



Center for  
**LifeLong  
Learning  
& Design**

University of Colorado at Boulder

Wisdom is not the product of schooling  
but the lifelong attempt to acquire it.  
- Albert Einstein

## Responding to the Remarks from Students in the Questionnaire

Gerhard Fischer and Hal Eden  
Fall Semester 2007

Course information environment (SWIKI):

<http://swiki.cs.colorado.edu:3232/phd-intro-2007/>

Introduction, September 4, 2007

## Three Computer Scientist which YOU consider most important for the field

Alan Turing (12)	Martha Palmer	Vannevar Bush
Allen Newell	Mitch Marcus	Ivan Sutherland (3)
James A. Gosling	Michael Collin	Donald Norman
John von Neumann (6)	Donald Knuth (2)	George Boole (2)
Vinton Cerf & Bob Kahn	Ken Thompson	Douglas Engelbart
Edwin Catmull	Dennis Ritchie (3)	Larry Tesler
Morton Heilig	George Dantzig	Alan Cooper
Yu Suzuki-	Stephen Wolfram	Edsger Dijkstra (3)
Noam Chomsky	John Backus	Thomas Bayes

## Three Computer Scientist which YOU consider most important for the field

Euclid	Bjarne Stroustrup	Christopher Burges
Alan Kay (2)	Michael Garey	Danny Hillis
Tim Berners-Lee (2)	Michael Garey	Jack Dongarra
Niklaus Wirth	George Dantzig	
Gita Alaghband	Vladimir Vapnik	

### ▪ Turing Award

<http://awards.acm.org/homepage.cfm?srt=all&awd=140>

- ACM's most prestigious technical award is accompanied by a prize of \$250,000. It is given to an individual selected for contributions of a technical nature made to the computing community. The contributions should be of lasting and major technical importance to the computer field.

# List your **Three Favorite Topics** that you would like to see discussed in this course!

## ▪ **Being a PhD Student**

- How to become a successful PHD student (in computer science)
- How to become part of the research community
- How to build strong relationships with professors and other students during my PHD
- What are some common characteristics of Fun Ph.D. experience
- What are some common characteristics of Painful Ph.D. experiences
- Keeping focused on an end goal that seems a long way off

## ▪ **Requirements**

- Specific details on requirements and expectations of PhD students
- What should we expect from the PhD program, what are recommended ways we can take advantage of experience (study abroad, summer research programs, etc.)

# Three Favorite Topics – Continued

## ▪ **Research Activities**

- Publishing research for the uninitiated
- How to become a great researcher - How to find and choose papers to read, how to make contacts, and how to choose your own research to conduct.
- working overseas
- Methods of organizing papers, research materials

## ▪ **Resources**

- Tools available for research (where to look for information)
- What are the pros and cons for collaboration in studying?

## ▪ **Thesis**

- What methods are there to test if a given thesis idea is too trivial or too ambitious.
- How to find brilliant ideas for our own research.

## Three Favorite Topics — Continued

### ▪ After Being Done with the PhD

- What is involved in becoming a professor after graduation (e.g., post-doc work? How competitive will it be in 5-7 years? What's the process of applying for positions?)
- A career in academia as a professor - Why choose academia? What to expect? How best to prepare? & academia vs. industry
- what are opportunities that PhD has more than anyone else

### ▪ Topics

- Machine Learning in CU at Boulder
- Analyzing Operating Systems (MS-Windows, Mac OS, Linux)
- .LaTeX
- network security

## Three Favorite Topics – Continued

### ▪ **Limits and Perspectives of the Field**

- How far are we from Star-wars? (especially about AI and ubiquitous computing)?
- What's CS all about?
- Where is CS heading as a field (research, curriculum, innovations)? Are we due for an overhaul in our curriculum?
- New areas/directions where CS research might develop? What are some opportunities ripe for applications/solutions?

### ▪ **Lectures**

- Labs introduction & What current research is being done in the department?
- Introduction to active research areas at CU
- Computer Science and its interactions with other disciplines (linguistics, cognitive science, engineering, education, etc...)

