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Ready, set, play! Disrupting our preconceptions of classroom learning through innovative teaching practices.

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READY, SET, PLAY!
USING PHYSICAL AND DIGITAL PROTOTYPING TO TEACH COMPLEX SYSTEMS IN INTERACTIVE DESIGN

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IVLA Conference September 2017
DESIGN SCHOOL SHOULD BE A LOT MORE LOL AND OMG AND WTF, AND A LOT LESS OK AND NVM AND ABCDF.

MITCH GOLDSTEIN
ASSISTANT PROFESSOR, ROCHESTER INSTITUTE OF TECHNOLOGY

For our purposes, play is an attitude and an approach to making work. Both inside and outside of the classroom, there are many ways in which play can serve as a basis for serious problem-solving.
As educators, we choose to create a learning environment that provides enjoyment to the people who conduct activities within it. Play does not need to be frivolous — it encourages exploration, constructive and critical discourse, and provides a safe environment to fail.

Framing work within the context of “play” allows design students to go beyond their presumed constraints and learn complex systems associated with interactive design.
DESIGN PRACTICE HAS MOVED FROM A FOCUS ON THE FORM OF STATIC ARTIFACTS TO A CONCERN FOR THE STRUCTURE OF DYNAMIC SYSTEMS: FROM A FOCUS ON THINGS WE CAN SEE AND TOUCH TO A CONCERN FOR EXPERIENCES THAT UNFOLD OVER TIME AND SPACE.

HUGH DUBBERLY
FOUNDER, DUBBERLY DESIGN OFFICE

Visual Literacy standards 5 + 6 are emphasized to teach complex concepts associated with interactive design systems. Students engage in a dynamic process of “making” through physical and digital prototyping in order to better understand systems thinking associated with the interactive design discipline.

This presentation features undergraduate design curriculum which requires students to move seamlessly between physical and digital constructs. Student works integrate motion, game, algorithmic and computational design.
Systems are abstract so here’s the approach I use for teaching systems thinking. Assignments begin with concrete methods and materials, so that the content I’m introducing is relatable for the students. This builds their confidence in the things they are creating.

Through practice, iteration and providing the students with a safe space to “fail”, I am able to move them towards more complex ideas associated with interactive design. Play is a vital component to inspire curiosity and creativity in the design classroom.
Students choose 15 seconds of instrumental music, analyze it, then design a score that visually represents three key sounds or beats in the music's structure, tone and dynamics.

Within the time constraint of an hour, students exploring the gestural qualities of their chosen musical segment. They make as many expressive sketches as possible using unconventional materials such as pipe cleaners, cut paper, paint, and popsicle sticks.
These gestural artifacts serve as the inspiration and primary sketches for their musical diagrams.
Students then need to simplify their expressive scores to only using three simple shapes, using only circles, squares and triangles, mapped to a timeline for their music.
Their sketches notation is then translated into more polished graphical scores for their music. The students’ graphic scores must be accurate in terms of representation of shape to sound.
Yerri Portillo
Dustust "Birth"
Raine Ferrin
Wintergatan "Marble Machine"
Assignment: Pattern Algorithm

Students create a pattern inspired by formal elements from a random object. Students engage in a rapid-sketching process, and develop three graphical marks that are used to create multi-layered patterns.

Algorithms are used to define each graphics’ behaviors in the making of each pattern: such as scale, color, opacity, position, rotation, frequency and repetition.

In the next project, students create a pattern that is inspired by formal elements from a random object. Students engage in a rapid sketching process, and develop three graphic marks that are used for creating a multi-layered patterns.

Algorithms are used to define each graphic’s behaviors in the making of each pattern, such as scale, opacity, position, rotation, frequency and repetition.
The project starts with students choosing a collection of random objects that I supply, and then they interpret the object visually through three specified approaches: Blind line drawing, wire sculpture, and cut paper.
Within the time constraint of an hour, students are asked to make as many sketches using these three approaches.
The blind line, cut paper and wire interpretations are translated as refined graphical marks. These marks are imported into Nodebox, and are used to create a multi-layered pattern through the creation of an algorithm.
Nodebox enables students to define the behaviors used in the making of a pattern; students assign a numerical value to each “node” that governs an icon’s scale, color, opacity, position, rotation, frequency and repetition. The pattern’s design immediately responds to any changes or adjustments made to each node’s value.

Using automation in the making of a visual artifact enables students to create complex patterns that would normally take hours to compose through an analog process.
Each student was required to make three unique patterns using the same three icons.

This assignment teaches fundamentals of creating and implementing a system. It is also a primer for creating visual systems through computation.
Starting students with a “concrete” approach created confidence around making; this enabled students to connect their work to a more abstract process of making later.

Additionally, starting with “random” objects provides the students with a basis for the graphical iconography, rather than trying to design something out of nothing.

Students didn’t immediately embrace the use of Nodebox; but after about an hour the students were using the software fairly efficiently and able to start sketching through playing with the “Nodes.”

Introducing the assignment through the use of hands-on “making” of artifacts eased students’ concerns/fears around the idea of using algorithmic design.
This project is inspired by the short documentary film “Caine’s Arcade,” a documentary about a 9-year-old boy who spent his summer vacation building an elaborate cardboard arcade inside his dad’s used auto parts store.
SERIOUS **PLAY** IS NOT AN OXYMORON; IT IS THE ESSENCE OF INNOVATION.

