# COLLEGE READINESS CONSORTIUM: MAY 05, 2010

Learning Made Visible: Design as a Catalyst for Integrated Education





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# WHY AM I HERE?

### A CASE FOR REFLECTIVE PRACTICES

## **John Dewey,** The Experience And Education

- teaching and learning as "a continuous reconstruction of experiences"
- experiences are educative, produce sensitivity and responsiveness and provide challenges that are accessible and yet evoke reflection (challenge-based learning)

# Donald A. Schön, Educating The Reflective Practitioner

- learning occurs by devising new methods of reasoning, strategies of action, and ways of framing problems (problem setting skills)
- designers juggle variables, reconcile conflicting values, and maneuver around constraints—a process in which... there are no unique right answers
- **Designers** construct and impose a coherence of their own... a reflective conversation with the materials of a situation.

## A CASE FOR COLLABORATION

# **Lev Vygotsky**

"Play and its Role in the Mental Development of the Child," 1933

"Play is the source of development and creates the zone of proximal development. Action in the imaginative sphere, in an imaginary situation, the creation of voluntary intentions and the formation of real-life plans and volitional motives – all appear in play and make it the highest level of preschool development."

**Zone of Proximal Development:** "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers

## A CASE FOR INDETERMINACY

# **Jean Piaget**

Four major factors relevant to the development of cognitive reasoning abilities:

- <u>1. Maturation</u> students must be biologically mature and physically developed and therefore capable of operating physically in their environment.
- <u>2. Experience</u> students past concrete experience and the ability to recall these experiences are critical for further development. Piaget outlines two types of experience: *Physical Experience* (*drawn directly from objects*) and Logical-Mathematical Experience (*drawn by actions which affect objects*).
- <u>3. Social Communication</u> students must be capable of communicating information via written and oral language.
- <u>4. Equilibration</u> for cognitive growth, students must be supplied a situation of cognitive challenge where their existing mental operations are not adequate. The accommodative process (called equilibration) by which the student deals with this new information will result in cognitive growth.

### A CASE FOR PROJECT-BASED LEARNING

Loris Malaguzzi: Reggio-Emilia: The environment as the Third Teacher

If we believe that education should start from **real experience**, then the school should appropriate these experiences and make them the subject of **investigation**, **study**, **and application**. The school should start from concrete problems and situations so as to ensure more immediate and lasting interest and motivation... The complexity of the children's task never daunts them or paralyzes their work. Indeed, the greater the challenge, the more tenacious the children become, and **moments of serious concentration alternate with moments of playful exploration together**, all with the utmost enjoyment.

-Loris Malaguzzi

## **Progettazione**

Project based learning wherein the students plan and organize their work and projects based on discussions about their interests and then implement these projects in the real world. (example: *Scarpa e Metro* or Shoe and Meter)

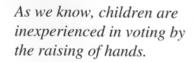
# Scarpa e Metro: The Invisibility of the Essential

Reggio-Emilia, Italy: 5 and 6-year-old children of the Diana School











The teacher repeats: «Who votes for the shoe?»
Tommaso and Daniela raise their hands.



«Who votes for the meter?» Alan, Marco, Pier Luigi, and Riccardo raise their hands.













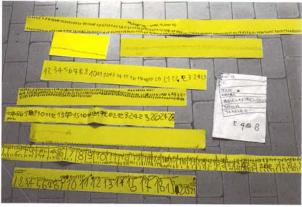








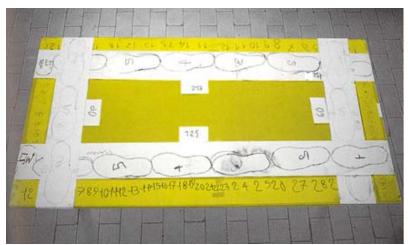
The teacher suggests that they line up all their measuring sticks on the floor...

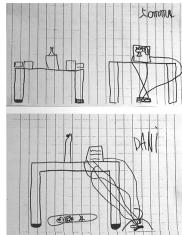


... to make the discrepancy clearer, hoping to catalyze a resolution of the problem.



