Quantitative Reasoning in the University Scholars Programme

Dr. Shawna K. Metzger
University Scholars Programme
National University of Singapore
smetzger@nus.edu.sg

27 April 2017

Presentation Overview

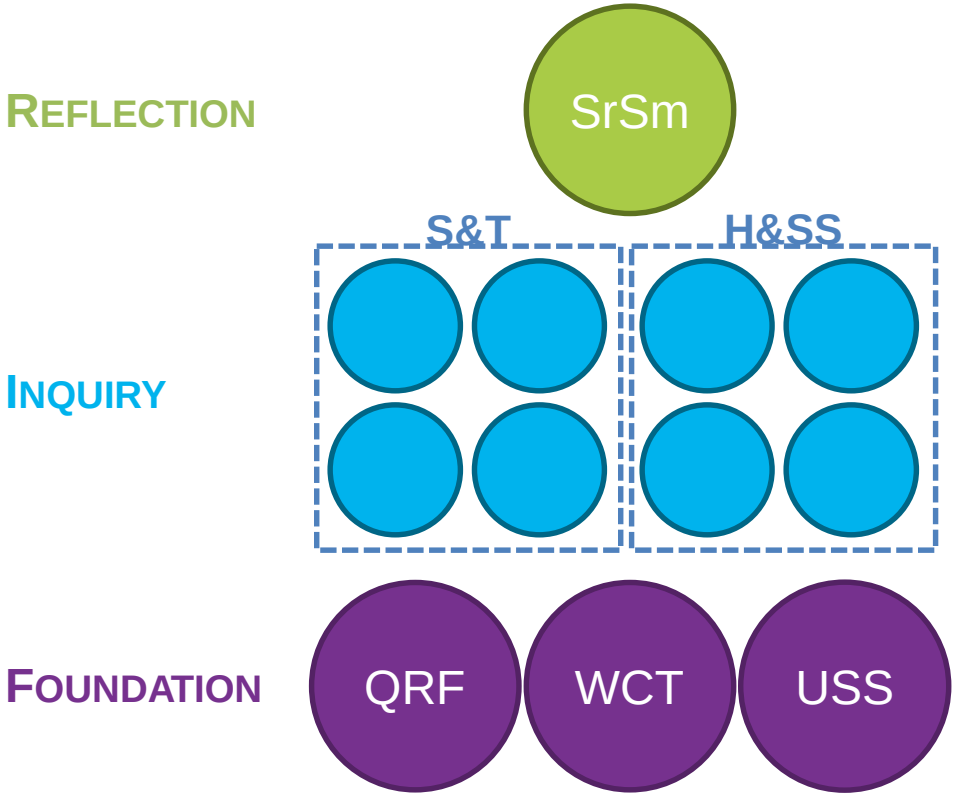
- What is USP's definition of QR?
- How did we arrive at this definition?
- Where does QR appear within USP's curriculum?

USP: Overview

- Multidisciplinary, partially residential honors program
- 180-220 students per cohort
- Seven partner faculties

USP: Curriculum

- 30% of MCs through USP



What is "QR": In USP

- QR as mindset
- Specific substantive topic

A mode of argumentation in which we use quantitative tools to produce numerical evidence.

Broad Themes

- Importance of context *(MAA, NCED, Carleton)*
- Argumentation *(Carleton)*
- Communication *(AAC&U, Carleton)*

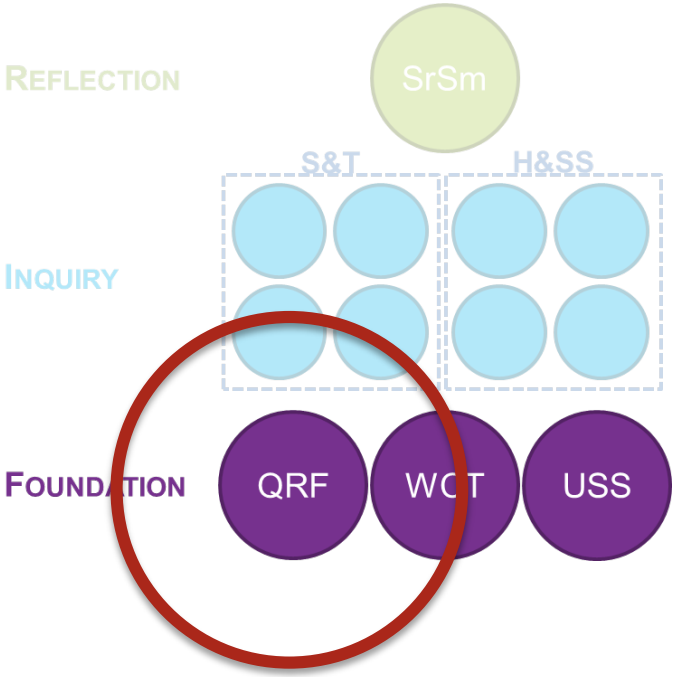
Tailoring to USP

- Programme objectives

Ability to identify and employ appropriate reasoning skills to investigate and articulate positions.

