Managing Diverse Teams

Invention Education
Webinar Series

Thursday, February 8, 2018
6:30 – 7:00 p.m. ET
Lemelson-MIT Program Overview

- 15 years of experience
- 228 high school teams
- 7 U.S. patents

National Awards
- Lemelson-MIT Prize
- Lemelson-MIT Student Prize
- EurekaFest

Invention Education
- JV InvenTeams
- InvenTeams

Celebrating invention, inspiring youth
Presenters: Bob Richards

- Business, Marketing, and Technology Teacher at Stockbridge High School, MI
  - 16 years of teaching experience
  - Robotics instructor of Stockbridge Advanced Underwater Robotics Team
  - President of Stockbridge Education Association
  - 20 years of experience serving in the Army

Invention Education Experience

- Lemelson-MIT InvenTeam (2016)

Underwater sensing and reporting system of lamprey larvae in the Great Lakes
ENTRY POINTS through knowledge, skills & interests

STEM
STEAM
Arts
Humanities
Robotics
Coding
Participatory Youth Action Research
Career & Tech Ed
Fab Labs
Maker Spaces
Entrepreneurship

Invention Cycle

Find & Define Problems

Prototype a solution with user input

Build & Test

Design

Inquire & Research

Teamwork

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Invention Teams

• Inventing and other STEM projects are “team sports.”

• A well-functioning team helps ensure the success of projects.

However, not all teams are well-functioning.

• Problems on teams lead to
  ✓ Absence of trust
  ✓ Lack of commitment
  ✓ Avoidance of accountability
  ✓ Inattention to results
  ✓ Conflict
  ✓ Loss of membership

Remember, inventing is just plain fun!

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Elements of a well-functioning team

• Common Goals
  • align goals within the team and individuals (e.g., agreeing on invention problems and solutions)

• Defined team roles and responsibilities through team building
  • understand what is needed to accomplish the invention
  • identify the strengths of each member
  • know the roles and responsibilities of each individual within the team

• Effective communication
  • create “footprinting”—building a collection of notebooks, documents, data, videos, pictures, and sound recordings that will serve as a record of your team’s work
Team Building Activity: Balloon Tower Challenge

Small teams build the tallest, free-standing tower using balloons and some sticky tape within a set time.
Four Corners

• Tinkerer
  • I like to take things apart and build things

• Talker
  • I like to talk to people and I enjoy public speaking

• Organizer
  • I like to organize people and things

• Doodler
  • I like to draw things and express my thoughts through drawing
Building the Stockbridge InvenTeam

• Recruit team members who are used to working together (attending the same class or activities, etc.)

• Allow flexibility for students with diverse expertise to participate
  • Students can participate as a club or an elective class

• Team building activities
  • SCUBA training
  • Running the class as a team/business
Managing the Stockbridge InvenTeam

• Specify roles and divide labor. Identify milestones.
• Menlo Board to track multiple projects and sub-tasks. Identify a responsible individual (RI)
• Periodic design reviews (formal and informal, even for smaller subtasks and fundraising)
• Brief and debrief each day
  • Brief: What are we planning to do? Who is responsible? How do we measure success?
  • Debrief: What went well? What do we need to improve upon? What needs to be accomplished before tomorrow (homework)?
Managing the Stockbridge InvenTeam

Critique without destroying motivation

Sandwich Feedback Technique

Praise
Criticism
Praise
Managing the Stockbridge InvenTeam

• Comparing competing ideas or concepts using
  • Rapid prototyping
  • Cardboard and PVC models
  • 3D Printed Prototypes
Portable Bicycle-powered Emergency Water Filtration Station at the 3rd White House Science Fair
Northeast High School
InvenTeam 2012 (Oakland Park, FL)

The student leader called a hiatus to address team strife before moving forward into the last technical push to build. The hiatus included a picnic at a local park!
Lemelson-MIT Resources

- Lemelson-MIT Program
  http://lemelson.mit.edu/

- InvenTeams National Grants Initiative
  http://lemelson.mit.edu/inventeams

- JV InvenTeams Curriculum Materials
  http://lemelson.mit.edu/jv-inventeams

- Inventor Archive
  http://lemelson.mit.edu/search-inventors
Other Resources for Developing Teams

• Some STEM programs with PBL are investigating the use of business practices that involve effective teamwork and communication
  – Six Sigma
  – Lean Product Development

• Teaching Teamwork from MIT’s Teaching+Learning Lab

• Team Process 2017: Following Silver video from MIT’s 2.009 senior Mech E capstone class – a large, team-based design class; a former Natick High School InvenTeam member was the Silver team’s leader

• Thanks for the Feedback by Douglas Stone & Sheila Heen
Other Resources

- **Teamwork during invention (suggestions from Inventions Unlimited Inc.)**

- **What Google Learned From Its Quest to Build the Perfect Team** (an article from the New York Times about building teams)

- Stockbridge InvenTeam on Facebook: [https://www.facebook.com/StockbridgeInvenTeam/](https://www.facebook.com/StockbridgeInvenTeam/)
THANK YOU!
Contact Us at PD-lemelson@mit.edu

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