Fluency with Information Technology

~ Implementing the Report ~

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Outline

- Review of Fluency vision
- Strategies for delivering FITness
- Case Studies:
  - Montclair State
  - UMass
  - UW
- Discussion

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A Quick Review

- NRC addressed the question

  “What should everyone know about IT?”

- Reasons for knowing IT: citizenship, job training, personally relevant goals
- Committee formed in 1997; report in 1999
- Fluency with Information Technology is goal

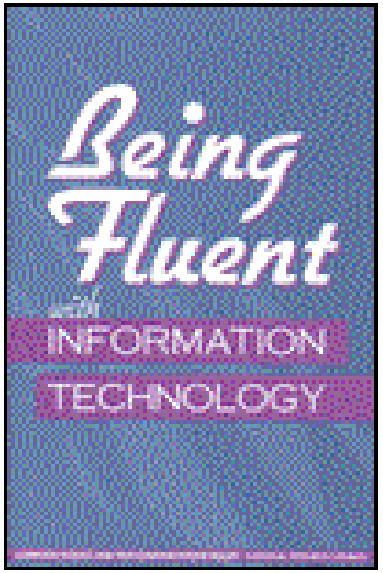
Fluency with Information Technology

- Traditional computer literacy does not suffice
- The committee adopted the term “fluency” at the suggestion of Yasmin Kafai, UCLA
- IT = everything users encounter on a net-connected PC … includes more than computers
- FITness is the term the committee adopted

Goal: Teach the IT needed to today
and how to learn more IT in the future

NRC Recommends: A Tripartite Solution

- Fluency with Information Technology requires the acquisition of three kinds of knowledge
  - Contemporary Skills
  - Fundamental Concepts
  - Intellectual Capabilities
- Skills, Concepts and Capabilities are different parts of IT knowledge
  - Interdependent
  - Co-equal
- Projects unify the information



Skills

- To know contemporary applications
- Approximately the same as “computer literacy”
- Essential for
  - Job preparedness
  - Education, as a tool making a student productive
  - Learning the other parts of FITness
- A moving target, relies on the state-of-the-art

Example: Use a word processor

Concepts

- The foundations of Information Technology
- Concepts refer to material that might be called the “book learning” part of FITness
- Concepts explain ...
  - How and why IT works as it does
  - Constraints and limitations on applications
  - Principles on which to build new understanding
  - Ideas that can be used to make IT more personally useful

Example: Organization of computer networks: TCP/IP

Capabilities

- Higher level thinking
- “Life skills” applied to Information Technology
- Learning Capabilities requires ...
  - Abstract thinking
  - Learning by analogies
  - Analysis
  - Judgment
- The raw material for life-long learning

Example: Engage in sustained reasoning

Selecting The Key Knowledge

- Committee goal: Avoid “over-prescription” trap
  - Top 10 items in each type
    - 10 top skills
    - 10 top concepts
    - 10 top capabilities
  - Keep to the plan -- no adds, just replacements
- FITness is not an end state -- it is a process of life-long learning ... so the goal is a sufficient level of introduction

Who Should Be Taught Fluency?

- Everyone!?
- K-12 is ideal ...
  - Learn basics as children build “model of world”
  - Skills with tools in middle years + fundamentals
  - High school treats capabilities
- Colleges teach Fluency now … what’s the best way?
- How do people “past school” become FIT?

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- Review of Fluency vision
- Strategies for delivering FITness
  - Single Course, Generic
  - Single Course, Specific
  - Two-Shots
  - Minor
  - Integrated
- Case Studies
- Discussion

Considerations

- Students arrive at college knowing some applications well
  - Literacy courses are now often pointless
  - Schools or states may have “requirements”
- Service Course vs Majors Course
  - Service course draws student credit hours
  - Using Fluency as CS-0 creates a “common” basis
- Customize to colleges, e.g. business or engineering
- Low-level courses often taught by adjuncts that are resistant to change … find new adjuncts

Needs leadership

Single Course, Generic

- Course: 1 college term, freshmen, not connected to disciplinary content, requirement(?)
  - + Teaches material early for maximum help
  - + Amenable to “large scale” offerings
  - + Can fulfill “general studies” requirements
  - + Limits faculty/staff demands to offering dept.
  - - Not integrated into majors
  - - Very much a “one size fits all” solution
  - - Tough for “immature” students

Single Course, Specific

- *Being Fluent* said FITness should be delivered within a discipline to specialize knowledge
- Course: 1 term, for majors, incorporating apps and ideas of area; taught by dept or college
  - + Career value high; emphasizes IT in field
  - + Projects integrate, benefit other classes
  - - Decisions on major often come late
  - - Disciplinary faculty not all ready to teach it
  - - Few economies of scale