In fact, we see that the resolution is near when Riccardo and Marco begin to shout:







# **Stuart Brown,** Founder of the National Institute for Play *Play: How it Shapes the Brain, Opens the Imagination and Invigorates the Soul,* 2009

"Play's process of capturing a pretend narrative and combining it with the reality of one's experience in a playful setting is, at least in childhood, how we develop our major personal understanding of how the world works. We do so initially by imagining possibilities—simulating what might be, and then testing this against what actually is."

**Mike Rose**, UCLA Graduate School of Education *The Mind at Work: Valuing the Intelligence of the American Worker*, 2004

"A related issue is the way we **classify work itself**... limiting categories reaffirm longstanding biases about particular occupations: The aesthetics of physical labor. **The choreography of hand, eye, ear, brain.** The everpresence of abstraction, planning, and problem solving in everyday work... Furthermore, there were no bridging mechanisms built between the vocational and academic realms to enable creative interaction, to foster cross-disciplinary discussion that could expand and enlighten, for example, the use of tools or the development of literacy."

**Howard Gardner,** Developmental Psychology, Harvard University *Multiple Intelligences: New Horizons*, 1993

"I believe that human cognitive competence is better described in terms of a set of abilities, talents, or mental skills, which I call **intelligences**... An intelligence entails the ability to **solve problems or fashion products that are of consequence** in a particular cultural setting or community. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal. The creation of a cultural product allows one to capture and transmit knowledge or to express one's conclusions, beliefs, or feelings."

# WHY DESIGN?

## 4 TYPES OF DESIGN-BASED LEARNING (From Meredith Davis, "Education by Design")

- 1. 2D-3D and Abstract form shapes, colors, texture, rhythm, balance
- 2. Professional or Disciplinary Model
- 3. Consumer Awareness analysis and assessment
- **4. Design-based Teaching and Learning:** uses design processes and design thinking to teach a range of subject matter (teaching through design)

"It is clear that, to solve the great challenges of the future, the United States needs creative workers and citizens who can overcome the limitations of traditional ways of solving problems, who can invent new strategies that are appropriate to a given situation, and who can adapt to change"

-Meredith Davis, PhD.







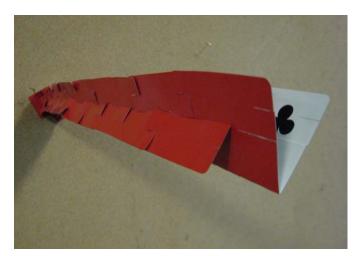


# THE POWER OF PLAY, SERIOUSLY









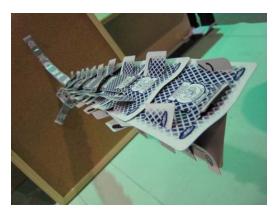




52 PIN-UP: 1 Deck of Cards + one stapler + 1 wall = 18 inch cantilever



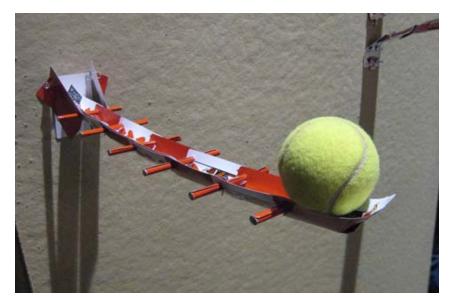












52 PIN-UP...Part 2: 1 Deck of Cards - stapler + 1 wall = 18 inch cantilever w/ tennis ball

PLAYSCAPES: Walker Art Center, Minneapolis
Raising Creative Kids, Family Programming, February 06, 2010
Role: Resident Artist and program developer (with A. Jarvi and K. Murray)







Marshmallows





Skewers







Structures made of toothpicks, gum drops, skewers and marshmallows relying on numerous skills and lessons: physics, mathematics, scale, collaboration, problem solving, representation, narrative structures, language development, etc.