MICHAEL SCHRAGE
RESEARCH FELLOW, MIT CENTER FOR DIGITAL BUSINESS

The film went viral, and as a result, it “became a movement to foster creativity worldwide.” Elementary schools from all over the world participated in the global cardboard challenge, a movement that encouraged students “build something awesome out of cardboard, recycled materials, and imagination.”

I wanted to bring the spirit of the global cardboard challenge into the design classroom.
Part one of this assignment involves the conceptual development, planning, design and physical construction for a lo-fi mechanical cardboard arcade game that is designed for a specific user. Students then translate their mechanical design to a mobile platform for the same user.

Part two requires students to translate their mechanical design to a mobile platform, again designed for that same user. Students work in teams of two or three, design and prototype a cardboard arcade game.
**User Persona: Eddie**

An energetic 5-year-old boy with a short attention span and inability to focus for long periods of time. He cannot read yet but can identify colors, letters and numbers. He is very physically active.

Each team is provided with a user persona, each persona has a unique constraint.

A user persona is usually based on real people or sets of people — and provides context around the problem the students are designing for.

User scenarios are important for framing the problem, and help define the goal(s) and objectives of the game based on their end user’s needs and constraints.
The sketching process starts with smaller, raw prototypes to map the game's scale, mechanics and functionality, including unique considerations needed for their end user.
Physical prototyping with lo-fi materials provides a “safe space” for students to experiment in a medium they are comfortable working with.
Teams work loosely, creating small prototypical mock-ups. This enables them to test various functions of their game's mechanics.

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Final game constructions must embody craftsmanship in the design, regardless of the project's lo-fi, “raw materials” approach. There are no specific requirements for the game's physical scale, but its proportions and affordances are tested for ease of use.
A scheduled “game day” encourages students, faculty and staff to test the students arcade prototypes. This provides the students with the opportunity to test out their games with real people, enabling them to put their ideas into a human context, and observe how users interact with their prototype.
The goal is to identify situations they might not have considered, or have their rules set execute in unexpected ways. This process identifies gaps in their product, system and assumptions.
User testing revealed successes and failures in the students game constructs and rule sets. Participants quickly “broke” games that had poor mechanics, complex point systems, or confusing rules.

The student designers were originally frustrated by the user testing process, particularly when their games didn’t function as planned, or game rules were misinterpreted by players.

They eventually learned to respect these failures as providing a new consciousness to their work… and value the unexpected and spontaneous outcomes from user testing.
The user testing and feedback from Phase One informed the conceptual development of Phase Two, where students are required to re-imagine and redesign their games for a mobile device.
Students must also factor additional aspects of game play in the digital interface that were not part of the cardboard construction — things such as quit, pause, resume, and the ability for the user to go back to start. They can also incorporate things that couldn’t exist in the cardboard games — such as power-ups, easter eggs, etc.
Students storyboard all the possibilities that a user might encounter through a single round of game play. We call this the “brown paper” phase.
Students use tool called Prototyping on paper (POP) that allows them to turn their brown paper sketches (through photographing the screens) into non-linear, clickable prototypes.

Students then swap their smartphones to test each other’s paper interfaces. They revise their storyboards to include any necessary considerations learned from user testing.
Once they are confident that their brown-paper storyboards have all the necessary components for intuitive use, these are refined into a more polished game schematic...
Like this. This is an example of wireframe schematic showing a single round of gameplay. At this phase, all the functional components of the game should be worked out from the paper prototypes.
The student's digital games are presented as click through prototypes. This provides a plausible scenario for showing a potentially functional system.
This assignment teaches students how to test and design interactions through non-linear sequencing and transitions. Prototyping and simulation creates an environment for exploration and learning. It allows designers to move beyond speculation, expected constraints, and enables methods for safely testing the boundaries of their system.
The drawing tools should engage users in a dynamic sketching process, and be fun and intuitive to use.
This project is a lego-constructed etch-a-sketch, built from an analog construct combined with programming. The contraption holds a stylus that, through a series of cranks and tracks, limits the user to drawing horizontally or vertically on a tablet running a Processing app.
Participant's were specifically asked to draw an organic object using the tool—in this example, a heart. There were several interesting results based on the tool's strict horizontal and vertical constraints.
This student created “audio artifacts” from the volume and dynamics of a participants voice. The author asked users to speak their name, and his algorithm generated shapes that change in scale, color, and quantity based on the frequency and volume of the sound.
Here is an example of how it works. <link> <Length: 00:11:00>
These are some of the unique visualizations, or “audio artifacts” of each person’s spoken name.
THE ROLE OF THE **TEACHER** IS TO **CREATE CONDITIONS FOR INVENTION** RATHER THAN PROVIDE READY-MADE KNOWLEDGE.

SEYMOUR PAPERT
PIONEER OF ARTIFICIAL INTELLIGENCE

Play later in the design process provides methods to safely explore and challenge implementations. It provides a platform where work can be evaluated constructively and pushed beyond its presumed constraints.

Play through user testing teaches students to consider the end user in their design. This fosters empathy, helping students to value and understand their audience's needs.

A classroom that facilitates play becomes a laboratory for experimentation. Play is a powerful form of experiential learning, and engages students in reflective practice. Play challenges students to create informed work, while engaging them to seek meaningful and novel design solutions.

Thank you.
THANK YOU

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