Hands-On Workshops in a Virtual World

Dr. Karen Wosczyna-Birch, Executive Director & Principal Investigator, COT-RCNGM
John Birch, Executive Director, Engineering Technology Challenge
Eric Flynn, Department Chair, Engineering & Applied Technologies, Gateway Community College
Wendy Robicheau, Program Manager, COT-RCNGM
# College of Technology (COT) Overview

## Creation
- Legislatively created in 1995
- Merger of Technical Colleges with Community Colleges
- Established by Higher Education Council

## Purpose
- Seamless pathways between community colleges & universities & technical high schools
- Articulation agreements for engineering and technology programs
- Respond to workforce needs through community college programs
- Umbrella for the Statewide Manufacturing Programs: Certificates, A.S. Degrees and career Pathways
- Offers multiple entry and exit points for students to meet educational and career needs

## Leadership
- Governed by a Statewide Site Coordinator’s Council
  - Community Colleges
  - State & Private Universities
  - High Schools
  - Non-Profits
  - Business & Industry
  - Consultants
COT – Higher Education Partners

Legend

Community Colleges (12)
- ACC Asnuntuck CC
- CCC Capital CC
- GCC Gateway CC
- HCC Housatonic CC
- MCC Manchester CC
- MXCC Middlesex CC
- NCC Norwalk CC
- NVCC Naugatuck Valley CC
- NWCC Northwestern CT CC
- TRCC Three Rivers CC
- TXCC Tunxis CC
- QVCC Quinebaug Valley CC

Universities (10)
- UCONN University of Connecticut
- CCSU Central Connecticut University
- COSC Charter Oak State College (online)
- FU Fairfield University
- UH University of Hartford
- SCSU Southern CT State University
- ECSU Eastern CT State University
- SHU Sacred Heart University
- UNH University of New Haven
College of Technology – Pathways & Articulation

All CCs have the same core curriculum for each pathway

- **Engineering Science A.S. Degree**
  - First two years of Engineering w/ min. goal of B.S.
  - Junior level transfer to 4-year partner universities
  - Problem-based and theoretical learning
  - Calculus-Based Curriculum

- **Advanced Manufacturing Workforce**
  - Prepares students for immediate jobs
  - Stackable Credentials
  - Hands-on, PBL; Internships, Apprenticeships & Industry Scholarships

- **Technology Studies Certs & A.S. Degree**
  - Earn College Credits while in High School
  - Over 20 Industry-driven options, credit certs, & curriculum
  - A.S. seamless pathway to 4-yr. universities at JR level

All 12 CT community colleges have the same core curriculum for each pathway
Center for Next Generation Manufacturing

- 2021– Funding to become the National Center for Next Generation Manufacturing
- Only NSF ATE Center for manufacturing
- Targets Underserved & Underrepresented Populations
- Provides Degrees & Credentials for Workforce Readiness
- Recognized infrastructure of COT as a national model
- Received an international supplements for international collaboration with Germany (2012) & France (2019)
- COT named HI TEC Innovative Program of the Year (2020)
- Recognized three times in 2013 MIT study commissioned by the National Academy of Sciences for best practices and as a national model for Technology Education
- Cited as a Key Resource in CT Business & Industry Association’s 2020 Connecticut Manufacturing Report
Student Programs (In-Person)

• **Purpose:** Incorporate technology and professional skills into a team-based extracurricular program
• **Professional Skills:** Teambuilding using Behavioral Diversity (DISC); Emotional Quotient (EQ); Dealing with Difficult People; Strategic Management Process; Time Management; Goal Setting; Advanced Memory Techniques

• **Mechanical & Manufacturing Engineering Technologies Program (MET\(^2\))** - Engage community college and university students in team-based learning environment and industry projects
  • Technical Skills: 3D Modeling (SolidWorks); 3D Printing; Virtual/Augmented Reality
  • Held during Winter Intersession through May annually
  • 2020 Program had 20 student participants

• **Engineering Technology Challenge (ETC)** – Engage high school students in team-based learning environment
  • Technical Skills: Programming/Coding Drones
  • Held over 5 Saturdays
  • Fall 2019 Program had 25 participants
Student Programs

How did we transfer the MET$^2$ Program from Photo 1 to Photo 2?

