Introduction

No problem can withstand the assault of sustained thinking.

Voltaire

Any fool can know. The point is to understand.

Albert Einstein

A problem is a chance for you to do your best.

Duke Ellington

Goals of this Course

To make you a better problem solver in general, by:

- Understanding how you operate
- Recognizing limitations and pitfalls in the approaches you use
- Learning techniques that you can apply to solve problems

To improve your ability to successfully complete the CS degree

Descriptive vs Prescriptive

Descriptive: discuss how other people do it

Prescriptive: teach you how you should do it

What Motivated this Course?

We designed this course in hopes of:

- Improving students' ability to design
- Improving students' ability to develop algorithms
- Improving students' ability to plan (projects)
- Improving students' ability to test and debug
- Improving students' performance on tests
- Improving students' analytical abilities
- Improving students' ability to "argue" (proving)
- Improving students' ability with personal interactions

Guiding Philosophy

1. Problem solving is a skill (it can be learned). It is not an innate ability.
2. Problem solving is fundamentally about attitude and effort (the "problem-solving stance").
3. The problem-solving stance isn't something that you can just "turn on" when you need it for a test, etc. You have to live it – and successful people do just that.

Course Organization/Process

Learn about yourself

Learn problem-solving techniques

Solve a wide variety of problems, so as to learn how to apply the techniques

What Kinds of Problems?

Problems “in the large”: Engineering tasks

- Lots of formal process, well developed

Problems “in the small”: Puzzles, homework

- Heuristics

Success as a student

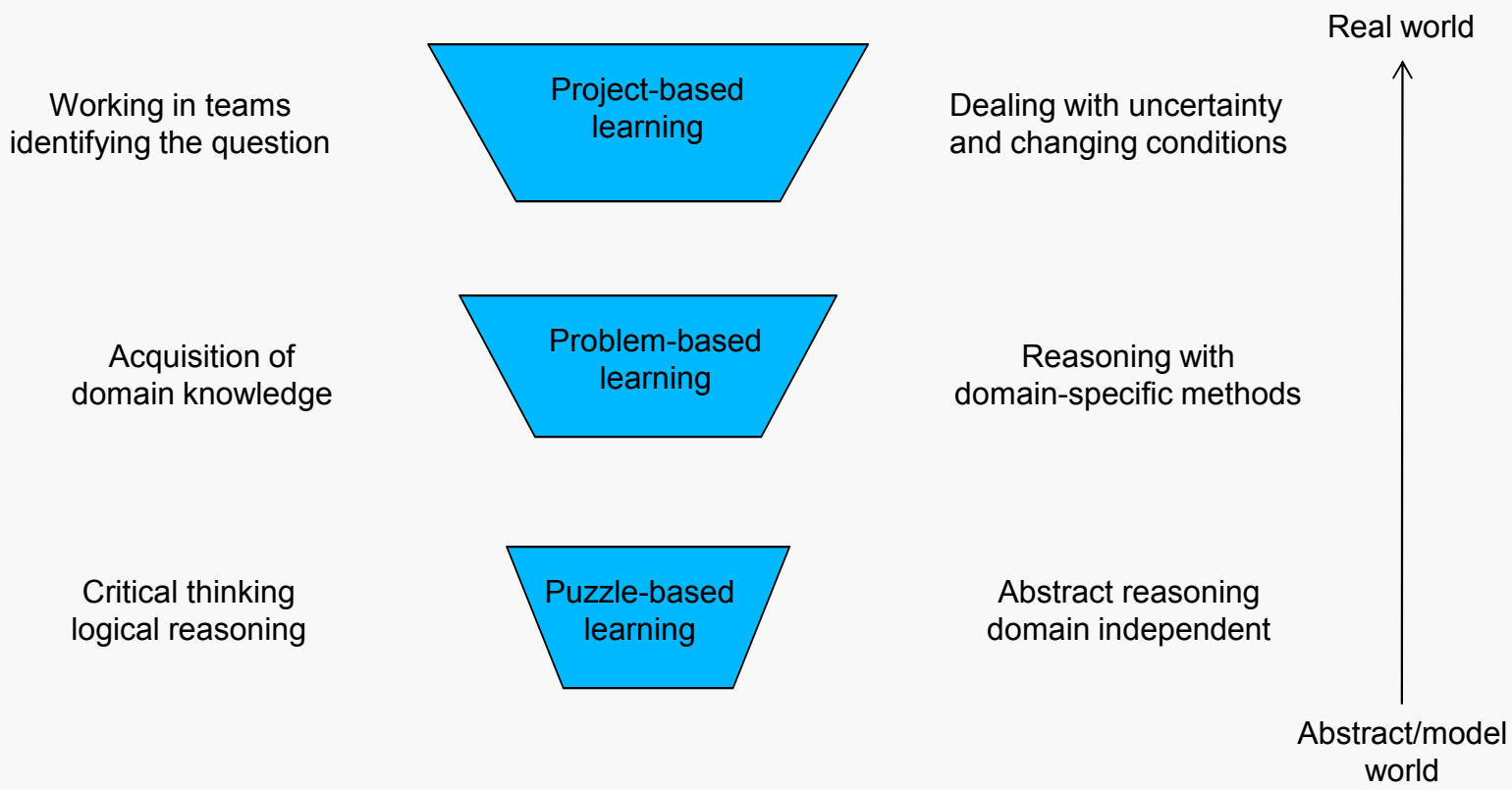
Interpersonal problems

- Take a “problem-solving” stance

Analysis, construction, organization, process, understanding

Communication skills

A Learning Hierarchy



N. Falkner, R. Sooriamurthi, and Z. Michalewicz, “Puzzle-based learning for engineering and computer science,” *IEEE Computer*, 43(4), 2010, pp. 20--28.

