MakerWeb Consortium: A Unique Approach to MakerSpaces
Who We Are

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The MakerWeb

• Makerspace in a Liberal Arts Context
• A Model for Peer Institutions
• Collaboration between ITS, Library, Faculty and Administration
About Union

• Founded in 1795
• Historic and Innovative
• Small, residential, independent liberal arts college with engineering
• Science curriculum: 1824; Engineering curriculum: 1845
• Located on 100 acres in downtown Schenectady, NY
• 2,200 full-time undergraduates from 37 states and territories and 29 countries
• 47% women and 53% men (overall)
• 10:1 student-faculty ratio
• 206 faculty members
Learning Commons
Collaborative Space with Computers and fixed furniture
Quietly collaborate
Science and Engineering Faculty Engagement
Bringing a Makerspace to Union (or trying)
What *is* a Makerspace?
MakerSpaces at Bigger Schools
A Makerspace with No Space?

A liberal arts college is a makerspace, it’s just distributed.

- sewing costumes (theater)
- welding steel (studio arts)
- green screen recording (modern languages)
- coffee roasting with popcorn machines (ECE)
- 3D printing robots (CS)
- flying drones (ME)
Where to Start: A Foot in the Door
NSF-MRI enabled projects

Dragonly Helmets

Soft Robots

Moss Canopies
STEM Projects
non-STEM Projects
Growing the Design Studio
Challenges (of too much success)

- Time
- Scaling
- Organization
- Space
Passing the Torch

**MakerWeb Coordinator Position Created**

2 yr position to coordinate the activities of many “maker” spaces on campus
Repurposed a position from another area of Academic Affairs
Placed position in ITS Learning Technologies & Environments group
Bring together faculty and students interested in making
Document projects
Provide training on equipment
Idea generation
MakerWeb Goals:

- Shared libraries.
- Collaboration across Disciplines
- Streamlining safety and maintenance tasks, to (hopefully) be used across nodes or labs.
MakerWeb

Shared Libraries
• Thingiverse
• Instructables
• Github

All shared with peer organizations starting with NY6
MakerWeb

Collaboration across disciplines:
• All resources are maintained by the MakerWeb, no single department has priority access.
• Equipment is positioned in different departments encouraging students and faculty to go to other departments.
Additional Events like coffee hours in the Idea Lab and Demo Nights are designed to create low barrier, low risk social opportunities for students across disciplines.
Safety across facilities is a particularly challenging issue ultimately regulated by facility managers, but training is shared to any interested community members. Our hope is that access to proper training will make equipment less intimidating and lower barriers to entry.
Examples of Maker Projects

3D Shapes with Mathematica
Surveillance blinding
Hello Barbie
Storytelling with Interactive Electronics
3D Shapes with Mathematica

Math students designed 3D shapes using Mathematica and we 3D printed them.
Surveillance Blinding
(Jess Sanford, CS Thesis)
Hello Barbie
(gender studies, CS, soc-anth, etc)
Storytelling with Interactive Electronics
(English Lit)
MakerWeb Nodes
(so far)

• Union Collaborative Design Studio (UCDS)
• Idea Lab
• ECE Discovery Lab (coming soon!)
Node: Union Collaborative Design Studio

6 Makerbots
1 Stratasys Connex Resin Printer and Waterblasting Equipment.

Members of the Union Community come to this studio when they need something 3D printed. Sometimes they need help designing files, which we help them with, sometimes they have files already made, and we just print them.
Makerbots

We use PLA (polylactic acid) to print
Sizes range from 3.9 L X 3.9 W X 4.9 H IN to 11.8 L X 12.0 W X 18.0 H IN
“PolyJet” Resin Materials include transparent, rubber-like, rigid opaque, digital ABS, biocompatible...

Build capacity 10.0” x 9.9” x 7.9” in.
Node: Idea Lab

Funded by (internal) Strategic Plan Implementation Grant ($42,000)

- 1,376 sq feet in the ground floor of the Library
- 3 group study rooms and an open area
- Flexible furniture, Idea Paint,
Cell Division

What are the phases of mitosis and meiosis?

Interphase - chromosomes composed of two sister chromatids and centromeres are not visible
Spherical snowball w/ an outer layer melts - volume decreases
Rate 2 cm³/min. How fast does the radius change when diameter of Snowball = 10 cm?

A 20 ft ladder leans against a wall. Bottom of ladder moves @ rate of 4 ft/sec.

f(x) = 3x³ + 2x² - 5x² - 2 @ x=1
f'(x) = 2x³ + 2x - 5x
f'(1) = 2(1)³ + 2(1) - 5(1) = -1
f'(1) = -1

15 ft high? At what rate is the depth of the liquid changing when liquid is at 10 cm.
Synergies

On Campus:
• Maker Club
• Maker House

Off Campus
• VentureWell University Innovation Fellows
• Higher Ed Maker Summit
• MakeSchools.org
• Tech Valley Center of Gravity
Funding the MakerWeb (after several attempts)

Andrew W Mellon Foundation “Our Shared Humanities”
Our Shared Humanities

The grant will support the promotion of Union’s Maker Community through:

• stipends to faculty to develop curricular tie-ins
• Maker Speakers
• Maker Faires
• participation in off-campus maker activities (like CNI)
Next Steps:

● Developing new Nodes of the MakerWeb
  ○ requires buy-in
  ○ example nodes:
    ■ Fiber Arts (theater)
    ■ Wood Shop (theater)
    ■ Metal Shop (engineering)
● Tool Lending Library!
● Acquire more equipment
  ○ Laser Cutter via Faculty Teaching Grant
● Acquire more space
Closing Thoughts
Contact Information

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Lots of Questions!