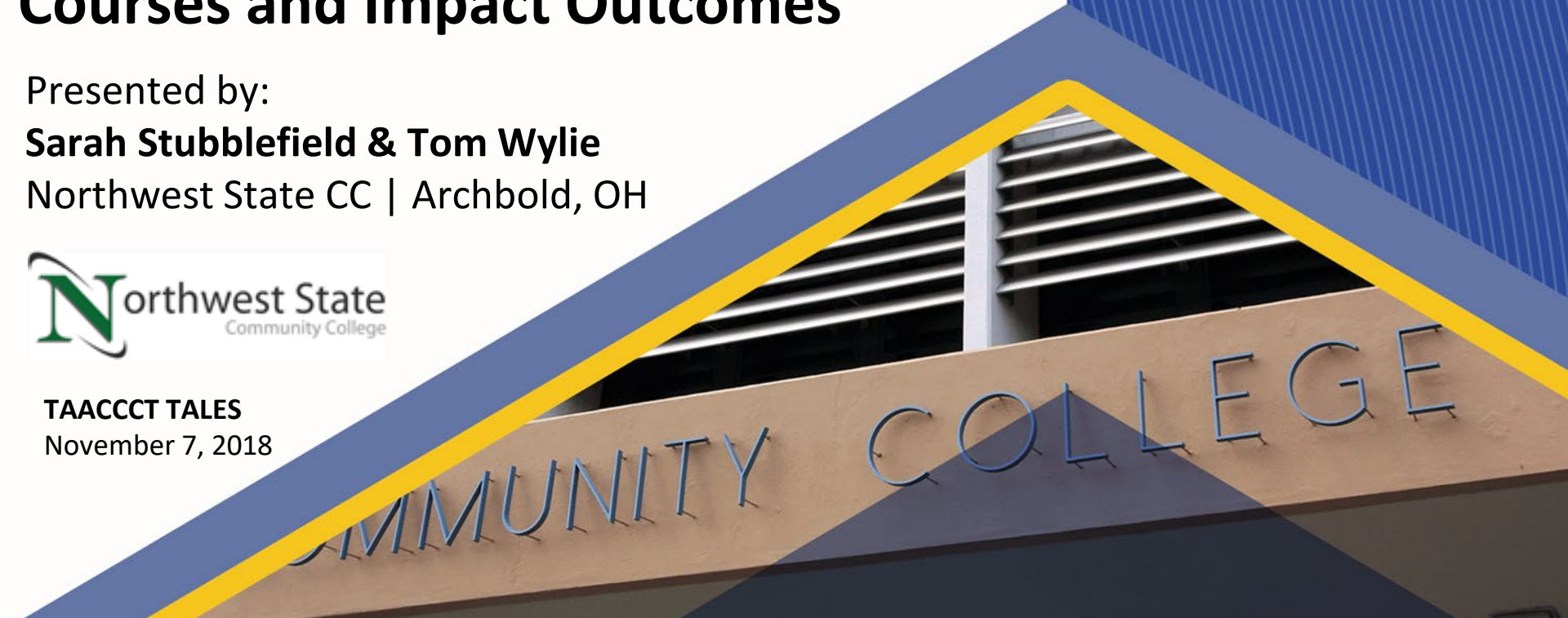
Using a Competency-Based Hybrid Model to Improve Technical Courses and Impact Outcomes

Presented by:

Sarah Stubblefield & Tom Wylie

Northwest State CC | Archbold, OH



TAACCCT TALES

November 7, 2018

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Using Storytelling for Scaling & Sustainability

"[Stories] can help problem solve, provide guidance, build confidence, or share the wisdom of those who have walked these steps previously. Stories can be used to help others overcome challenges and invite them to embark upon the next steps in their own journeys."

- Compliments reporting
- Reaches a broad audience
- Quickly digestible
- Opportunity for reflection

"Employers told us, I need x amount of employees. If they can't find them in Ohio, we might have to move operations somewhere else."

StoryTelling Network
A SkillsCommons IMPACTcommunity

Presenters

Sarah Stubblefield

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Northwest State Community College

Webinar Overview

1. Explain how a 2-year community college moved 17 industrial technology courses to a competency-based hybrid model

1. The impact & data results of the new model

1. Learning acceleration strategies

1. Lessons learned from the journey

Why Change?

1. Employers discussing the possibility of relocating

1. Potential loss of business to other providers

1. Employer awareness of Open-entry/Open-exit models

1. Employer input: “Voice of the Customer”

Employer Initial Feedback

1. Curriculum needed realignment

1. Inconsistent skill levels of students they hire

1. Students need more hands-on skills

1. Traditional college schedules no longer work

1. Completion of certificates/degrees take too long

Grants Drive Change!

NSCC was awarded two federal grants:

*TAACCCT Round 4 individual TAACCCT: IAM iSTAR ($2.5M) (2014)

*National Science Foundation-Advanced Technology Education grant: HOME4TECHS ($200K) (2015)

Old Model vs. New Model

Original Technical Course Model at NSCC

Course Outcomes	Student Materials	Delivery Method	Student Pacing	Hands-on Experience	Assessment	Delivery Timeframe
Based on Textbook	Based on Textbook	F to F Lecture Instructor	Based on Instructor	Lab Exercises to support lecture	Grade based on 3 tests	16 week semester

A traditional technical course offered at many 2-year colleges

Competency-Based, Hybrid, Flexible-Lab Course Model (NSCC)

Course Outcomes	Student Materials	Delivery Method	Student Pacing	Hands-on Experience	Assessment	Delivery Timeframe
Aligned with Industry Skills Requirements	Active Learning: Videos, Voice over PPT, Simulations. PDF, OER, Textbooks	Hybrid, Lecture Online Labs on Campus	Flexible: Student masters module then moves to next module	Labs used to develop skills and prepare for HOA	Hands-on Assessment (HOA) 100% skills mastery (8 HOAs & 8 LMS Assessments/course)	8 week mini -semester (Part of Term)

Impact: First 3 Converted Courses

Data results for the first 3 courses converted to the new model (Programmable Logic Controller, Motors & Controls and Robotics):

1. Enrollment increase of 44% (324 to 466 enrollments)

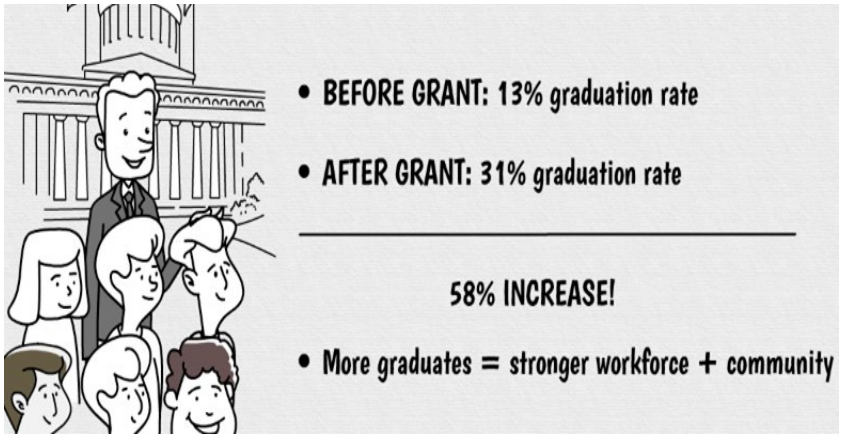
1. 7% increase in student GPA attainment