Photo 1

Photo 2
Mechanical & Manufacturing Engineering Technologies Program (MET²) - Engage community college and university students in team-based learning environment and industry projects

- Week 1 = Professional Skills
  - Use of virtual breakout rooms to utilize traditional team exercises

- Week 2 = Technical Skills

- Lecture overviews of Manufacturing Processes, Lean Techniques, Assembly Optimization, CNC Machining, Mastercam, 3D Printing, and Virtual Reality

- Hands-on Activities for Blueprints and SolidWorks
Student Programs (Virtual)

Hands-on Activities for Blueprints and SolidWorks during MET² Winter Intersession

Students were provided with:
- LEGO helicopter set
- Calipers
- SolidWorks Student Edition

During Workshop:
- Measure LEGO pieces with calipers
- Create blueprints for LEGO pieces
- Design LEGO pieces in SolidWorks

During Semester Project:
- Measure each piece of a LEGO helicopter kit (39 pieces)
- Create blueprints for each piece
- Create each piece in SolidWorks
- Create assemblies of parts in SolidWorks
- Create virtual environment to assemble helicopter in virtual reality
Student Programs (Virtual)

*Engineering Technology Challenge (ETC)* – Engage **high school students** in team-based learning environment

- Modalities and curriculum were modified to shift to an online experience.
- Zoom was utilized for teleconferencing and Google Classroom for the learning management system.
- TinkerCAD was used for the study of electronics and CAD design for circuit theory and the creation of virtual circuits. Participants explored the CAD functionality of TinkerCAD with the construction of their own 3D designs.
- BBC Micro:bit and MakeCode online Integrated Development Environment (IDE) adopted to allow a physical and online experience for programming. Students were provided with their own micro:bit device and challenged with writing programs for industry and real-world scenarios given to each team.
- For example, students coded programs that allowed them to measure the sound in their homes, play a rock-paper-scissors game, and measure the temperature with the integrated sensors of the micro:bit.
Professional Development (In-Person)

Summer Teacher Workshops

- Provides professional development for community college faculty and high school teachers in the use of skills-based curriculum both online and in-person
- Four days during summer
- Held on a community college campus
- Incorporates the same technologies as the student programs
- Participants develop curriculum based on the professional skills and technical skills lessons they learn during the workshop
Professional Development (Virtual)

Summer Teacher Workshop

• Held online August 3-6, 2020; 14 participants from 10 states

• Provided participants with:
  • Robo-Link Mini Co-Drone typically used during In-person Engineering Technology Challenge Program
  • SolidWorks Student Edition

• Hands-on activities included:
  • SolidWorks
  • Assembly and programming of the mini drones

• The 2021 Summer Teacher Workshop will include the BBC micro:bit, which will also be distributed to participants
In Conclusion

• Hands-on workshops were still held despite not being able to hold in-person workshops

• When necessary, adjustments were made to the specific platforms and supplies used in order to demonstrate technologies in a manner appropriate to the audience

• Some of the new technologies will remain part to the workshops as they transition back to in-person formats
Dr. Karen Wosczyna-Birch
Principal Investigator & Executive Director
College of Technology
Regional Center for Next Generation Manufacturing
Kwosczyna-birch@commnet.edu

Wendy Robicheau
Project Manager
College of Technology
Regional Center for Next Generation Manufacturing
wrobicheau@commnet.edu

Eric Flynn
Department Chair, Engineering & Applied Technologies Department
Gateway Community College
eflynn@gwcc.commnet.edu

John Birch
Executive Director & Co-PI
Engineering Technology Program
thebirchgroup@snet.net