# THE MAKERSPACE REVOLUTION

STEM Learning, Engineering, and Building a Makerspace

Tom Hammond

The University of Akron Wayne College
tomhammond@uakron.edu

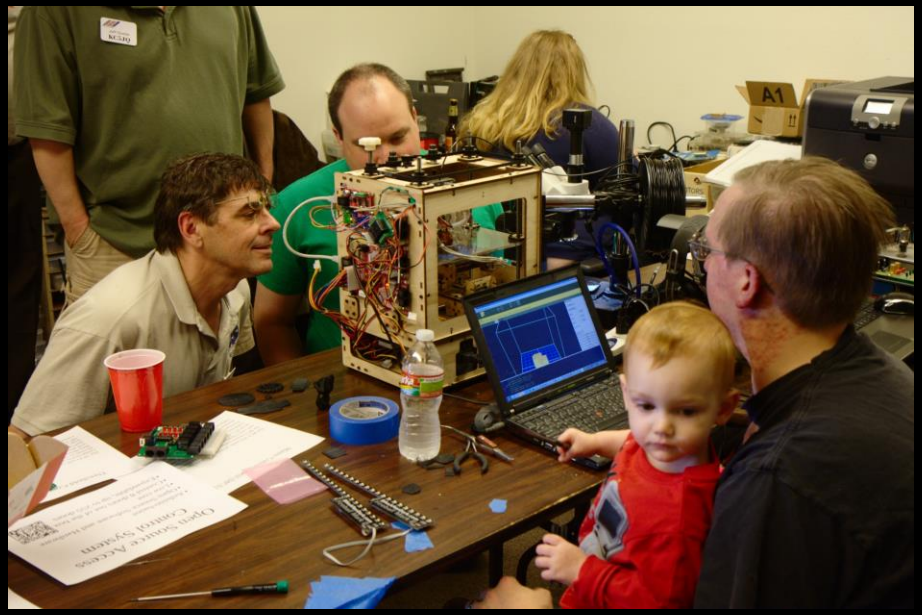
May 27, 2015

PowerPoint at: blogs.uakron.edu/waynec3

# TOPICS

- What is a Makerspace?
- Funding
- Room Design
- Operations and Staffing
- Communication
- Curriculum Integration
- Community Outreach
- Feedback
- Q & A

# WHAT IS A MAKERSPACE?



# WHAT IS A MAKERSPACE?

**DEFINITION**

- DIY spaces where people gather to create, invent, and learn
- Contain 3D printers, laser engravers, CNC routers, electronics, software, craft, supplies, and tools
- Suitable for many disciplines, but especially engineering, computer technology, science, and art
- Patrons meet, socialize, and collaborate

# FUNDING

# FUNDING

## GRANT SOURCES

- Local foundations & trusts, utility companies, large & small companies/agencies
- National competitive grants
  - American Honda Foundation, National Science Foundation, NEA Foundation, U.S. Dept. of Defense
- Non-published grants
  - Bill & Melinda Gates Foundation
- Work with internal offices & departments

# FUNDING

- **Contact local businesses for consumables**
  - Plastic filament, wood, acrylic, supplies
- **Start an endowment**
- **Use a mailing list**
  - Word gets around!
- **Acknowledge gifts with dedication plaques**
- **Invite donors back to realize progress**

# ROOM DESIGN

# ROOM DESIGN

**PLANNING**

- Makerspace Playbook (http://goo.gl/to3BGd)
- Visit area makerspaces
- Dedicated room or library

**ATMOSPHERE**

- “Techie” look
- Hang-out area for homework, socializing, projects
- Meeting place for clubs

# ROOM DESIGN

**CONTENTS**

- Computers for workshops/lessons/classes
- Webcams to broadcast activity
- Display cases & windows (glass door, too)
- Empty tables for projects
- Whiteboards
- “Idea Box” for unfinished or donated objects

# OPERATIONS & STAFFING

# OPERATIONS & STAFFING

**OPERATIONS**

- Maintenance schedules
- Service plans
- Policies and procedures
  - Who can use the space and for which activities?
  - What can cause revocation?
- Equipment use queues

# OPERATIONS & STAFFING

**STAFF**

- Staff for all hours of operation
- Likes challenges / learning new things
- Knows CAD design, teach lessons, tutor
- Equipment use/maintenance
- Student staff relatable to other students

**DIRECTOR**

- Community contact, grants, purchasing, staffing, documentation, project management

# OPERATIONS & STAFFING

**SAFETY**

- “Hold harmless” waiver
- Label/summarize all equipment
- Usage guides, tutorial videos, warning posters
- Written and demonstrative tests
- Ability badges
- Posted MSDS for harmful chemicals
- Safety plans