1. 10% increase in course completions

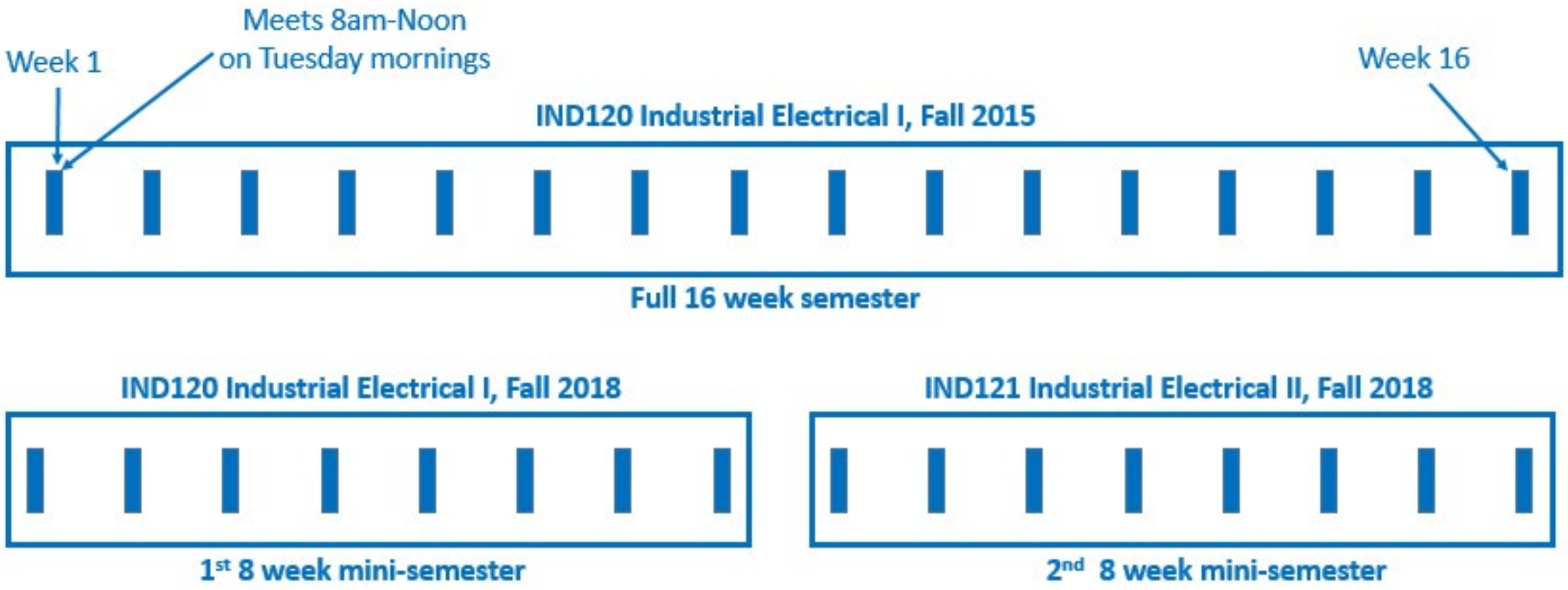
Storytelling in Action!

Accelerating Graduation Pathways and Strengthening Ohio's Workforce

Storytelling in Action!



From 16 weeks to 8 weeks



Impact of Assessment

The new assessment model has had the greatest impact on this project:

1. Individual student assessment

1. Students develop more hands-on skills

1. Role of the faculty

1. Employer engagement

Types of Assessments

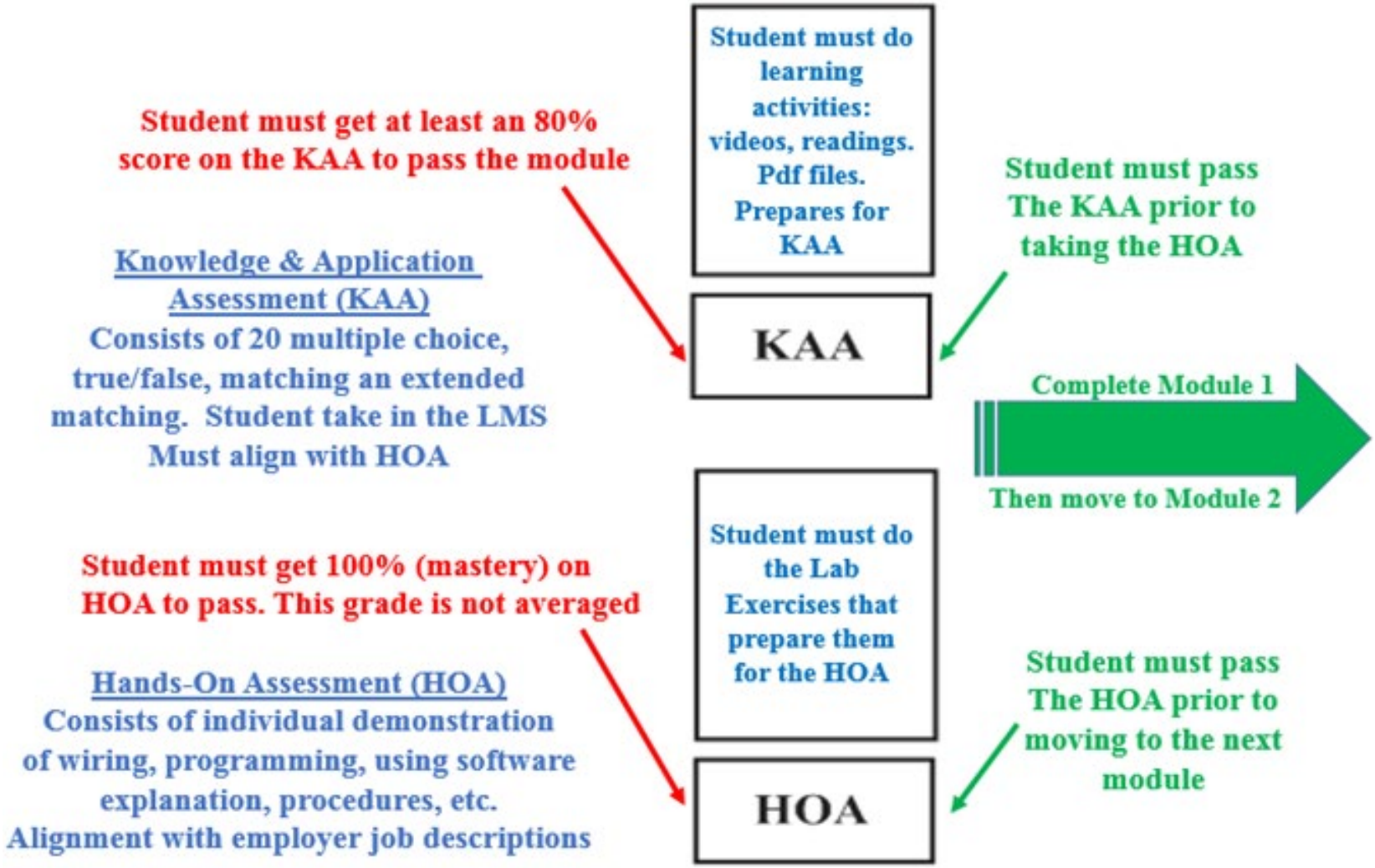
There are 2 assessment types:

1.**Knowledge & Application Assessment** – KAAs - which are taken through the LMS system. Students must get at least an 80%.

