Communication & Learning?

- Communication vs Mimetic Technology
- Communication technology is not unalloyed good
  - power
  - fascination and pleasure
  - deception

Communication

\[ \# \neq \# \]

Information \neq Knowledge

- Reflection vs Discourse …
Learning as Research Activity

• Learning by doing: Make your own
  • tools, to encapsulate knowledge (theorems)
    • Cabrera Physics
    • Tversky Psychology
  • models, to learn how to abstract, analyze
  • views, to learn how to communicate

• Research Environment = Learning Environment
  • research -- understand something known to few
  • study -- understand something known to many
  • experts and novices share “language,” -- different registers, dexterity
Scholarly Gestures

• Create and interpret models
  • algebraic, geometric
  • relational
  • numerical, statistical
  • logical

• Create and interpret narratives
  • text
  • cinema
  • music

• Annotate anything with anything

• Create and use functions
What’s Fundamental? What’s Artifact?

• Network is artifact. Latency becomes
  • object inertia
  • metric on places
• Multimedia is an artifact.
• Expressivity is fundamental.
Trends: “Computing Technology”

Monolithic, OS-bound apps ->
-> distributed tools
-> pure document

Transmit data ->
-> remote process
-> transmit objects
Trends: “Writing Technologies”

expressive

Video, film
Music, Theater
Mathematica
Natural (written) language

Diagrams, Drawings

Structure programming languages
Procedural programming languages

hard to write easy
Old Dualities

- Natural language narratives, analog art

17.2.11. Now define the continuous map $f_{\lambda} : M \to \mathbb{R}^n$ in the following way:

$$f_{\lambda}(x) = \begin{cases} f_3(x) & \text{for } x \in M_0 - M_1^0, \\ (1 - t)f_3(x) + tf_3(x) & \text{for } x = (b, t) \in B_1^0 \times [0, 1] = T, \\ f_1(x) & \text{for } x \in M_1^0 - T, \end{cases}$$

here $p$ is the projection on $T_0$, while $f_1 : (M_0^0 - T_1) \to T_1$ is the smooth $C_{n-1}$-operimetric map spanning $\hat{g}_1 : B_1^0 \to T_1$, $\hat{g}_1 = pf_3$, which exists according to the production hypothesis.

In the third poem (“My Life, My Life,” 1939) M. Farjeon sees her as like a unicorn consigns to a sublime parenteral” world, where we knew how pure she was! Did not in its own wood, so lose itself in looking for where she alone begot itself, the creature of the sea and the rest of the respective versions, responds...

```c
int main(int argc, char* argv[]) {
    #ifdef DEBUG
        syslog(LOG_WARNING, "mmddSession: created mmddResMgr and sessionMgr\n");
        fprintf(stderr, "mmddSession: created mmddResMgr and sessionMgr\n");
        fflush(stderr);
    #endif

    #ifdef DEBUGREAL
        {
            char *p;
            char **argPtr;
            register int i;
            FILE *fd;

            argPtr = argv;
            i = 0;
            while (i < argc)
                {
```
Performable Writing

+ Readable by human
+ Interpretable by computer

Example

Differential Equations - student projects:
Written narrative
Interpretable (math) functions
Structures amplify conversation
between teacher and student

This curve represents a family of solutions for the equation. Each solution is defined by \( z_0 \) and \( y_0 \), which together define the specific elevation, or value for \( z \). For example, if we choose \( z = 0.2 \) (or conversely, we choose values for \( z_0 \) and \( y_0 \) and get a \( z \)), we can slice the curve above at \( z = 0.2 \) to get the two-dimensional curve for that value.

```math
Plot3D[z, (x, 0.6), (y, 0.4), PlotRange -> {0, 2}, PlotPoints -> {1, ClipFill -> None}
```

lovely plots, but they don't seem to match your definition for \( z \); there must be typo

where the border of the plateau represents the two-dimensional curve for that value of \( z \). Looking at both of these graphs in a different way, we can use ContourPlot to represent the above curve from overhead:

```math
ContourPlot[z, (x, 0.6), (y, 0.4), Contours -> 40]
```
Performable Writing

Example: Quantum Mechanics Simulations
Combine symbolic with numeric functions
Combine mathematics with English narrative
Produce video in place
Problems

• **Modalities**
  • Sound, Music and Speech
  • Haptic
  • Embed computational artifacts into physical media

• **Representations**
  • Structured media: text, databases, scorefiles, Mathematica
  • Opaque media: human, realia, bitmap, digital video, aiff sound

• **New writing technologies (languages) for**
  • Action and interaction
  • Multi-modality
  • Performable literature