



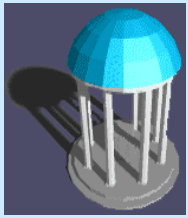
Teaching as Design

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Added comments from Jim look like this.

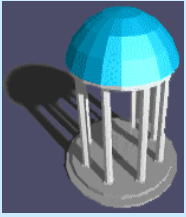


Traditional Western Formal Education

- Plato's Academy
385 B.C.
- Univ. of Bologna
1088 A.D.

Oldest university in continuous operation.
- Student books rare
- Teacher lectures to deliver information





Printing Press ~1440 A.D.

- Radical change in teaching possible:

Reading assignment

- But still we lecture!





More Media for Info Delivery >1800

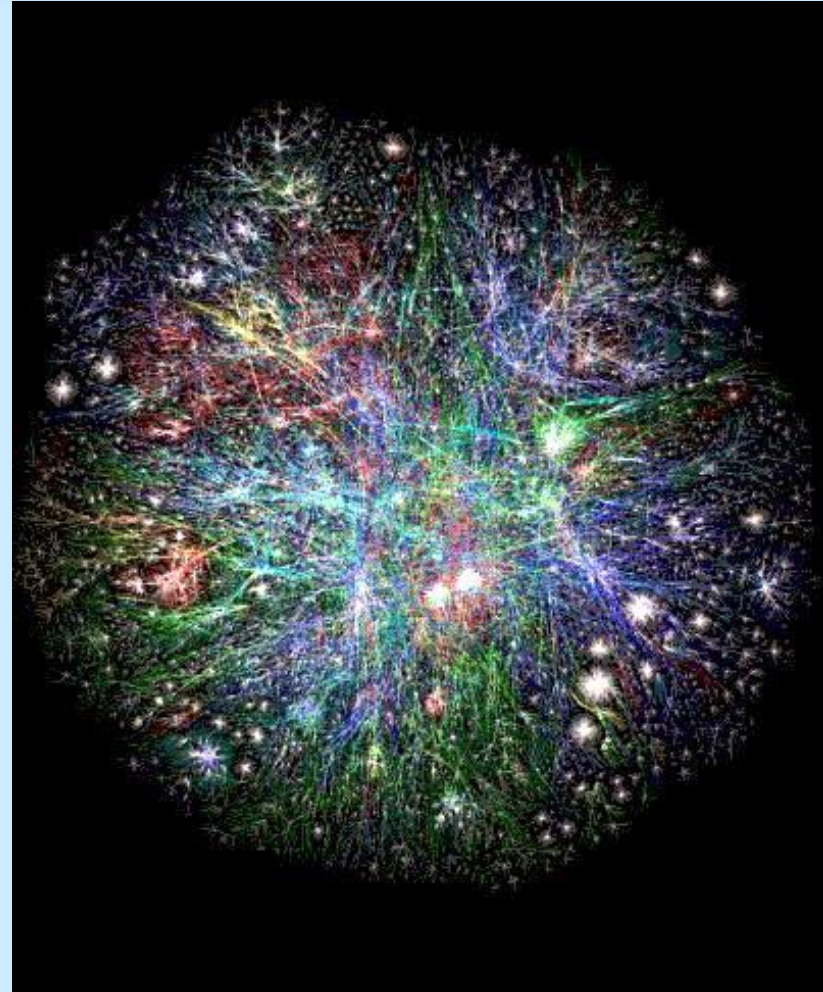
- Photos
- Recordings
- Movies
- Videos

- But still we lecture!



The World-Wide Web 1990

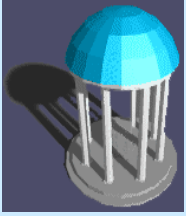
- Interactive request-delivery
- Incredible scope of knowledge
- Fast search
- Wikipedia
- Totally new means of information delivery
- But still we lecture!





Physics-College or High School

- How many of you had such a course?
- Of you, how many learned physics principally:
 - By studying the text?
 - By listening to the lecturer?
 - By wrestling with the problem sets?
- How many re-studied the text more carefully while wrestling with problems?



Assertion (after Dewey)

- Most of us learned most that we know well by
- What we *did*,
- not by
- What we *read or heard explained*.
- But still we lecture!



Paradox

- We learn chiefly by

Induction = “student centered”.
Give students examples, let
them discover general
principles.

Induction

But

- We teach chiefly by

Deduction = “teacher centered”.
Give students general
principles, which they then
apply to examples.

Deduction!



Including this dictum!

Including this whole talk!

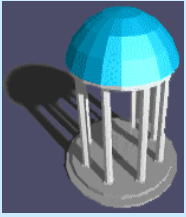


The Scarcest Commodity

- In education, the scarcest commodity, whose allocation causes the most heated debate, is not money, it is:

- **Student Time**

Not so sure... we've had many many budget cuts since 2015...



The Teacher's Job

is to

*Design Learning
Experiences*

not principally to
Dispense Information



So, Focus is on

- **LEARNING, not TEACHING**
STUDENT, not TEACHER
EXPERIENCE, not TEXT
SKILLS, not INFORMATION
DESIGN, not PREPARE



Donald Schön's Insight

- All professional education teaches the *skills* of the profession by *critiqued practice*.
- E.g., law, medicine, architecture, the ministry, art, music, social work, and indeed engineering.
 - *Educating the Reflective Practitioner* [1984]



How Does This Play Out?

- Assignments
- Flipped classroom
- Quizzes & Tests
- Student-designed lessons
- Project-based learning
- Learning new skills, resources
- Yes, some old-fashioned lectures



Projects

- **Costly in time**
- **Deep vs. broad?**
 - **Make the curriculum broad, the courses deep**
- **Collaborative?**
 - **2 is magical, 4 is also very good**

I think we are losing breadth today. E.g., many of our graduate students now take only courses very directly related to their research areas.

These are references to group size. I think the point is symmetric collaborative groups are better.



Architecture Course Project— Special-Purpose Computer

- Milestones with early deliverables:
 - Application description—**Precise**
 - Facts missing?—**Guess!**
 - **Better to be Wrong than Vague!**
 - Programming manual—End first month
- Intensive critique
- Complete project—End third(!) month
- Intensive critique
- **Do it over!**



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