
Student Success \ Math & Physics and Biology

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Computer Science: Experts vs. Novices

SYNTACTIC KNOWLEDGE

Knowledge of language units and rules for combining language units (e.g. INPUT).

- Experts have syntactic processing automated. This frees up more capacity for focusing on content and meaning of programming.
- More automation of lower level programming skills in experts than novices.

SEMANTIC KNOWLEDGE

Mental model of major locations, objects, actions in computer system (e.g. DATA STACK).

- Novices tend to have misconceptions about memory spaces. Experts do not.
- Novices lack semantic knowledge and don't know what basic instructions refer to.

SCHEMATIC KNOWLEDGE

Categories of routines (e.g. LOOPING).

- Experts are more sensitive to typical configurations of routines and programs.

- Experts classify programs by functional vs. surface characteristics.
- Experts classify according to lines executing task versus lines using same syntax.
- Experts use their past knowledge (schema) of programming to classify problems.

STRATEGIC KNOWLEDGE

Tests for devising and monitoring plans. Includes breaking a problem into smaller/finer subparts.

- **Top-down refinement approach:** Expert software designers break problem into parts/steps and more systematic.
- **Hook-crook approach:** Novice software designers break problems into parts/steps but fail to compose alternatives.
- **Unfocused approach:** Novices begin to solve problems before understanding the program.