# COMMUNICATION

# COMMUNICATION

**WEEKLY BLOG** blogs.uakron.edu/waynec3

- Build mailing list for <u>everyone</u> expressing interest
- Continually take pictures; write about them

**WEBSITE** engineering.case.edu/thinkbox

- List makerspace mission, equipment, tutorials, donor recognition, community involvement, marketing materials, projects

**INVOLVE LOCAL NEWSPAPERS**

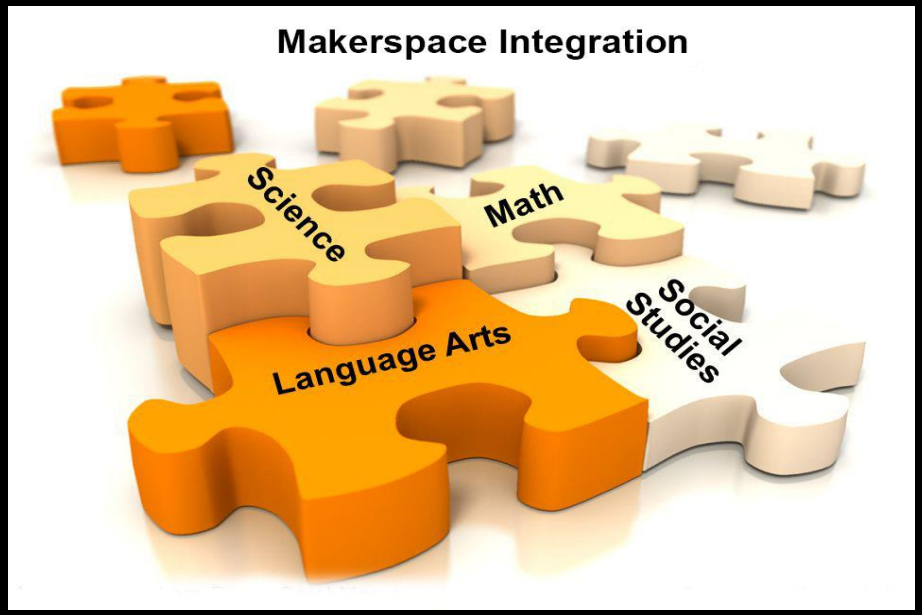
- Include reporters in mailing list blog

# COMMUNICATION

## MARKETING DEPARTMENT

- Gets the word out through campus publications (electronic & printed), e-mail blasts, etc.
- Promotional posters
- “On the road” presentations
  - Portable 3D printer
  - Tablecloth with logo
  - Stand-up banner
  - Custom-made handouts (3D printed, engraved, include logo)

# CURRICULUM INTEGRATION



# CURRICULUM INTEGRATION

**INTENDED CURRICULM (ENGINEERING)**

- Model rockets (Statics and Dynamics), Robotics & Structural Studies (Tools for Engineering)

**CROSS-CURRICULAR**

- Multiple disciplines and pedagogies
  - Contact department heads and individual teachers
  - Integrate into subject content
- Students helping students
  - Engineering students helping business majors

# CURRICULUM INTEGRATION

**CROSS-INSTITUTION**

- Shared projects with other schools
  - Model rocket high schools with college engineers
  - 3D printed parts for Rube Goldberg machines

**INTERNSHIPS**

- Invite companies to makerspace, offer lessons/services to employees
- Creates business relationships with students

# COMMUNITY OUTREACH

# COMMUNITY OUTREACH

## OPEN ACCESS

- Students, staff, community use at no/low cost
- Educational/personal/business projects

## FREE SERVICES

- Fix things around college, personal requests, ADA requests, business/community requests
- Lab staff and students gain experience

# COMMUNITY OUTREACH

## SHOW ON THE ROAD

- Portable printer for offsite demonstrations
  - Schools, Kiwanis, Lion's Club, business/trade mixers, Chamber of Commerce meetings

## FREE LESSONS

- Cerco and Northwestern CAD training
- Community kids CAD & 3D lessons, summer camp
- Invite 4-H, Boys/Girls clubs, YMCA, libraries
- Host a Maker Faire

# FEEDBACK

# FEEDBACK

**TRACKING**

- Patron sign-in
  - Number of weekly/monthly visitors helps funding

**PATRON SURVEY**

- Feedback marker boards on walls
  - What was the most/least fun or most frustrating?
  - What would you change/add to the makerspace?

**COMMUNITY FEEDBACK**

- Cold-call business & schools to discover needs

# Q&A

# THE MAKERSPACE REVOLUTION

STEM Learning, Engineering, and Building a Makerspace

Tom Hammond

The University of Akron Wayne College
tomhammond@uakron.edu

May 27, 2015

blogs.uakron.edu/waynec3