the Federal Reserve Bank of St. Louis. In this module, students complete both graph-building and graph-reading tasks related to the concept of real GDP per capita. As a novel contribution, this work documents the degree of self-efficacy displayed by each student when completing individual tasks and answering multiple-choice questions. Preliminary findings indicate college students are more proficient and more confident than high school students in both data literacy and numeracy domains, although less so in the latter. This finding suggests there could be instructional benefits in leveraging student proficiency in data literacy for the development of numeracy skills.

**Reading and responding to arguments “in the wild” (Facilitated discussion)**  
**Andrew Miller, Belmont University****Abstract**

Many textbooks written for quantitative literacy courses include a chapter on logic with the ultimate objective of identifying valid and invalid arguments. Recently I have grown disillusioned by these chapters, especially when applied to arguments “in the wild” such as letters to the editor. Few such “real life” arguments are laid out as precisely as an Aristotelian syllogism, and most require the acceptance of unstated implicit premises to make the necessary logical connections. One aim of quantitative literacy education is to connect the work we do in class to tasks that students will do in real life. To that end, how can we rehabilitate the chapter on logic? In this facilitated discussion, we will explore this problem by analyzing two recent letters to the editor, discussing how a quantitatively literate person might approach them and how this might influence our teaching.

**The numeracy of self-assessment: Learned consequences and rich opportunities (Discussion)**  
**Edward Nuhfer, California State University; Steven Fleisher, California State University Channel Islands; Karl Wirth, Macalester College; Rachel Watson, University of Wyoming; Paul Walter, St. Edwards University; Christopher Cogan, Memorial University of Newfoundland; Lauren Scharf, U.S. Air Force Academy; Kali Nicholas Moon, Respect Academy; Cinzia Cervato, Iowa State University; Eric Gaze,, Bowdoin College; Patrick McKnight, George Mason University; Matt Rowe, University of Oklahoma****Abstract**

Our facilitated discussion begins by briefly summarizing the numeracy that produced a "psychology reversal" refuting key aspects of two decades of research that established the Dunning-Kruger Effect as the consensus for characterizing human self-assessment. We then draw on the new findings of an expanded research team of scholars who now use these findings to study social justice, assess student learning in classes, programs, institutions and demographic groups, for designing instruments for engaging students interactively in self-assessments that promote self-efficacy, self-regulation, higher-order thinking, civil discourse, and metacognition. The reversal opens vibrant new opportunities for research and application in every conceivable learning endeavor, especially in the social and behavioral sciences. Our open discussion at the end is an invitation to use our instruments and to explore new areas for teaching and research. This session's findings provide a case example of the importance of understanding numeracy at every level of scholarship.



**Mathematics corequisite models at a Massachusetts State University****Eileen Perez and Elizabeth Gilbert, Worcester State University****Abstract**

We begin with an overview of the four major-based pathways and companion gateway courses at a Massachusetts State University. The four pathways are Liberal Arts and Social Science, STEM, Education, and Health Sciences; the companion courses are Quantitative Reasoning, Introduction to Functions, Numbers and Operations, and Statistics, respectively. First, we will focus on the STEM pathway and its gateway course, Introduction to Functions. Highlights will include the evolution and introduction of the course, placement requirements, and the corequisite version. The integration of the remedial material at the college level, as well as student placement outcome data, will be discussed. Next, the talk will shift focus to a review and update on the Education and Liberal Arts pathways, including placement into the related courses, course design, and the continuing evolution of these courses. The presentation concludes with lessons learned, as well as future plans for each pathway and its companion gateway course.

**2021 NNN Numeracy survey – Feedback session**

Andrew Richman, Boston University; Kathryn Appenzeller Knowles, Texas A&M-San Antonio;  
Nadia Benakli, New York City College of Technology, City University of New York.

In 2010, the Special Interest Group of the MAA on Quantitative Literacy (SIGMA-QL) and the National Numeracy Network (NNN) presented preliminary results of a 2009 survey on quantitative graduation requirements at US 2 and 4-year undergraduate institutions. We will provide a brief report of the 2009 survey results, including findings and limitations, that informs our effort to distribute an updated survey in fall 2021. We will share our current thinking about challenges to improving and extending the questionnaire. Our goal is to engage with and receive feedback from the NNN community on our preliminary plans for the survey update.

**Never miss a teachable moment: How to cultivate statistical literacy and time-management traits that foster success**

**Marla Sole, Tamika Daley, and Mendel Batashvili, Guttman Community College, the City University of New York**

**Abstract**

Statistical literacy is best achieved by engaging students in meaningful, authentic investigations, and modeling the real-world critical thinking skills needed to accurately assess the validity of claims made. This presentation will share the beginning stages of a class project designed to investigate media claims that teens have changed their sleeping habits in response to the pandemic. As part of an introductory statistics class, students were actively engaged in modeling how empirical researchers work, as a first step to providing more robust evidence to support or refute this claim. Simultaneously, students examined how their own personal habits might foster or impede their academic progress. Students had the opportunity to see how empirical researchers apply a different lens compared to qualitative researchers and how robust evidence is needed to tell a complete and compelling story. Authentic investigations offer students the opportunity to model how statisticians actually work and give educators an alternative means to assess learning. This presentation will share an overview of a project started and students initial work and perceptions of the gains made.