2.**Hands-On Assessment** – HOAs – which is a one-on-one between the faculty and the student. The student must get 100% (mastery)

Students receive an A, B or F for a course. There are no C or D issued.

Assessment Model 3



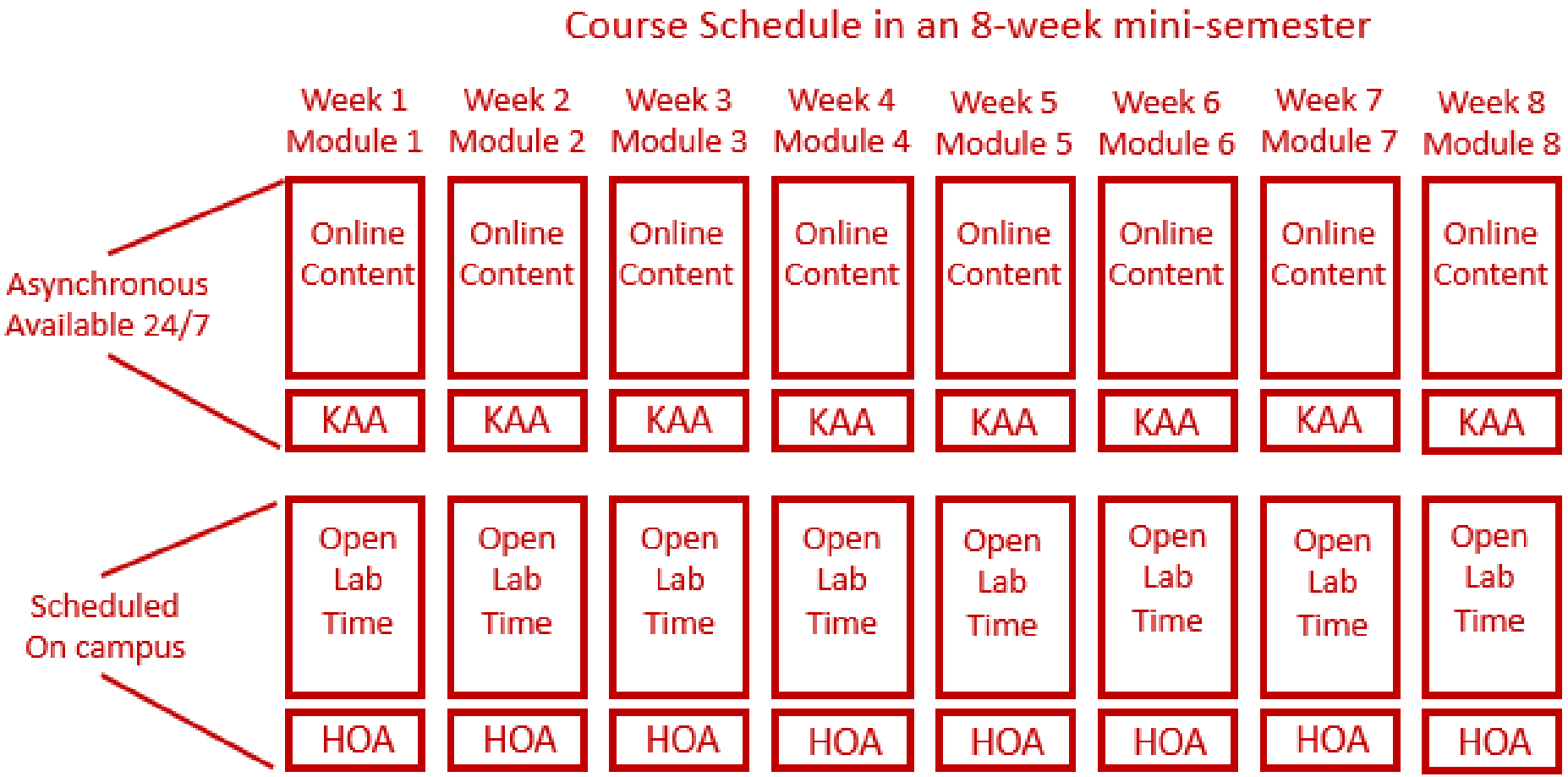
Moving the Lecture Online

- Learning activities were created in the LMS to replace the lecture
- Students have 24/7 access to all course materials
- Online classes were standardized in terms of look and feel
- Faculty had to develop online LMS skills to enhance student learning
- Faculty support students' online learning through the LMS, online office hours, and interactivity during the open lab time.

