



# Comparison of *Benchmarks* and *NSES*

## *NSES* Topics Not Included in *Benchmarks*

- Types and levels of organization, and hierarchies as common themes
- Explicitly, importance of measurement in science
- Different systems of measurement
- Separation of mixtures of substances by their properties
- Chemical reactions are oxidation/reduction (exchange of electrons) or acid/base (exchange of hydrogen ions), radicals as reactive units
- Identification of protein catalysts as “enzymes”
- “Complementarity of structure and function” as a theme in biology
- Identification of DNA molecule as “chromosome,” human chromosome number
- Behavior patterns “ensure reproductive success” and “must be flexible enough to deal with uncertainty and change”
- An inherited trait can be determined by one or many genes, and a single gene can influence more than one trait
- Metallic core of earth
- Atmosphere includes nitrogen
- Clouds affect weather and climate
- Radioactivity and gravitational energy of formation as sources of earth’s hot interior
- Because water is a solvent, it transports dissolved substances with it wherever it goes
- General notion of a “reservoir” in systems
- Safety and injury prevention
- Sex transmits diseases
- Severity of disease symptoms
- Variety of factors influencing decisions about health practices
- Mood and behavior can be modified by substances
- Natural hazards
- Pursuing science as career or hobby can be fascinating and intellectually rewarding
- “Science distinguishes itself from other ways of knowing . . . through the use of empirical standards, logical arguments, and skepticism . . . .”
- Additional episodes in the history of science:
  - Molecular biology
  - Information and communication
  - Quantum theory
  - Galactic universe
  - Medical and health technology