

# Steps & Lessons on Converting to a Competency-Based Hybrid Model Part 1

Presented by:

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# Workshop Materials Available for Download:

[https://ate.is/Scaling\\_CBE](https://ate.is/Scaling_CBE)

# Instructional Elements to Improve Technical Courses



# Build Justification for your Project

# Common Theme for your Project:

**Executive Summary:** This document will serve as an explanation to senior administrators and faculty on exactly what your project is doing.

**Explain** why you are doing the project, and what was the driving force for the possible changes in your curriculum and method of delivery. This could be: employers, student access, faculty wanting to make sure all students are at the same skill level when graduating.

**How** you are going to change the curriculum, assessment and method of deliver, comparing it to where the courses are now.

**Expected Outcomes** should be explained in simple terms. Be prepared to respond if an Administrator or Board Member would ask you: How will you know if this initiative is successful?

**More Hands-On Skills Development:** Moving the lecture online makes more time for hands-on learning. Skills Assessment drives students to develop Hands-On Skills.

**Faculty assured of Skillset of each Student:** One-on-one skills assessment for each student by the Faculty assures the required skills and knowledge. No students can skirt the system.

**Flexible Schedule for Faculty:** Since the lecture portion of the course is moved online to the LMS, the Faculty can have a flexible schedule to perform other tasks on/off campus.

**Student Access:** Students have the flexibility of attending any of the scheduled lab times, or scheduled open lab times. Some faculty take attendance in the lab times to identify students procrastination.

**Realignment of Technical Curriculum:** Some of the curriculum had not been changed for 10-20 years. Technology had changed and employers drove us to change.





# HOME4TECHS

Hands On Maintenance Education 4 TECHnicians



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- Traditional college schedules no longer works for employers
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- Completion of traditional college certificate/degrees take too long

## Solution:

- Redesign the curriculum to meet employers needs
- Build a **competency-based, hybrid instructional model**
- Require individual skill assessments
- Move the courses' **lecture portion to an online format**
- Utilize technology tools to accelerate learning
- Offer the students a **flexible open-lab schedule**

## Project consists of 3 distinct areas:

### Curriculum

- Realignment of curriculum
- Competency-based learning
- Hybrid course model
- Modular online eLearning
- Hands-on assessments
- Open lab learning model

### Technology to accelerate learning

- Virtual machines for each student
- Hands-on hardware simulations
- Student access to software 24/7
- Virtual interactive simulations
- MOOCs

### Faculty professional development

- Quality matters
- Instructional systems design
- Online course development
- Instructing online courses
- Technical content cross-training
- Learning object development



**Programmable Controller Course**  
Allen Bradley MicroLogix and CompactLogix

**Motors & Controls**  
Allen Bradley PowerFlex 70s and 525s

**Servo & Robotics**  
Fanuc LR Mate 200iD



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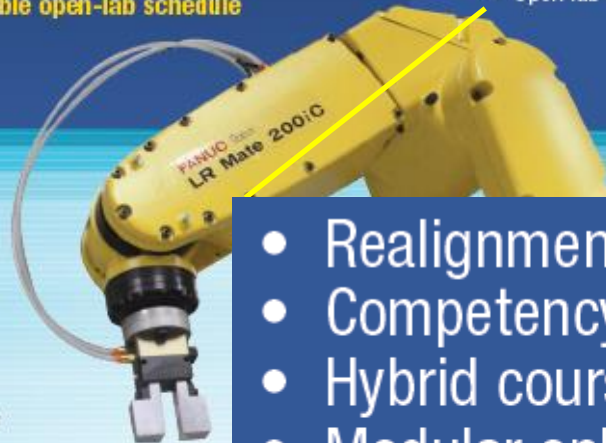
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- Won in 2015. Ran from 8/1/15 to 7/31/18
- Amount was approximately \$200K
- Focus was to build a model to convert lecture/lab technical courses to a competency-based/hybrid model
- 3 courses were converted:
  - IND223: Motors & Motor Controls
  - PLC200: Programmable Controller I
  - PLC230: Servo & Robotics

- 3 faculty were PI & Co-PIs
- Assessment model changed everything: Employers wanted students with more hands-on skills. Students learning behavior will follow the assessment model. Assess their hands-on skills, and they will focus on developing their hands-on skills.
- Lecture moved online, scheduled & open lab model
- Project results (2 yrs. of the old model, compared to 2 yrs. of the new):
  - 44% increase in enrollment (of the 3 courses)
  - 10% increase in retention
  - 7% increase in grade level attainment

# Traditional Education Model Versus Competency-Based/Hybrid

Competency-based Education consists of the following unique elements:

**Mastery of Skills** - The CBE course is typically parsed into modules, with assessments in each module that must be passed at the mastery level.

**Flexible Pacing** - Student will progress through a course at their pace of learning (and of course mastery). Some students will finish early, and some will take a little longer.

**Fixed Learning**- Ideally, every student has the same knowledge and skills assessments that require mastery, thus all students should be at the same level when they complete a course.

**Variable Time** – This refers back to flexible pacing. Student progress through a course at their own pace. Some students finish sooner, and can start the next course prior to the start date if they are registered (assessments cannot be open until the start date of the next semester). Some student take a little longer, thus they may need more time than what is in the course (incomplete). Incompletes are awarded by the Dean based on Faculty input. Procrastination is not tolerated.



## Traditional Technical Course at NSCC, 9 years ago

### Syllabus

### Textbook

### Lecture

### Handful of labs

### 3 P/P Tests

### Grade (ABCDF)

The challenge is: How does an Instructor know that all students have the skills required by the employers?