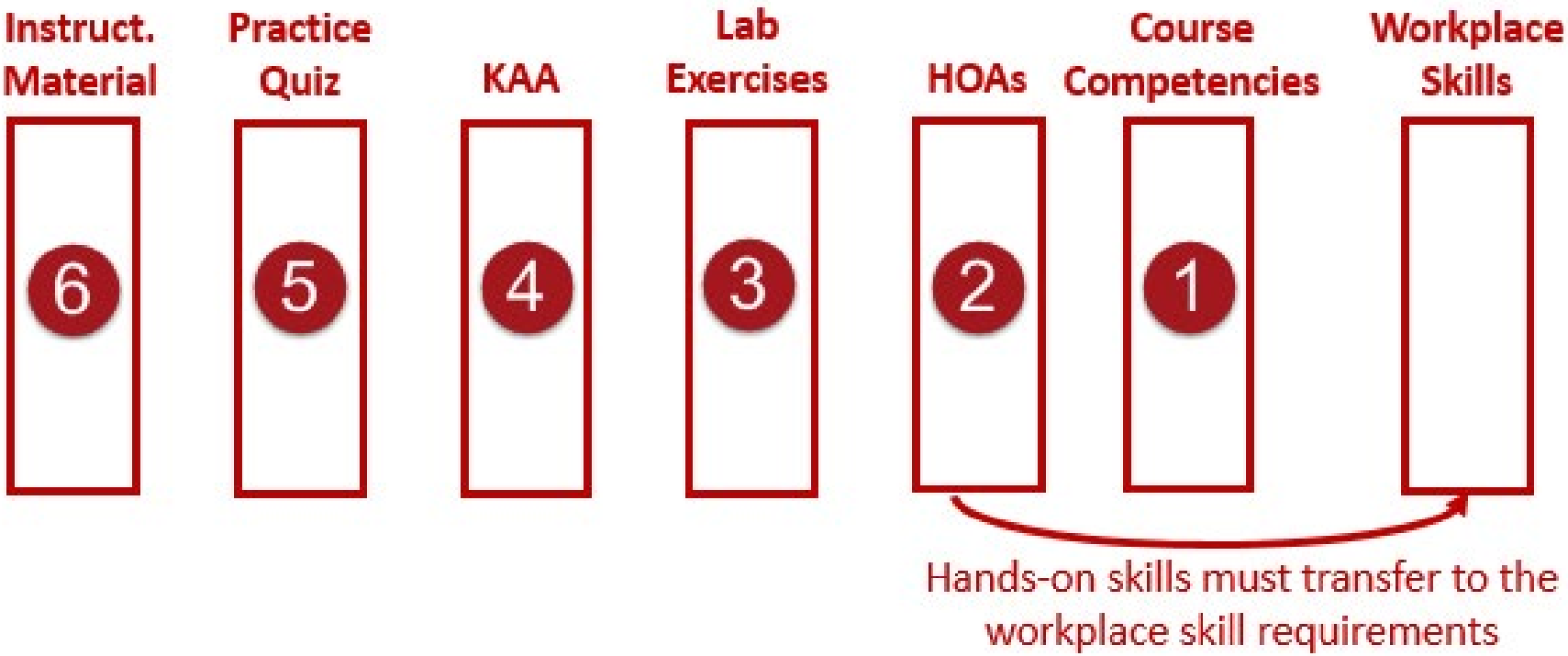
Flexible Lab Model

- Courses have schedule lab times every week for faculty to assess the students (HOA).
- Extra lab time if added so students can develop hands-on skills
- Accomodations are made for students moving between day and evening courses due to workshifts

Online & Flexible Lab



The Design Process



Curriculum Alignment

Information was gathered from 3 sources:

1. DACUM (Develop A CurriculUM) validated competencies

1. Faculty who did corporate training in industrial technologies

1. Job descriptions obtained from local employers

Hands-on Assessments

An example of a student HOA for an electrical course would be:

1. Build an operational circuit from an electrical print

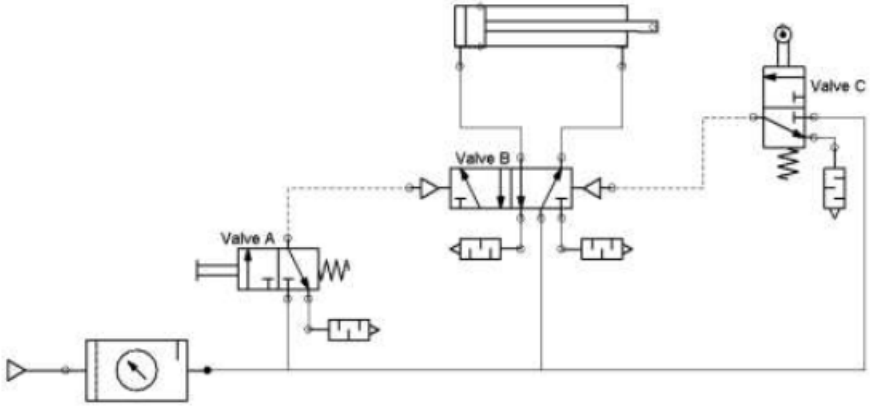
1. Explain the operation of the circuit to the instructor

1. Demonstrate the knowledge of an electrical print

1. Predict the operation of circuit based on certain criteria

1. Troubleshoot a faulty circuit

Example HOA

_____	7.	Assemble this circuit in the lab, and make it operational. 
_____	8.	Demonstrate the operation of the circuit to the instructor.
_____	9.	Explain the operation of the circuit to the instructor.
_____	10.	Explain to the instructor what the pressure reading should on the blind side port, when Valve A is actuated.
_____	11.	Explain to the instructor what the pressure reading should be on the rod side port of the cylinder, when Valve C is actuated.
_____	12.	Troubleshoot a fault the instructor will put into the circuit, after a brief absence of the student.

Lab Exercises

- Lab exercises are structured, hands-on learning experiences
- Students develop skills that are transferable to workplace skills
- Prepare the students for the Hands-On Assessment

Example Lab Exercise

Lab Procedure 4.1: A.S. Automatic Return Circuit and Flow Control

Upon completion of this lab procedure, the student should be able to:

1. Download the simulation file from the Message Center in Sakai, in the Virtual Machine.
2. Open the simulation file in Automation Studio, and start the simulation
3. Identify and explain the purpose of each component on the pneumatic print
4. Explain the basic operation of the pneumatic circuit
5. Explain the purpose of using flow control valves in an automatic circuit
6. Determine which flow valve affects the extension and retraction of the cylinder
7. Predict the pressure that would be measured at any port in the circuit

