
Student Success \ Math & Physics and Biology

KAVEH FARROKH (PH.D.)

Physics: Experts vs. Novices

BASIC SKILLS IN PHYSICS

- Possession of certain skills (e.g. basic math) needed.
- Performed in a routine manner with minimal attention.
- Allows you to focus on problem-solving (goal) the problem.

CONCEPTUAL UNDERSTANDING IN PHYSICS

- Rote memorization of formulas do not work in physics, math, calculus, and statistics exams since this strategy is void of conceptual understanding.
- Knowledge of which formulas and tools to use and when to use them

- Experts understand fundamental knowledge principles.
- Knowledge not confused with more superficial information.
- Experts understand shared underlying principles.
- Novices tend to rely heavily on rote memory.
- Novices look at diagrams together superficially (they don't try to understand underlying concepts).
- Experts and novices memory structure in physics differ in three ways: (1) Content; (2) Organization and organizing force (novices especially challenged); (3) Form of knowledge organization.

Student Success \ Math & Physics and Biology

KAVEH FARROKH (PH.D.)

STRATEGIES

Experts:

- Every step contributes to the information needed for the solution process.
- Use the working forward strategy (use givens – givens used to generate more information).
- Know the path that leads to the solution and follow it.
- Recognize problem schemas for familiar problems.

Novices:

- Use the working backwards strategy (identify goal and find formulas that lead to goal).
- Work backwards through a series of subgoals to try to solve this formula.
- This strategy seems to work well for novices because it reduces search to information related to goal.