PLAYSCAPES: Walker Art Center, Minneapolis
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# PARALLEL PLAY\_DESIGN IN EDUCATION

A8250: Graduate Seminar taught Spring Term 2008, University of Minnesota

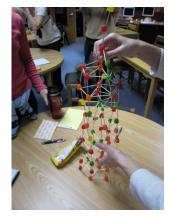
12 Students (11 Architecture + 1 Landscape Arch)

# Highlands Elementary School: Edina, MN

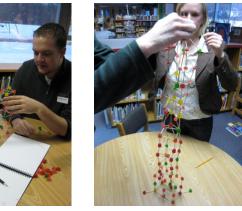


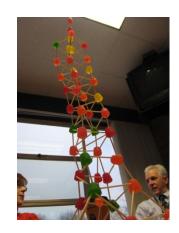












TEACHERS AS STUDENTS (OF DESIGN)

Groups of Three + Box of DOTS + Tooth picks – talking

Challenge: Build a tower as tall as possible in 20 minutes



# **GRADUATE STUDENTS AS TEACHERS OF DESIGN**













Highlands Elementary School: Edina, MN

## **EMBODIED MEASUREMENTS**





**Edina Teachers:** K. Oberle + L. Stageberg **Design Grad Student:** Carrie Ann Fathman

**Teacher Aids: 1-5** 

**Grade Levels:** Kindergarten **Number of Students:** 40

Developed over 3 days:3 hour per day

### **Objectives:**

Measurement: embodied and standard Cooperative Learning

Develop non verbal communication skills Basic math, quantification and numbering Concepts of scale, size, proportion, space

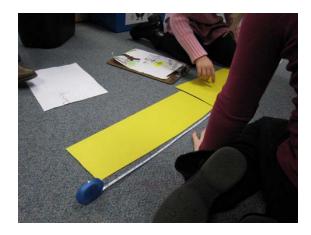






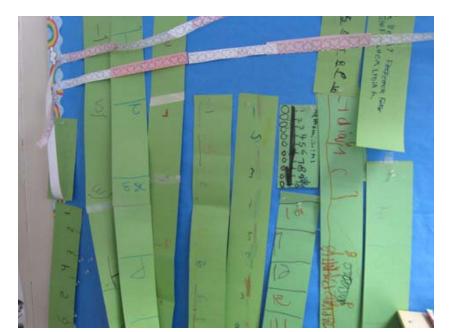


Project began by sorting and counting everyday objects to determine a baseline for measure











Each student then developed their own measuring device based on their own unit of measure and began to measure spaces and objects in their school



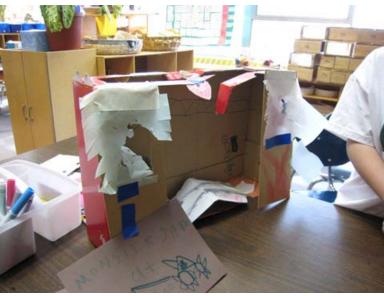


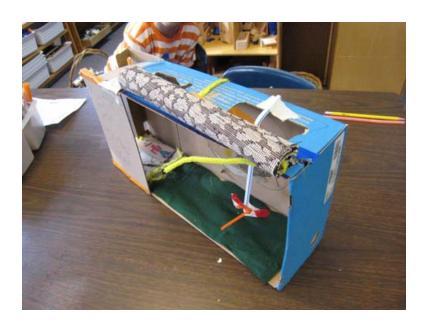




Students produced scaled models of puppet theaters based on their own stories and character development









Students produced scaled models of puppet theaters based on their own stories and character development