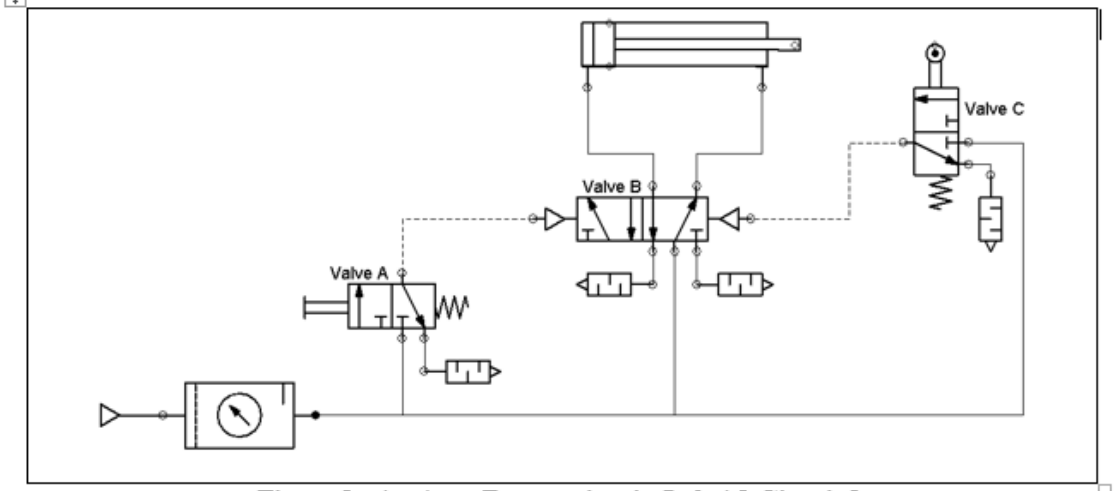
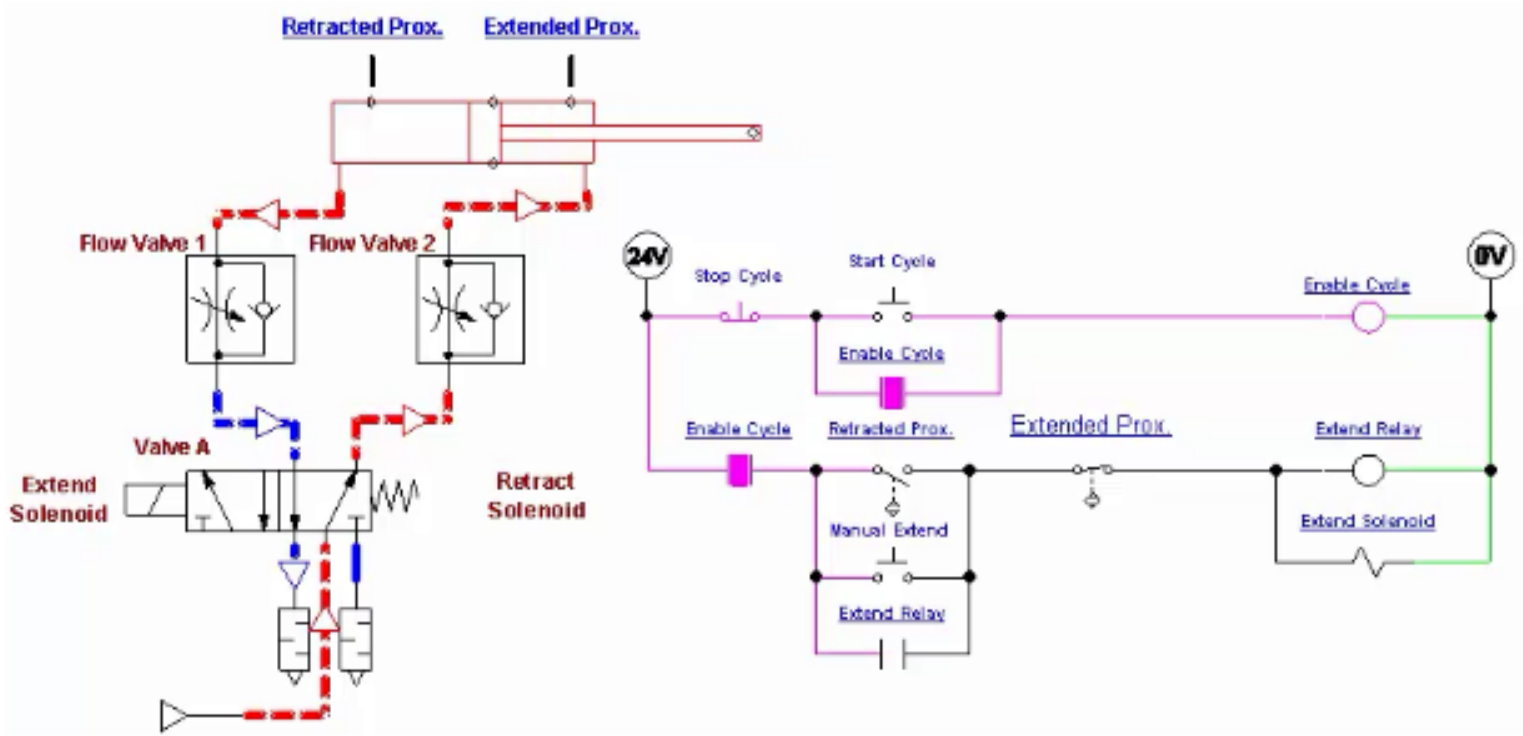


Figure 1. An Auto Return circuit, Lab 4.1 Circuit 1.

Knowledge & Application Assessment

- The KAAs are typically 20 multiple-choice or true/false questions, taken through the Sakai LMS system.
- Every module has a KAA, which must be passed (80%) in order to take the HOA in the module.
- These questions are applied, or situational, versus memorization
- There must be a correlation between the KAA and the HOA

Example KAA Question



14. What is the purpose of the Extend Relay in the electrical circuit?

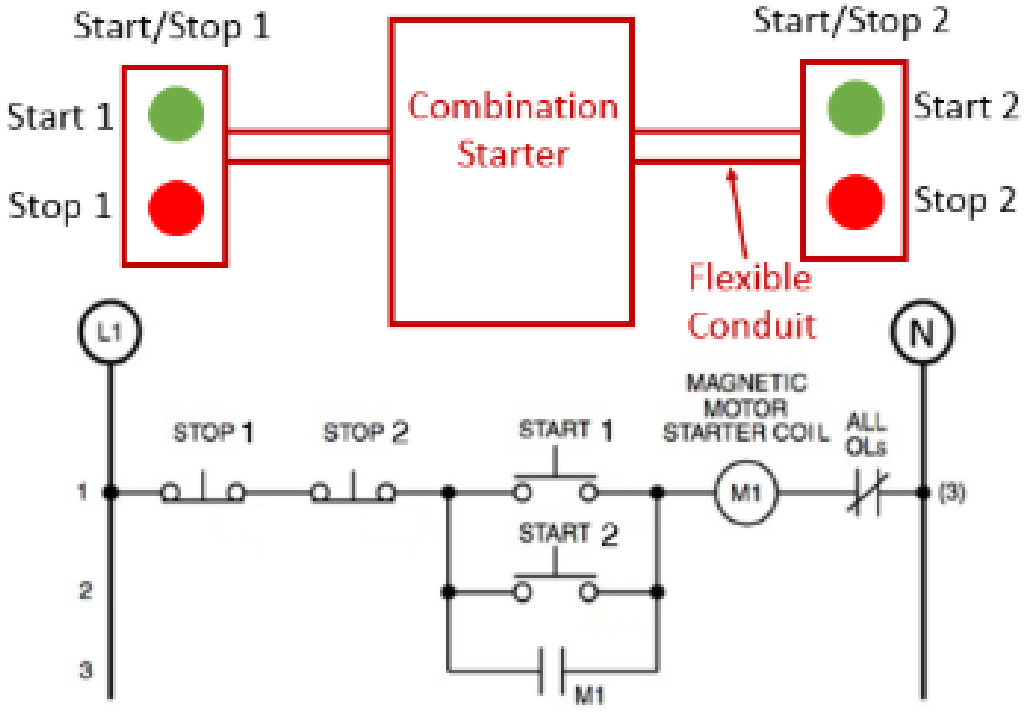
a. To let the user know that the cylinder is extending

