Center for LifeLong Learning & Design

University of Colorado at Boulder

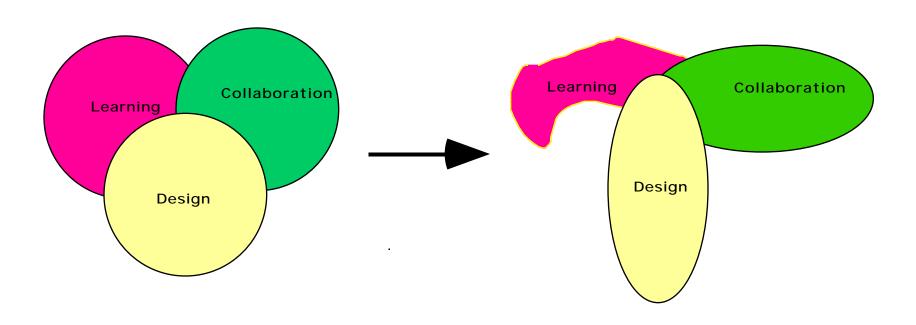**Wisdom is not the product of schooling but the lifelong attempt to acquire it.**
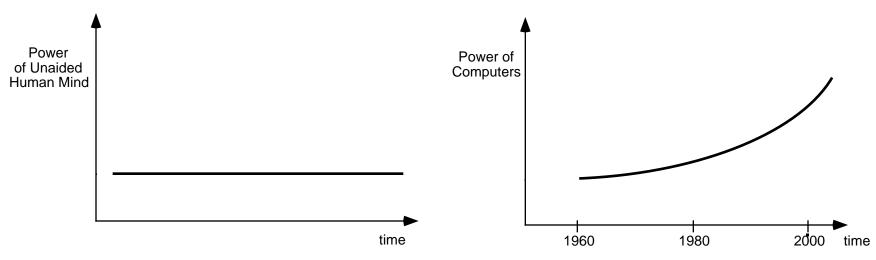**- Albert Einstein**

Design, Learning and Collaboration

Gerhard Fischer and Leysia Palen
Spring Semester 1999

Introduction and Overview of Course, Jan 11, 1999

Intersection of Design, Learning and Collaboration and their Changing Nature through New Media
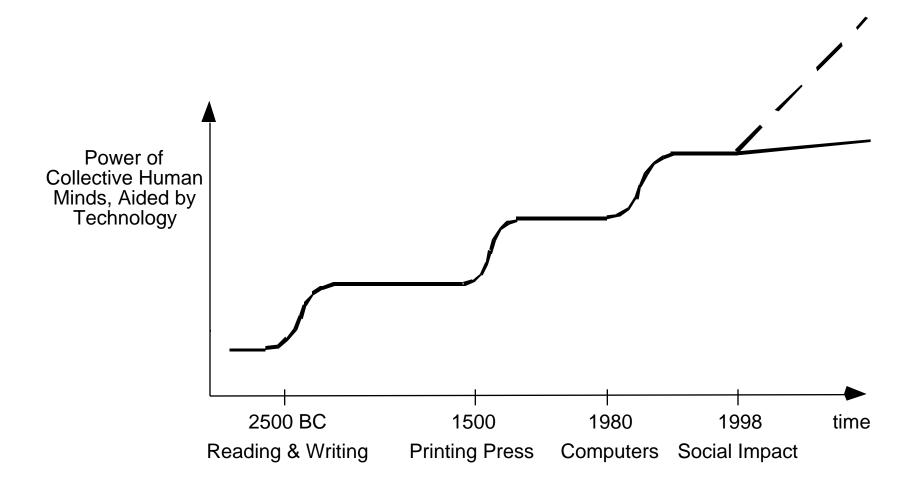
The Tension between Human and Computational Power

The power of the unaided individual human mind remains constant over time.

Computing power increases at an exponential rate.

The Collective Human Mind — Exploiting the Social

Design

- **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 / poster, a household appliance, a housing development, a software system, ...

- **some relevant publications:**
    - Norman, D. A. (1993) Things That Make Us Smart, Addison-Wesley Publishing Company, Reading, MA.

    - Schön, D. A. (1983) The Reflective Practitioner: How Professionals Think in Action, Basic Books, New York.

    - Winograd, T. (Ed.) (1996) Bringing Design to Software, ACM Press and Addison-Wesley, New York.

