

11. Quantitative Literacy and Reasoning as Tools for Learning Across the Disciplines

Session Description: A beautiful characteristic of quantitative literacy and reasoning (QL/QR) is that they allow one to generate insights in myriad contexts and disciplines. In this session, we invite educators to share how they promote QL/QR as tools for accessing insights in a context or discipline within or outside of mathematics. We welcome a diverse collection of scholarly presentations. Sponsor: SIGMAA-QL. Organizers: Kathryn Appenzeller, Texas A&M - San Antonio, kknowles@tamusa.edu; Samuel Luke Tunstall, Trinity University, stunstal@trinity.edu; Gizem Karaali, Pomona College, Gizem.Karaali@pomona.edu

Title: Statistical Literacy: Quantitative Tools for all Disciplines

Presenter: Milo Schield

Description (220 words): The tools needed to reason with numbers are of two kinds: (1) those that *require* numbers (mathematical) and (2) those that are *based on* numbers but are primarily word based (literacy). Both are involved in numeracy. Numeracy includes quantitative literacy (Q/L), statistical literacy (S/L) and data literacy (D/L). (1) Those that *require numbers* are generally well-known and are used deductively in proofs and in math problems. (2) Those that are *based on numbers* tend to use ordinary English inductively as evidence for disputable claims. These tools are less well-known but are at least as important. These tools enable one to distinguish association from causation (disparity from discrimination), to identify assembly (how things are defined, summarized and presented), to distinguish experiments from observational studies, to describe and compare ratios, to describe and distinguish predictions from explanations in medical tests or in 2x2 tables of counts or percentages, and to indicate what it means to "control for something" or "take something into account". Those involved in quantitative reasoning tend to focus on just those tools that *require* numbers. Those involved in numeracy (Q/L, S/L, D/L) are more likely to include both: those tools that *require* numbers and those that are *based on* numbers. Including both is essential if the goal is to help students reason effectively across the disciplines when using numbers.