b. To prevent the extend and retract from occuring at the same time

c. To speed up the extend cycle

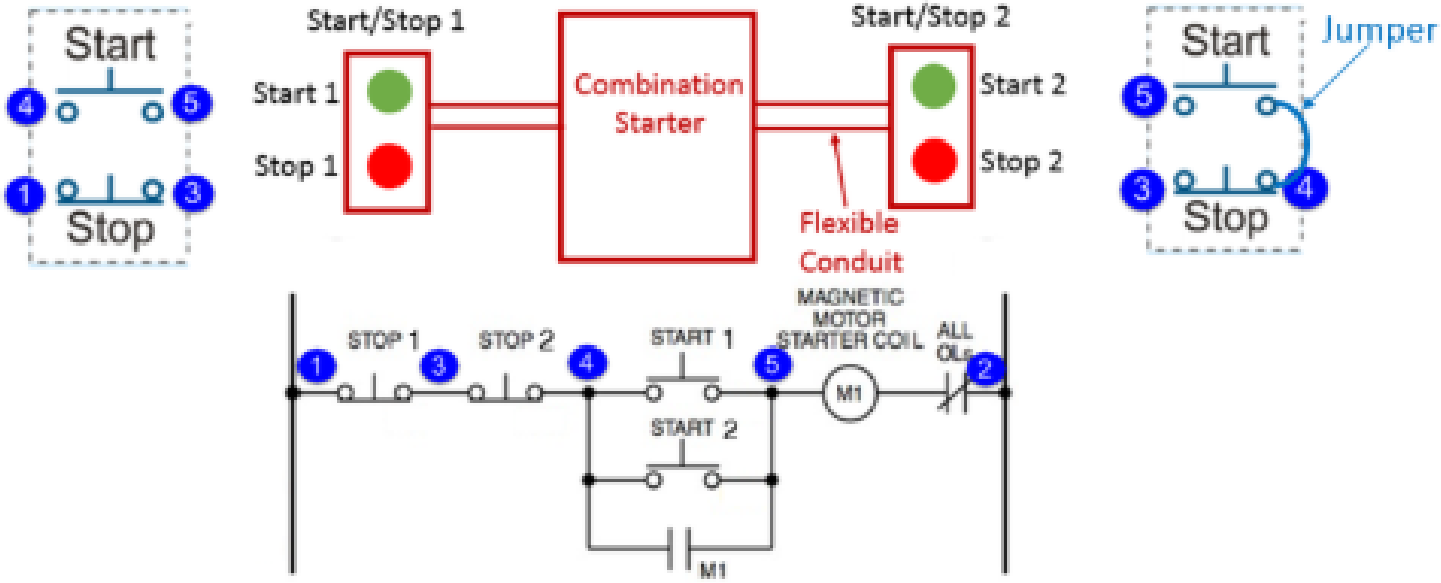
d. To create a hold-in circuit to keep power on the Extend Solenoid

Practice Quiz - A learning tool



9. T **F** From this illustration, there will be 4 wires ran (not including the ground wire) to Start/Stop 2 (push button station), from the combination starter.

Practice Quiz Feedback



Explanation: As shown in this illustration, there will need to be 4 wires run to Start/Stop station #1. There will need to be 3 wires run to Start/Stop station #2. The reason for one less wire on PB station 2, is that there is a jumper done on the pushbutton.

Instructional Materials

- Textbook sometimes do not align with employer needs
- Faculty created Powerpoints, PDFs, Simulations and Videos
- OER and manufacturers' literature is also implemented
- Build the objects to view on portable devices

Acceleration Strategies

1. 24/7 student access to licensed software through the student VM (Virtual Machine)

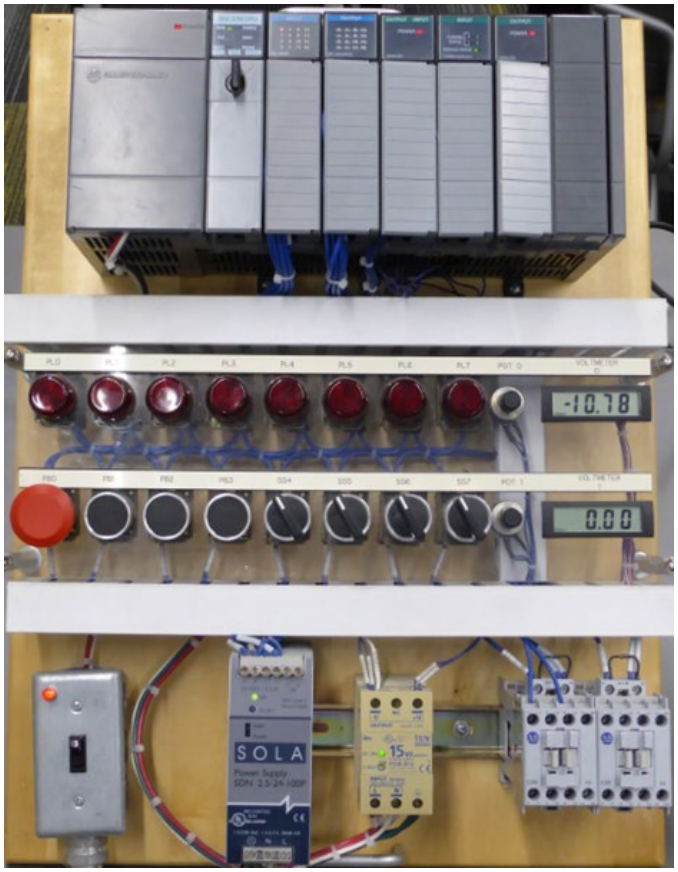
1. Interactive virtual simulations, available 24/7 through the VM

1. Active learning objects in the online portion of a course

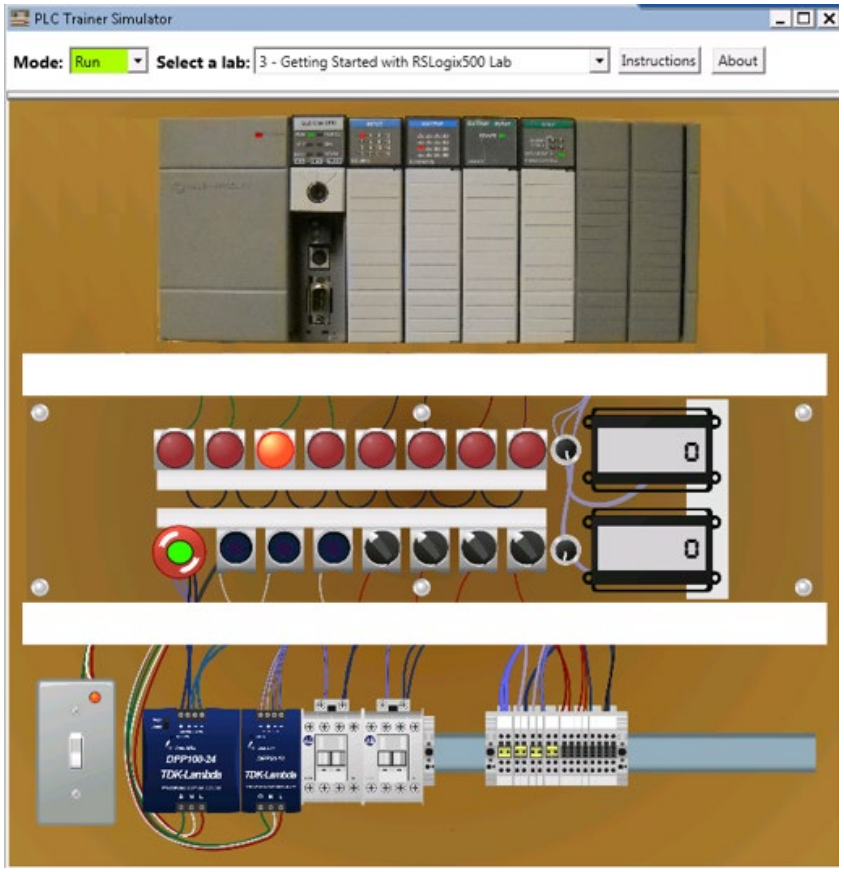
1. Additional lab times beyond the scheduled lab times