### ▪ **Money**

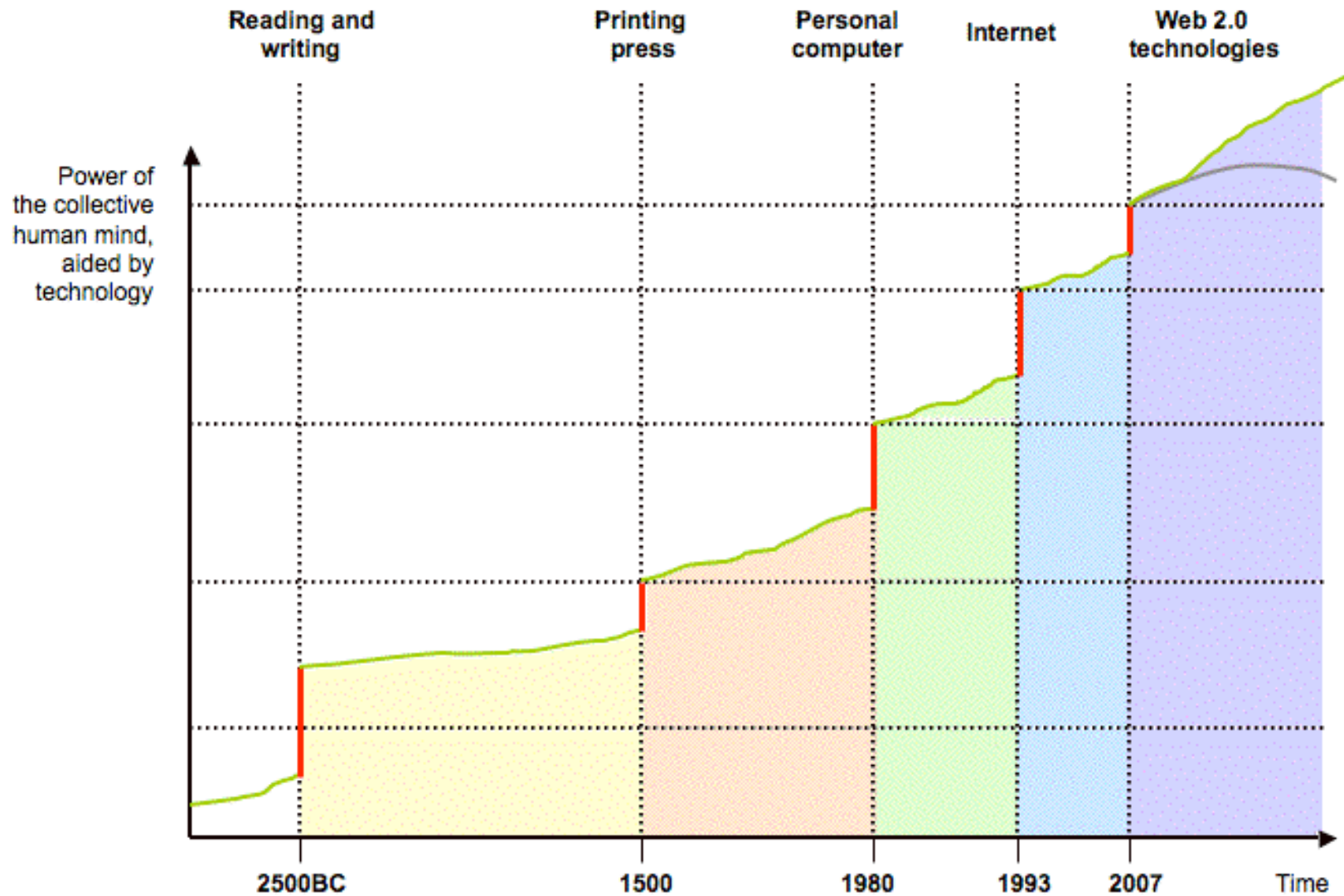
- How to do fellowship writing
- writing proposals

# Computer Science – A “Design” Discipline?

- **natural science: “how things are”**
  - knowledge about natural objects and phenomena
  - primary interest: analysis
  - examples: physics, chemistry
- **sciences of the artificial: “how things might be”** (and ought to be in order to attain goals and to function)
  - knowledge about artificial objects and phenomena
  - primary interest: synthesis
  - examples: engineering, medicine, business, architecture, painting, universities, cognitive artifacts, notations
- **design** = although there is a huge diversity among design disciplines, we can find common concerns and principles that are applicable to the design of any object, whether it is a (scientific, mathematical) notation, a household appliance, a housing development, a software system, .....



