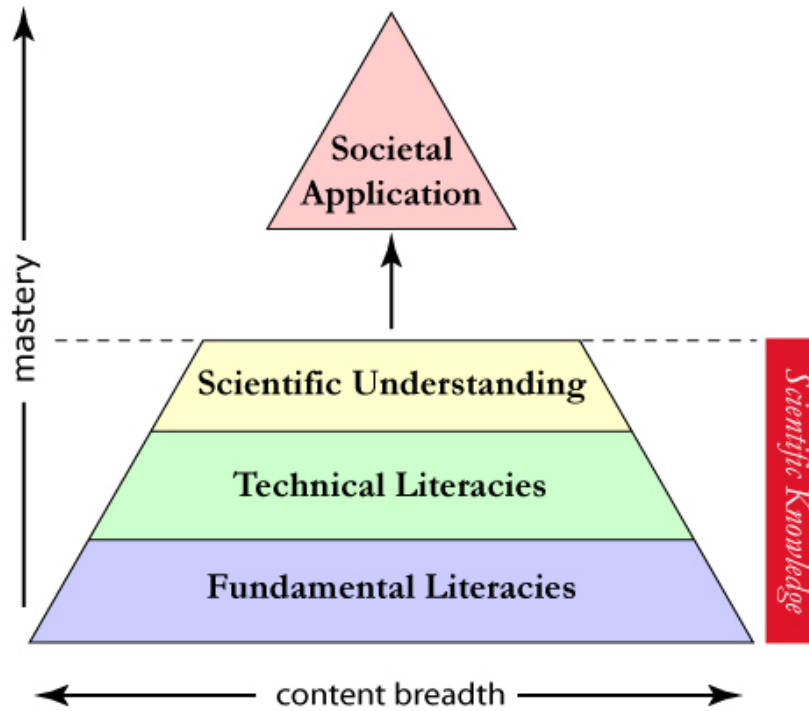


## Literacies Critical for Achieving Scientific Understanding

- **fundamental literacies:** literacies that allow one to read and interpret data and make computations
  - background
    - during their educational career, most students have been exposed to these skills at least once
    - lack of practice may, however, prevent students from easily applying these literacies
    - these skills are also important in many every day activities, e.g. buying stocks, picking a cell phone plan, arranging financing for purchasing a house, etc.
  - skills
    - power to *read* a table or *interpret* a graph or chart
    - facility to *make* qualitative assessments
    - capacity to *perform* simple quantitative calculations
  
- **technical literacies:** skills specific to the scientific disciplines
  - background
    - some technical literacies are common to many sciences
    - others are much more specialized
    - many students may never have been introduced to these skills
    - nearly all students benefit from practicing these literacies
  - skills for Earth sciences
    - skill to *read* different types of maps
    - ability to *visualize* in three dimensions
    - capacity to *conceptualize* changes through time
  
- **citizenship literacies:** skills needed to apply scientific understanding and knowledge to complex societal problems
  - background
    - students may have been exposed to some of these skills in high school courses (history, sociology, geography, civics)
    - lack of application may hamper students using these literacies effectively
    - necessary to filter information bombarded with (TV and radio news, internet, newspapers, etc.)
  - skills
    - **social context** skills useful understanding cultures and societies impacted by geologic “problems”
      - appreciate historical background & significance
      - understand population demographics
      - economic content
      - awareness of different cultural & social viewpoints
    - **critical thinking** procedures and methods necessary to analyze scientific “solutions” to geologic “problems” from economic, social and political perspectives
      - ability to *identify* consequences (manifest & latent)
      - capacity to *recognize* impacts (both short & long-term)
      - power to *ascertain* externalities, e.g. hidden & shared costs
      - skill to *devise* alternative strategies

**General Education science course: survey**



**General Education science course: focused**

