

# Ensuring Workforce Readiness for the Energy and Manufacturing Industries Through Educational Simulations

**Excelsior College** and **Polk State College** offer two-year technical students comprehensive preparation for entering the skilled trades in the energy and manufacturing sectors, two key industries identified by ATE as requiring more well-qualified technicians. Our institutions are united around a goal to provide as much education as possible virtually, to meet the needs of working adult students, many who also shoulder considerable family and community responsibilities. To provide the most complete educational experience, **Excelsior College uses new technology such as simulations to deliver hands-on learning**. The project proposes building, in a virtual environment, the exceptional learning component of industry requirements for earning certificates. Combined with knowledge-based preparation in existing course work, this will now provide online students the opportunity to earn both an academic degree and workplace credential.

## GOALS

1. Students demonstrate workforce readiness by earning a certificate and/or becoming employed.
2. Offer flexible, rigorous virtual training to meet the needs of non-traditional, adult students.
3. Prepare two-year technical students with diverse backgrounds to be work-ready for today's manufacturing and power generation industries.
4. Demonstrate the effectiveness of simulations for achieving deep learning and developing high-level thinking.
5. Share educational resources and information about innovative teaching models that will encourage and guide educators in adapting these practices.
6. Prepare two-year graduates to advance into four-year degree programs and beyond, while continuing to work.

## SCOPE OF WORK

### Creation of Simulation Scenarios:

Safety & Personal Protective Equipment (PPE)  
 Blueprint Reading  
 Job Task / Troubleshooting

### Creation of a Simulation Dashboard:

Integrated with the LMS (Canvas)  
 Student View  
 Instructor View  
 Institutional View

### Creation or enhancement of academic courses utilizing the simulation learning objects:

PPE for Electrical Workers (8-week)  
 Blueprint Reading (8-week)  
 Job Task and Troubleshooting (8-week)  
 Energy Industry Fundamentals (15-week)  
 Industrial Safety (CBE OE3)  
 Intro to Electricity Electronics (CBE OE3)  
 Motors and Controls (CBE OE3)  
 Intro to PLCs (CBE OE3)  
 Intro to CNC (CBE OE3)

## ROADMAP

### DESIGN

Simulation content/scenarios for Electrical & Manufacturing  
 Detailed storyboards

### DEVELOP & REFINE

3-D simulations  
 Team review and feedback  
 Efficacy studies  
 Refinement  
 New & enhanced courses  
 Integration with LMS

### USE & TEST

Simulation content/scenarios for Electrical & Manufacturing  
 Detailed storyboards

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## LIST OF SIMULATION SCENARIOS

### SAFETY & PERSONAL PROTECTIVE EQUIPMENT (PPE)

Manufacturing PPE - Intake Slurry Valve  
Manufacturing PPE - Pump Motor  
Electrical PPE - Pump  
Electrical PPE - Motor Controller Circuit  
Electrical PPE - AC Motor

### BLUEPRINT READING

Compressor Motor  
Water Pump  
3-Phase Press Motor  
3-Phase Roll Mill  
Liquid Process Control System

### JOB TASK/TROUBLESHOOTING

#### Electrical

Three-Phase Motor Unstable  
Three-Phase Motor Overheating  
Three-Phase Motor Fail to Start

#### Manufacturing

Milling Machine Inspection  
Liquid Heating Unit Underheat  
Motor and Pump Alignment

## LESSONS LEARNED

- ▶ Challenges with simulation completion (likely due to functionality/navigation)
- ▶ Positive student learning experience: perceived learning gains, motivation
- ▶ Strong content built into simulations
- ▶ Need to increase student use of completed simulations (for pilot and for evaluation): PPE, Blueprint Reading

## NEXT STEPS

- ▶ Expand dashboard data collection variables in learning mode
- ▶ Extend student “practice” sessions during learning mode
- ▶ Roll out of Manufacturing PPE, Blueprint Reading Simulations—Fall term
- ▶ Faculty webinar for simulation use in courses; increase student awareness for course sign-up

### MORE INFORMATION ABOUT OUR PROJECT:

<https://atecentral.net/msites/ensuringworkforcereadiness/home>

Personal Protective Equipment simulation learning mode is also available to public at [wisc-online.com](http://wisc-online.com).

### CONTACTS:

**Dr. Bei Liu**, Excelsior College, 518-608-8485

**Dr. Eric A. Roe**, The University of Texas at Austin, 512-232-5172

**Dr. Mori Toosi**, Polk State College, 863-837-5937

**Dr. Henry Cobra**, Polk State College, 863-837-5952

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