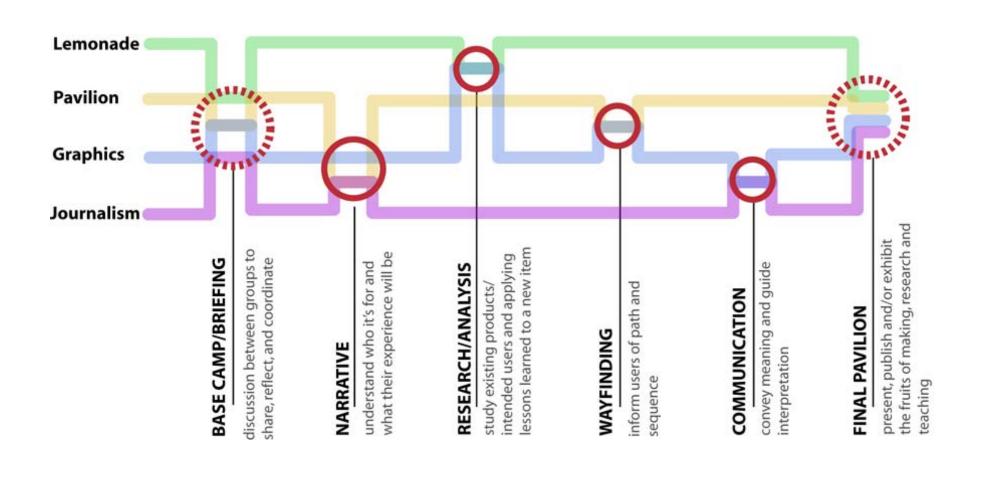




Puppet theaters were increased to full scale and constructed within the classroom



# DESIGN CAMP 2008: Horizontal and Vertical integration of Design Education





Wendy Friedmeyer, *Educational Programs Coordinator, Design Institute, University of Minnesota* 



Curriculum Workshop with Faculty

Highlands Elementary School, Edina, MN



40 Students (Ages 5-10 years)



Teachers Highlands Elementary School



Jamie Johansen, *Teacher / Facilitator Highlands Elementary School, Edina, MN* 



1. Lemonade: *Product Design*Scott Christensen, Designworks



2. Branding: *Graphic Design*Daniel Jasper, Associate Professor, Graphic Design, UMN



3. Journalism: *Narrative + Technology*Cheryl Wilgren Clyne,

Adjunct Professor of Art, UMN



4. Pavilion – Ground: *Architecture John Comazzi, Asst. Professor of Architecture* 



5. Pavilion – Sky: *Tensile Structure Bruce Wright, Editor, Fabric Architecture* 









Research + Analysis: Testing and evaluating existing recipes of Lemonade







**Taste Tests with other campers: Data sets and analysis** 

# Lemonade: *Product Design*









Design of unique lemonade flavors: *Bug and Chocolate* 









Design of unique lemonade flavors: Stinger and Straw

# 2 Lemonade Branding: *Graphic Design*







Analysis of existing graphics and branding strategies: Building narrative skills, empathy and non-verbal communication skills





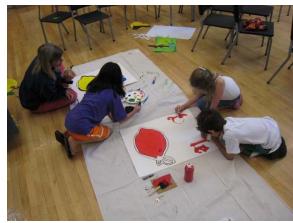




Development of graphic design and branding for final Lemonade flavors: required collaboration and communication with Lemonade group

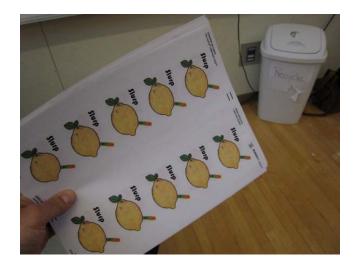
## Lemonade Branding: Graphic Design







**Design and implementation of branding templates** 









Graphic design identity coupled with each lemonade flavor: Slurp, Sizzle and Crawler

# 3 Journalism: *Narrative and Technology*













Students and teachers learn journalism and technology skills together

# Journalism: *Narrative and Technology*













Students and teachers learn journalism and technology skills together







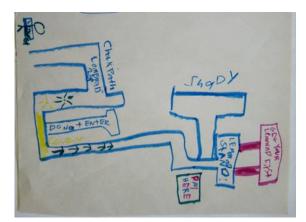


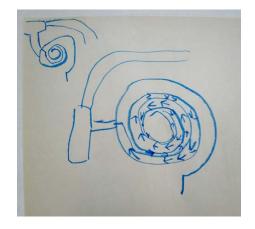
Began by representing ideas through diagrams, maps, plans and notation: non-verbal communication skills











Samples of Lemonade Pavilion diagrams: non-verbal communication skills







Translating Lemonade Pavilion diagrams into quick prototypes and studies for analysis and discussion













Converting Prototypes and scenario planning into three mock-ups for each lemonade stations

# 5

## Pavilion – Sky: *Tensile Structures*











Began by learning basic concepts of structures and physics: Tension, compression, balance, stability, statics, etc.