    - Fischer, G. (1994) "Domain-Oriented Design Environments," Automated Software Engineering, 1(2), pp. 177-203.

Learning

- **learning** = is a new form of labor and working is often a collaborative effort among colleagues and peers. In the emerging knowledge society, an educated person will be someone who is willing to consider learning as a lifelong process. More and more knowledge, especially advanced knowledge, is acquired well past the age of formal schooling, and in many situations through educational processes that do not center on the traditional school.

- **some relevant publications:**
  - Gardner, H. (1991) The Unschooled Mind, Basic Books, Inc, New York.

  - Papert, S. (1980) Mindstorms: Children, Computers and Powerful Ideas, Basic Books, New York.

  - Guzdial, M., Weingarten, F. W. (1995) Setting a Computer Science Research Agenda for Educational Technology, (CRA Report No. 1995). National Science Foundation.

  - Fischer, G. (1999) Lifelong Learning — More Than Training, International Journal of Continuing Engineering Education and Life-Long Learning (eds.: Riichiro Mizoguchi and Piet A.M. Kommers)

Collaboration

collaboration = the individual, unaided human mind is limited: there is only so much we can remember and there is only so much we can learn.

- **some relevant publications:**
  - Resnick, L. B., Levine, J. M., & Teasley, S. D. (Ed.) (1991) Perspectives on Socially Shared Cognition, American Psychological Association, Washington, D.C.

  - Koschmann, T. (Ed.) (1996) CSCL: Theory and Practice of an Emerging Paradigm, Lawrence Erlbaum Associates, Hillsdale, NJ.
      http://www-l3d.cs.colorado.edu/~l3d/courses/CSCI7782-3-S98/

  - Sachs, P. (1995) "Transforming Work: Collaboration, Learning, and Design," Communications of the ACM, 38(9), pp. 36-44.

  - Fischer, G., Lindstaedt, S., Ostwald, J., Schneider, K., & Smith, J. (1996) "Informing System Design Through Organizational Learning," International Conference on Learning Sciences (ICLS'96), pp. 52-59.

Innovative System Developments in L3D

http://www-l3d.cs.colorado.edu/~l3d/

- **Domain-Oriented Design Environments** kitchen design, computer network design, voice dialog design, ...

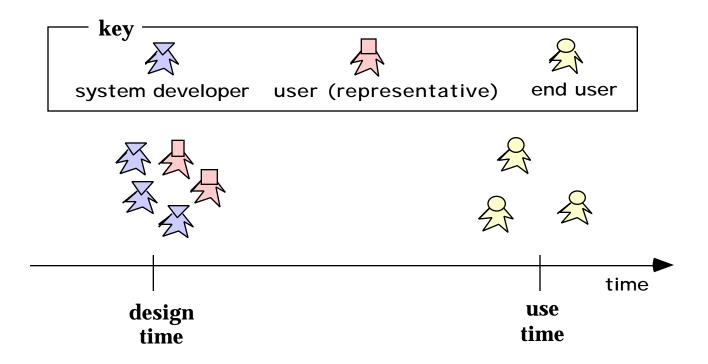- **Dynasite** WWW support for collaborative design Sources, Dynagloss, ...

- **Agentsheets**, **Visual AgenTalk, Behavior Exchange** substrate for domain-oriented design environments simulation, end-user programming sharing the work

  Envisionment and Discovery Laboratory integrated physical and computational environments creating shared understanding studying authentic problems

Fundamental Difference between Printed and Computational Media

print media: a fixed context is decided at design time

computational media: decision at use time can take advantage of contextual factors only known at use time (e.g., dynamic forms, dynamic websites, ...)

challenge: articulation of contextual factors at use time (about tasks, users, social systems,.....) — end-user programming, specification sheets, usage data, ...

Self-Application: A "New Culture" for this Course

- "asymmetry of knowledge" or a "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

Informed Participation for a New Civic Discourse in the Information Age

- **"knowing in action"**
    - knowledge is acquired by interacting with the world and people

    - a merge between being informed and participating in the world because
        * we cannot really be informed unless we participate
        * we cannot really participate unless we are informed

- **design principles:**
    - from consumer to designers

    - from closed to open systems

    - honor and support emergent behavior

    - underdesign systems

Integration of Theories, System Development, Practice and Evaluation

Theories

System Development

Evaluation

Practice