The Principal Elements of the Nature Of Science: Dispelling The Myths

William F. McComas, University of Southern California

- Myths of Science perpetuated
- Formality of the "Scientific Method" underpins arguments

- Laws vs. theories vs. hypothesis (myths 1, 3)
- Science as a solitary pursuit (myth 15)
- Scientific objectivity (myths 9, 11, 12, 13, 14)
- The absolute proof provided by methodically accumulating evidence (myths 2, 4, 5, 6, 7, 8, 10)
- Goal is to rethink science instruction, show the pageant of science

Potential Discussion Topics

- Are the only scientific ideas the potentially falsifiable ideas?
  - Should scientists work to try to refute their own ideas?
- Allegiance to the research tradition or "paradigm" – positive or negative?
  - Can we find a golden middle between limiting investigation and providing direction?
- Law vs. Theories, are laws in Computer Science true laws? (Moore's Law, Amdal's Law)
- Myth #7: Science is procedural more than creative
  - How many of us were taught the *simplicity* and *elegance* of science in high school?
- Myth #11: Scientific conclusions are reviewed for accuracy
  - Is Competition between research groups good for science?
  - Do prizes encourage competition (eg; Millenium Prize, X Prize etc.)

A Framework for Design

Creswell - "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches" (Chapter 1)

- Discussion of various methods and philosophies of scientific investigation
- Knowledge Claims
- Strategies of Inquiry
  - Qantitative - Postpositivist
  - Qualitative – Constructivist & Emancipatory
  - Mixed – Pragmatic Assumptions
- Discussion on choice of approach

Potential Discussion Topics

- The Tao of Rumsfeld: There are known unknowns but there are also unknown unknowns
  - How would we use mixed methods in CS and Software Engineering?
- HCI and Qualitative methods
  - What are the trends in peer reviewed conferences?
  - Are we already using mixed methods?