Translating initial models into larger prototypes and studies for testing, analysis and discussion

## Pavilion Teams: Bringing Together Ground and Sky













Translating mock-ups and studies into full-scale constructions based on models and prototypes























## **Design Camp 2007: SCHOOLING**

#### **INSTRUCTORS**

John Comazzi, Assistant Professor of Architecture, University of Minnesota Anselmo Canfora, Assistant Professor of Architecture, University of Virginia

#### **CAMP ORGANIZERS**

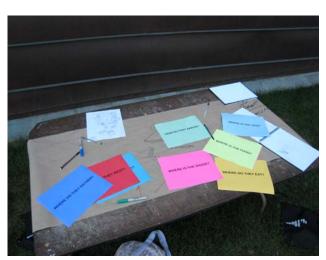
Jan Abrams, Director, Design Institute, University of Minnesota
Wendy Friedmeyer, Education Coordinator, Design Institute, University of Minnesota



material acquisition

scaffolding







DAY-01: ICE CREAM SOCIAL - 300 ICECREAM SANDWICHES IN 3.5 HOURS







fast, cheap and in control constructing a prototype pavilion in 3.5 hours

## ICE CREAM SOCIAL – 300 ICECREAM SANDWICHES IN 3.5 HOURS













DAY-02: PLAN – DO – REVIEW...



Reviewing and assessing the previous day's work







**RESEARCH & DEVELOPMENT** 















**DESIGNING** CUPCAKE









Assembling the pavilion for the preparation, display, distribution and consumption of 400 cupcakes









The social spaces of the cupcake pavilion in use by a panel of professionals and critics













BEING CUPCAKE

#### Learning Made Visible: Design as a Catalyst for Integrated Education

Ramp Up to Readiness: College Readiness Consortium, University of Minnesota (2 of 5 Readiness Skills)

#### Academic Readiness: knowledge and skills to do first year, credit-bearing, college-level work

- 1. Demonstrate mastery of the knowledge and skills required for college-level math, English and science
- 2. Analyze complex problems and scenarios and develop sound answers and solutions
- 3. Critically evaluate claims and hypotheses
- 4. Ask and investigate important questions about ideas, issues and the world
- 5. Evaluate and revise academic work to ensure accuracy and achieve precision

#### Personal and Social Readiness: maintain positive relationships with peers and adults

- 1. Set and continually monitor progress toward reaching important goals
- 2. Continually put the necessary time and effort into reaching important goals
- 3. Take responsible risks to advance toward achieving important goals
- 4. Accept, seek out and learn from honest feedback that helps improve progress toward important goals
- 5. Seek help from adults and peers and use other strategies to overcome obstacles on the road to achieving important goals
- 6. Manage time efficiently and effectively
- 7. Know how to form and work effectively in study groups that help the student master challenging academic material
- 8. Create and maintain positive relationships with teachers, professors and other adults in positions of authority

#### Learning Made Visible: Design as a Catalyst for Integrated Education

- 1. Transformations of meaning (objects, materials and actions) Vygotsky
- 2. Promotes active learning and reflective practices (Dewey, Schön, Montessori, Malaguzzi)
- 3. Develops Cooperative Learning / Teaching skills (David and Roger Johnson)
- 4. **Negotiating the Unknown -** Piaget: Equilibration
- 5. Connects learning to the everyday the real life consequences of decisions made (or not made)
- 6. Promotes process over product (although can address specific curricular outcomes)
- 7. Develops a comfort level with risk making designers fail faster and better
- 8. Design is disciplinary-specific yet cross-disciplinary in its practices requires collaboration
- 9. Although the process is often indeterminate, the outcomes are tangible, specific and accountable