**Does your first name affect your chances of being selected?**

**Kostas Stroumbakis and Rommel Robertson, Queensborough Community College, City University of New York**

**Abstract**

Students, as part of an in-class activity, were asked to select a random sample of first names from a list. They consistently under selected uncommon names, even as those were names of their peers. The activity was used to demonstrate to students the difficulties associated with human selection of random samples and to shed light on potential implicit biases. The activity can serve as a starting point for quantitative and statistical reasoning in courses where such biases are discussed in more depth. We will give a project overview and compare human selection to simulated computer selection, using spreadsheets.

**Quantitative student support centers (Working group—all welcome to attend)**

**Luke Tunstall, Trinity University; Eric Gaze, Bowdoin College; Özlem Elgün, DePaul University; Lin Winton, Carleton College**

**Abstract**

As support centers for students in quantitative courses across the disciplines grow, the NNN can—and should—serve as one home for individuals involved in administering such centers to come together to discuss common challenges and opportunities. The first meeting of this new NNN working group will allot time for group members to discuss their current contexts and to collectively identify common challenges and opportunities that the group can discuss in future meetings and through asynchronous communication. Potential topics that the group might choose to discuss include (among others) center administration, tutor training, campus partnerships, and assessment. All NNN members involved in student support are welcome to participate in this group.

**Confounding, multivariable thinking, and interpreting multiple regression: Concepts and examples**

**Jessica Utts, University of California, Irvine**

**Abstract**

Most college students will take at most one statistics course, and it's important to use that opportunity to help them understand results from statistical studies. A common error made in interpreting such studies is to attribute cause and effect when it is not warranted, usually because of confounding variables. Another common mistake is to ignore multivariable thinking by looking at the relationship between two variables without taking into account additional variables that could completely change that relationship. A more technical type of misinterpretation occurs in multiple regression when individual coefficients are interpreted without taking into account the other variables in the model. This talk will give clear and simple examples of these three types of misunderstandings that you can use in your classroom to illustrate them to students. Most of the discussion is relevant to a first course in statistics, whether it focuses on statistical literacy or a more traditional approach. The interpretation of multiple regression may be more appropriate for a second course.

**Hypothesis testing of the efficacy of Covid-19 vaccines****Frank Wang, LaGuardia Community College of the City University of New York****Abstract**

In late November 2020, there was a flurry of media coverage of two companies' claims of 95% efficacy rates of their newly developed Covid-19 vaccines, but information about the confidence interval was not reported. This paper presents a way of teaching the concept of hypothesis testing and the construction of confidence intervals using numbers announced by the drug makers Pfizer and Moderna publicized by the media. Instead of a two-sample test or more complicated statistical models, we use the elementary one-proportion z-test to analyze the data. The method is designed to be accessible for students who have taken a one-semester elementary statistics course. We will justify the use of a z-distribution as an approximation for the confidence interval of the efficacy rate. Bayes' rule will be applied to relate the probability of being in the vaccine group among the volunteers who were infected by Covid-19, to the more consequential probability of being infected by Covid-19, given that the person is vaccinated. Preliminary student learning outcomes will be shared.

**Too many cooks in the QR kitchen? Leveraging interdisciplinary expertise in developing an alternative mathematics pathway****Beverly Wood and Debra Bourdeau, Embry-Riddle Aeronautical University****Abstract**

How many instructors does it take for amazing course design? Or perhaps we should begin with, "A mathematician, humanist, communication expert and statistician walk into a bar." This unlikely team of four has co-developed a pair of courses (Learning to Reason I: Art and Quotient, and Learning to Reason II: Commerce and Flux) that deeply investigates quantitative reasoning from multiple perspectives. Blending elements of rhetoric, logic, and history with mathematical computation, representation, and application, breaks through the perceived barriers between the unyielding, obstinate world of mathematics and the ambiguous, equivocal world of the humanities. Developing the courses as an interdisciplinary team of mathematicians and humanists has brought together multiple ways of reasoning and habits of mind that present students with experiences in critical thinking involving both numbers and words. We will share content from our QR courses as well as ideas for managing a multidisciplinary team.

**Essential quantitative skills for quality and safe nursing practice****Joan Zoellner, The Charles A. Dana Center at the University of Texas at Austin; Daniel Ozimek, Pennsylvania College of Health Sciences; Anna Wendell, Rivier University****Abstract**

Mathematical competency and effective quantitative reasoning skills are essential for safe nursing practice. However, research on the mathematics and statistics education of nurses continues to identify a lack of consensus on the necessary quantitative learning outcomes for undergraduate nursing programs. During this facilitated discussion, we intend to lead a process to draft an inventory that can form the basis of a national consensus on the quantitative learning outcomes necessary for quality and safe nursing practice. This inventory will include differentiation between the quantitative skills and competencies specific to a particular degree or certification level (e.g., LPN, ADN, BSN, NP, DNP) with those that are universal for all practicing nurses. Participants should be prepared to discuss the relative importance of various quantitative skills for safe nursing practice.