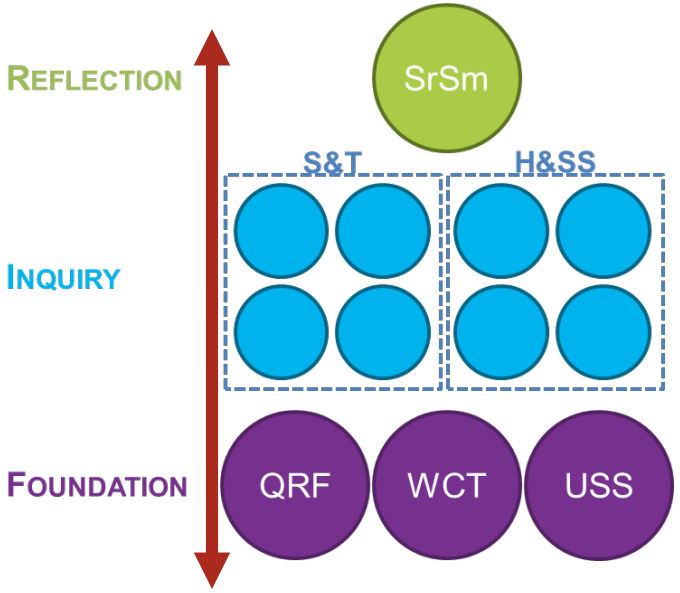
Tailoring to USP

- Horizontal integration
  - Writing and Critical Thinking
    Argumentation
  - University Scholars Seminar
    Broader historical context



Tailoring to USP

- Vertical integration
  - Sciences and Technologies
    Scaffolding explicitly from QRF
  - Senior Seminar
    Multi-modal eMagazine



Our QRF Modules

- Quantifying Our Eco-Footprint
- Quantifying Nuclear Risks
- War and Democracy
- Quantifying Environmental Quality
- The Pursuit of Happiness

Cross-Module Convergence

- Common concepts
- Common broad learning outcomes

Common Concepts: Elements of QR

1 **Sm** scientific method	2 **Hy** hypothesis	3 **Sp** sampling	4 **Da** data	5 **Op** operationalize
6 **Va** variable	7 **Md** modeling	8 **Ay** analysis	9 **De** deduction	10 **Cr** critical thinking

Common Learning Outcomes

1. Name the steps of the scientific method as it applies to quantitative research, describe the relevant tasks associated with each step, and be able to perform these tasks correctly

2. Have a particular awareness of (1) the role that theoretical concepts and their empirical operationalization play in the research process; and (2) the importance of falsifiability

3. Be able to: (1) build datasets by gathering and organizing numerical data; (2) compute basic descriptive statistics; (3) perform basic statistical analyses (e.g. linear regression); and (4) interpret the analysis results

4. Have familiarity with the concept of significance, in the statistical sense, and be able to explain why it is central to the very notion of quantitative reasoning

Summary

- QR as mindset; argumentation using numbers
- Looking outside, then using programme-level outcomes to tailor to USP
- Compulsory Foundation module, further opportunities for extending and applying in higher curricular tiers

Questions?

UQF2101G, Quantifying Nuclear Risks

Assignment	Common Learning Outcome(s)
First essay	• understanding quantitative information (3) • employing the scientific approach (1)
Short quizzes	• knowing key ideas, explaining key concepts (1, 2)
Written summary	• interpreting the scientific method (1) • understanding a professional scientific article (1)
Oral presentation	• communicating quantitative information (3) • synthetizing information (3) • analyzing data (3, 4)

UQF2101H, War and Democracy

Assignment	Common Learning Outcome(s)
War data (comprised of 7 pieces)	2, 3, 4
Group project (class presentation, indv. summaries)	1, 3(4)
Final exam	All, except 3(3)

UQF2101I, Quantifying Environmental Quality

Assignment	Common Learning Outcome(s)
Weekly homework assignments	1 – 4
Individual report	1, 2
In-class quizzes	3, 4
Term project	1 – 4