PLC Simulators

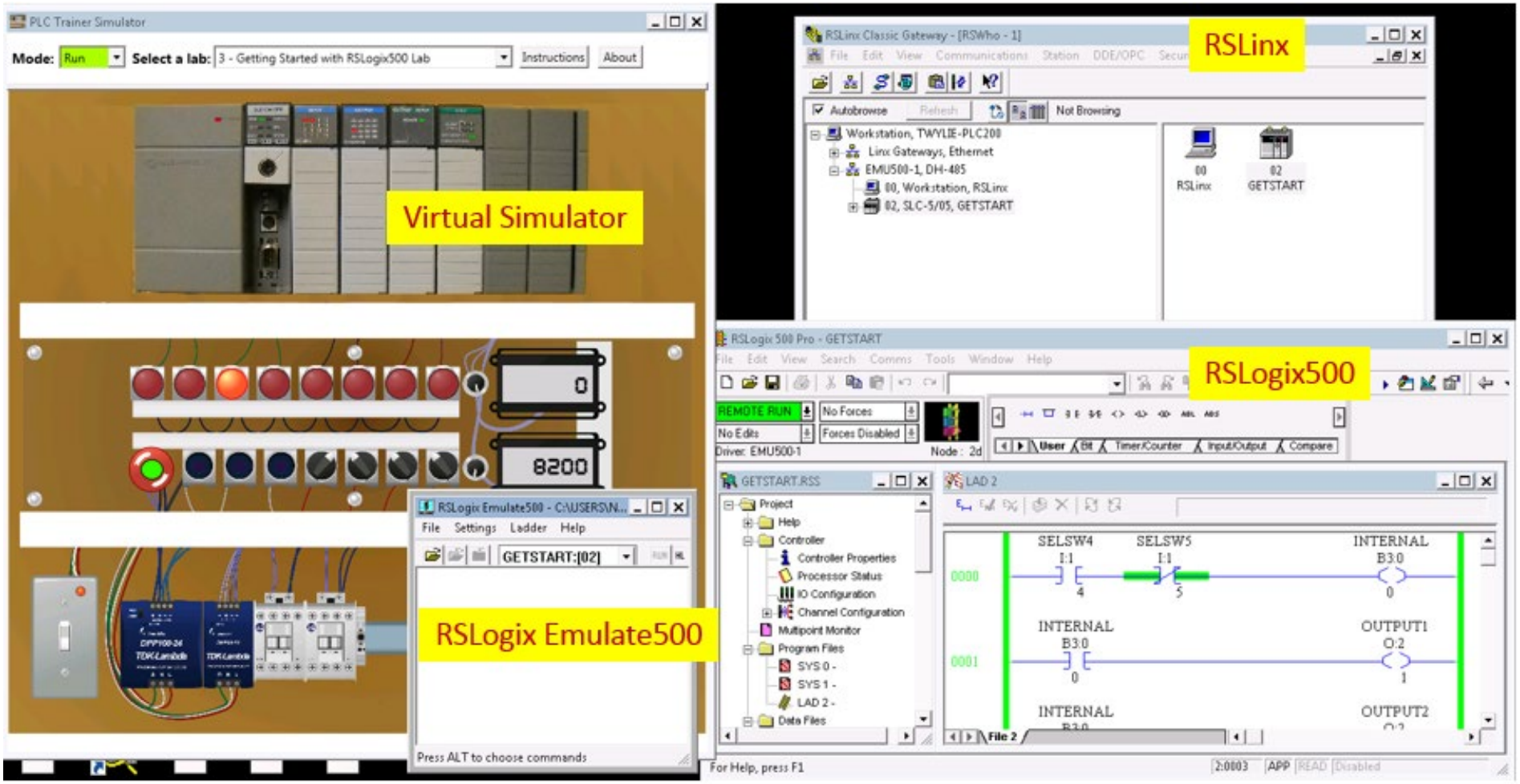
Hardware Simulator



Virtual Simulator

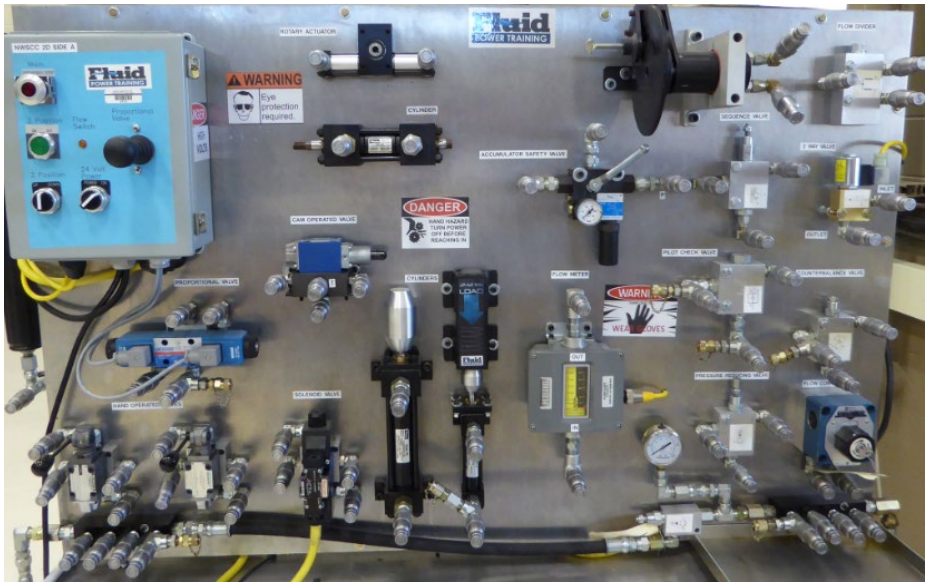


Virtual PLC Simulator

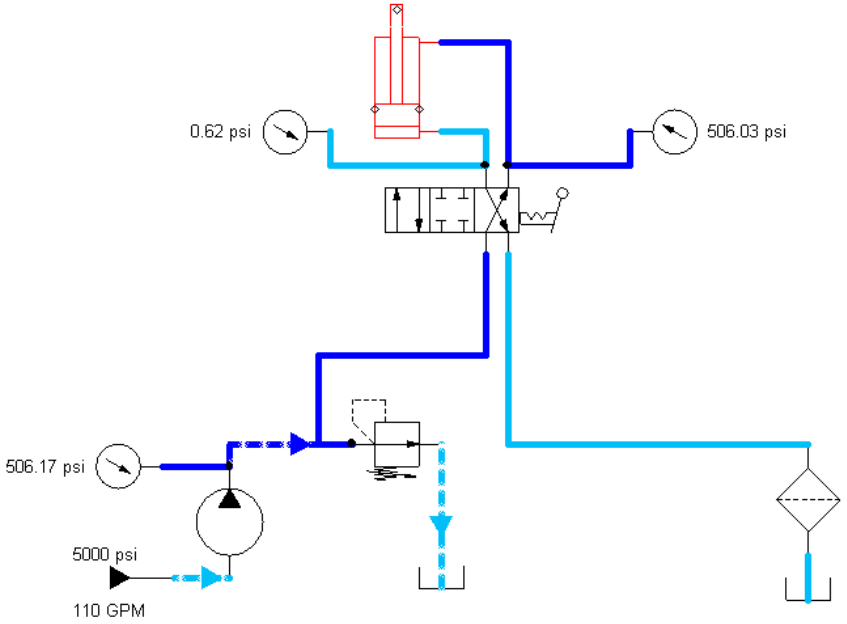


Hydraulic Simulators

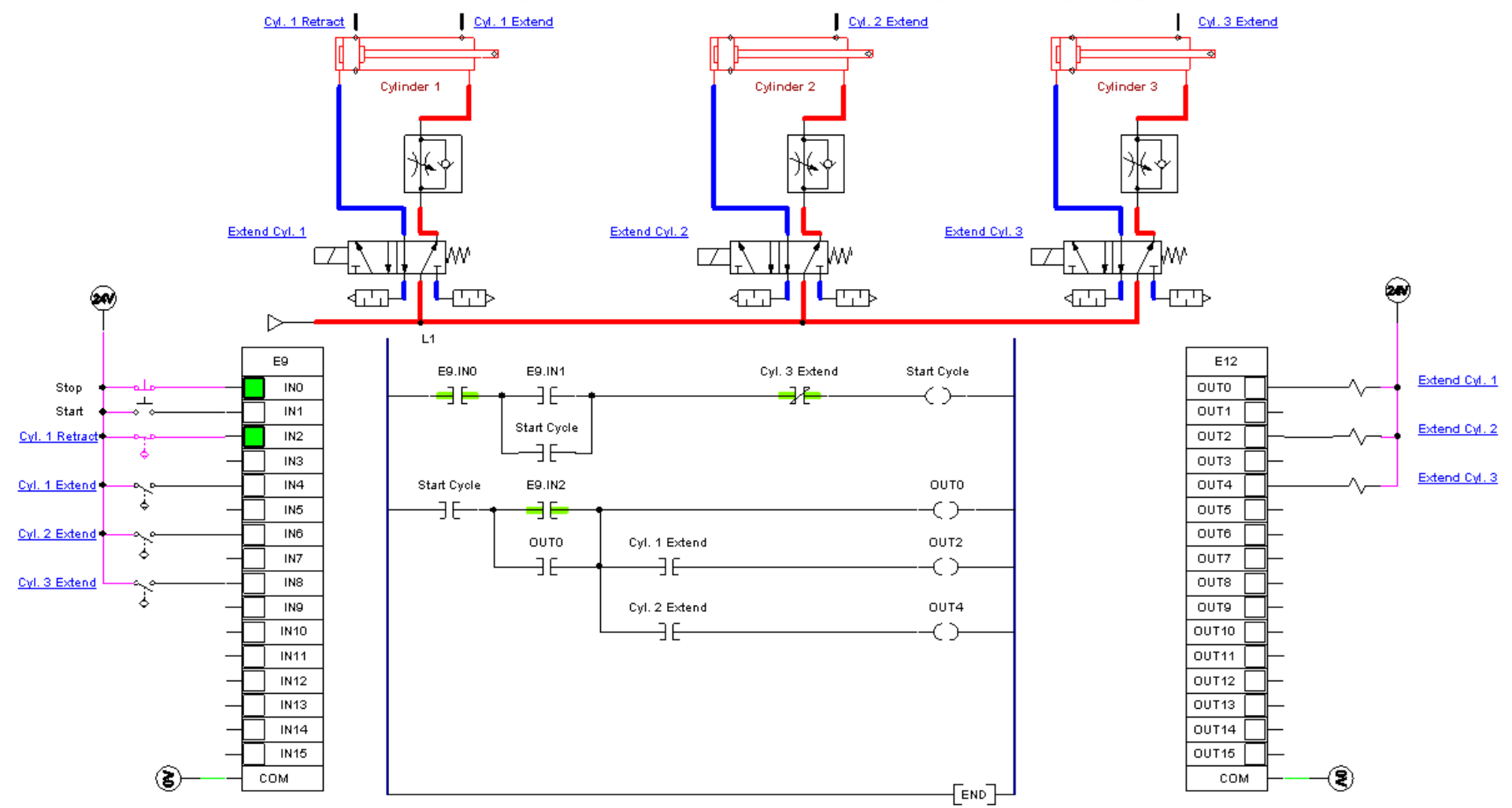
Hardware Simulator



Virtual Simulator



PLC/Pneumatic Simulation



Finish Early, Keep Moving

- Students can finish a course in less than 8 weeks (25% do this)
- Students can start of the next course if they finish early
- All learning objects including practice quizzes are accessible
- The KAAs and HOAs cannot be taken until the start of the next term

Impact on Students

Student survey feedback - 96% very satisfied (200 students):

1. “I really appreciate the 24/7 access to all of the material”

1. “I could not go to college for these courses under the old model”

1. “I can actually finish early and start on my next course”

1. “I know what is expected on me in each course”

1. “I really like more hands-on type of learning”

1. “I really like the videos you guys have created”

Impact on Employers

Feedback from an employer survey (15 companies):

1. 100% of the employers are satisfied with the new model

1. Employers see a higher skill level in graduates they hire

1. Employers appreciate the flexibility of the lab scheduling

Impact on Faculty

Here are some comments from Faculty:

“The major advantage of this model is the consistency of instruction in all of the courses. All students end with the same skills even with different faculty.”

“Faculty do not have to grade tests, create labs or create lectures, all of this has been developed and is in the LMS.”

“There is more time available to do corporate training, than what we had in the old model.”

Lessons Learned

1. To change the student learning behavior, change the assessment model.

1. The student AND faculty culture must be changed

1. Faculty do not need to become instructional designers, they must learn to develop assessments & labs, and learn to facilitate online learning

1. Video is king, when it comes to students learning a concept

A Final Thought: Start Small

There is nothing wrong with starting small by scaling an element or two of this model into a traditional course model.

Original Technical Course Model at NSCC

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A traditional technical course offered at many 2-year colleges

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Traditional Course Model, scaled to include Outcomes & Assessment

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A traditional technical course scaled to include the Course Outcomes & Assessment from the Competency-based Model

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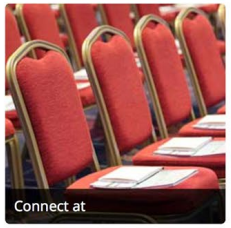

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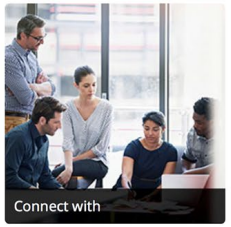

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