Two Shots

- Course(s): Teach a Single Generic version to freshmen, then specialize to discipline in a "research methods" or "career tools" course
  - + IT taught early, but eventually specialized
  - + Economies of scale & staffing w/personalize
  - + Methods & Tools classes can dig deeper
  - + Allows Generic to be slightly easier, patient
  - - May be more contact time in overload curric
  - - Inevitably includes some repetition

Minor

- Course: Create strong Single Specific class as preparation to an IT intensive subset of major
  - + Enables “forward thinking” version of major
  - + Provide broader knowledge of IT
  - - Requires IT-intense major course offerings & IT savvy faculty
  - - Benefits only students opting for minor

Best when Single Generic is available

Integrated

- Courses: Distribute the Fluency content across curriculum, like writing, ethics, etc.
  - + Just-in-time-learning approximates life
  - + Incorporating capabilities benefits other classes
  - - Difficult to find suitable place for concepts
  - - Requires rethinking of curriculum and introduces demands on faculty
  - - Generally difficult to implement; requires pioneers

One other option …

- BeneFIT100, a free self-paced online version of UW's FITness course
  - NSF funded, UW produced with "good production values"
  - UW offers course for credit/tuition … keep it fresh

    http://www.fit.washington.edu
- Substantive course that takes motivation … college students may need an instructor
- Using BeneFIT100
  - TA sets pace, answers questions, gives quizzes
  - Students work at their own pace, own schedule
  - Contact UW Extension for particulars

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UW's FIT100

- Developed in 1999 as report was coming out
- Challenging curriculum that has taken some time to refine, now stable; formally evaluated
- Jointly offered by CSE & Information School
  - Like a college science class for non-techies
  - 3 projects include: HTML, DB design, JavaScript
  - 150 students per quarter, 3 lectures, 2 labs per week
  - Not required, but fulfills quantitative & logical reasoning
  - "Infinite" supply of students

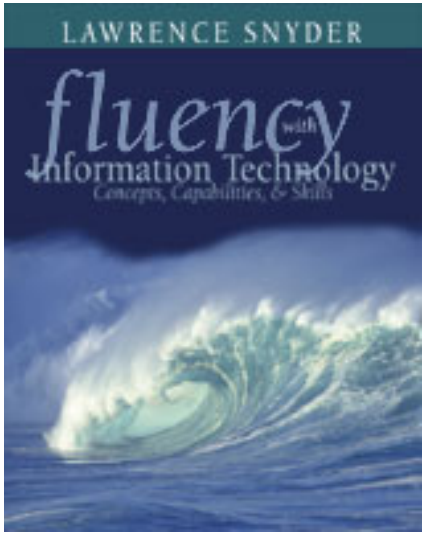
FIT100 Goal: Fluency in 10 Weeks

- At the high-level …
  - 2 weeks Preliminary Material
  - 2 weeks Project1: Bogus Web Page
  - 2 weeks Project 2: JavaScript Application
  - 2 weeks Project 3: Database Design
  - 2 weeks (scattered): midterms, holidays, cushion
- Teaching FIT is easy … organizing and keeping to the schedule is the challenge!

Delivering Material, the Principles

- The approach to delivering FITness is ...
  - Skills taught in AW's *FIT* + labs
  - Concepts taught in AW's *FIT* + review in lecture
  - Capabilities taught in AW's *FIT* + demonstrations in lecture

Adjust the Skills instruction to match the background of incoming students and curricular needs -- use "generic" approach for independence



Bottom Line

- Most students complete the work and are successful at FIT100
- Class takes time and good study habits
- Anecdotes suggest FIT100 students are “launched” on a lifelong learning process
- Programming is tough for non-techies, but patiently taught, it can be learned and becomes a source of pride and confidence

Not everything must be learned … quick exposure followed by later study is valuable

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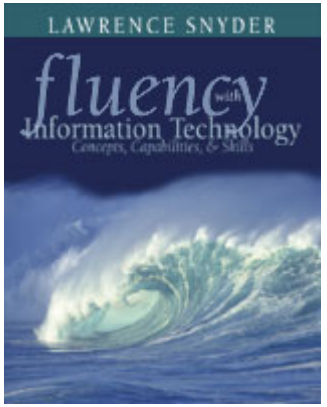
Links ...

- NRC report, *Being Fluent with Information Technology:* www.cstb.org
- University of Washington's FIT100
  www.cs.washington.edu/100
  www.washington.edu/oea/9915.htm
- BeneFIT100
  www.fit.washington.edu
- *Fluency with Information Technology*
  Addison-Wesley, 2003
  www.aw.com/snyder/



Just Do IT