# Beyond the Unaided, Individual Human Mind



# **The Motto of the Integrated Teaching and Learning Laboratory (ITLL)**

<from Confucius, 500 BC>

**I hear and I forget**

**I see and I remember**

**I do and I understand**

# Learning and Teaching

- *"A major illusion on which the school system rests is that most learning is the result of teaching"* — Ivan Illich (in "Deschooling Society")
- learning and teaching are not inherently linked →
  - much learning takes place without teaching and
  - much teaching takes place without learning

# Passion for Learning – Beyond Tests

COMMENTARY • OPEN FORUM

Tuesday, May 2, 2000



## More is Less

- **Blaise Pascal:** *“I have made this letter longer than usual, because I lack the time to make it shorter.”* — Provincial Letters XVI
- **Antoine deSaint-Exupéry** (aviator, aircraft designer, author of classic children’s books): *“Perfection (in design) is achieved not when there is nothing more to add, but rather when there is nothing more to take away.”*

# What is the Scarce Resource: — Information or Human Attention

- *“What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention,, and a need to allocate efficiently among the overabundance of information sources that might consume it.” — Herbert Simon*
- *From “Anywhere, Anytime, Anyone” → “The Right Information at the Right Time, in the Right Place, in the Right Way to the Right Person”*

# CS Formalisms — General or Specific

- question: why is one programming language not good enough?
- **Turing Tar Pit:** *“Beware of the Turing Tar Pit, in which everything is possible, but nothing of interest is easy.”*
- **The Inverse of the Turing Tar Pit:** *“Beware of the over-specialized systems, where operations are easy, but little of interest is possible.”*
- observation: “The smartest people in the world do not generally look very intelligent when you give them a problem that is outside the domain of their vast experience.”

# The Role of Mathematics in Software Design

*“I am skeptical that classical mathematics is an appropriate tool for our purposes: witness the fact that most formal specifications are as large, as buggy as, and usually more difficult to understand than the programs they purport to specify.*

*I don't think the problem is to make programming `more like mathematics'; it's quite the other way around.” — W. Wulf*



## Ease of Use — The Ultimate Goal?

- “If ease of use was the only valid criterion, people would stick to tricycles and never try bicycles.” — Doug Engelbart
  
- ease of use (usable) → useful, engaging
  
- ease of use → low threshold, high ceiling

# Course Information Environment

- a Swiki at: <http://swiki.cs.colorado.edu:3232/phd-intro-2007/>
- all course work (lecture notes, assignments, questionnaire) will be distributed, documented, and shared via the Swiki

## Self-Application: A “New Culture” for this Course

- “**symmetry of ignorance**” — stakeholders are aware that while they each possess relevant knowledge, none of them has all the relevant knowledge
- teacher, learner = f{person} → **teacher, learner = f{context}**
- the knowledge for (re)solving complex, real-world problems does not exist *a priori*, but is generated through collaboration among stakeholders

# Preview of the Course

- locating relevant information
- writing papers
- giving a presentation
- defining a area of research
- writing a dissertation
- interviewing faculty members and experienced PhD students
- creating a community
- getting a job
- guest lectures

## Some Relevant Websites

- the PhD program at CU Boulder  
<http://www.cs.colorado.edu/grad/phd/>
  
- why computer science:  
<http://www.cs.colorado.edu/why/>

# What does a Ph.D. require?

- intrinsic motivation
  
- dedication
  
- sometimes: hard work
  
- getting through days in which one thinks:
  - “I will never get done with this!”
  - “why do I waste years of my life doing this!”

# What is a Ph.D. all about?

- it qualifies you for the rest of your life
- it opens you doors which may provide unique opportunities for you
- it should motivate you *“to work hard not because you have to – but because you want to!”*