# Traditional PLC Course Schedule:

Wk. 1	Wk. 2	Wk. 3	Wk. 4	Wk. 5	Wk. 6	Wk. 7	Wk. 8	Wk. 9	Wk. 10	Wk. 11	Wk. 12	Wk. 13	Wk. 14	Wk. 15	Wk. 16	
Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	Mon <i>Lecture</i> 8a-12p	
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					<i>Test #1</i>								<i>Test #2</i>			<i>Final</i>

ET 2440 Industrial Control Systems

4 Cr. Hr., 128 contact hours (2 hrs. Lec. & 6 hrs. Lab/week for 16 weeks)

Students & Faculty make 32 trips to campus for this semester course

3 Written or Online Knowledge-based Assessments, and possibly projects

Pace is set by the Instructor

# Traditional PLC Course Pacing:

Wk. 1	Wk. 2	Wk. 3	Wk. 4	Wk. 5	Wk. 6	Wk. 7	Wk. 8	Wk. 9	Wk. 10	Wk. 11	Wk. 12	Wk. 13	Wk. 14	Wk. 15	Wk. 16
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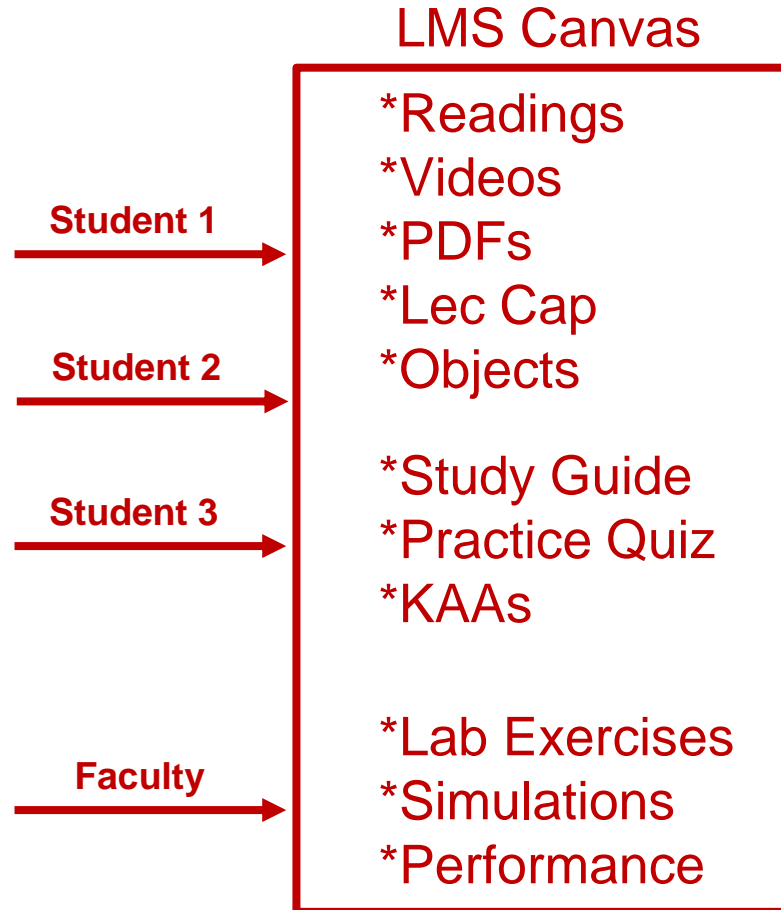
- 1
- 2
- 3
- 4
- 5
- 6

Pace is set by the Instructor

Pace is the same with all students

Learning/Grade is variable

## Competency-Based/Hybrid Instructional Model



### On-campus class time

**Lab Exercises      Hands-On Assessment**

**Lab Packs sold in Bookstore (required)**

**Faculty facilitates learning**

**Faculty assesses student skill/knowledge**

**Self-proctored Online Assessments**



Wk. 1		Wk. 2		Wk. 3		Wk. 4		Wk. 5		Wk. 6		Wk. 7		Wk. 8		Wk. 9		Wk. 10		Wk. 11		Wk. 12		Wk. 13		Wk. 14		Wk. 15		Wk. 16																	
Module 1 Canvas <b>M1 KAA</b>		Module 2 Canvas <b>M2 KAA</b>		Module 3 Canvas <b>M3 KAA</b>		Module 4 Canvas <b>M4 KAA</b>		Module 5 Canvas <b>M5 KAA</b>		Module 6 Canvas <b>M6 KAA</b>		Module 7 Canvas <b>M7 KAA</b>		Module 8 Canvas <b>M8 KAA</b>																																	
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				↑								↑								↑																											
								<b>Performance Assessment #1</b>												<b>Performance Assessment #2</b>												<b>Performance Assessment #3</b>												<b>Performance Assessment #4</b>			

Students & Faculty make 16 trips to campus for this semester course

Pace is set by student learning and completion



## Traditional Assessment Model:

Test #1

Test #2

Test #3

**Knowledge**

Paper or

Online

10 Point Sys.

A-F Grade

## Competency-based Assessment Model:

M1 KAA

M2 KAA

M3 KAA

M4 KAA

M5 KAA

M6 KAA

M7 KAA

M8 KAA

**Knowledge**

Paper or

Online

80% min.

A, B, or F

**Performance  
Assessment #1**

**Performance  
Assessment #2**

**Performance  
Assessment #3**

**Performance  
Assessment #4**

**Skills**

Hands-on

100% min.

- Apprentices base progress on seat time (lecture and lab).
- Get ahead of this by discussing it with the Educational Representative form their joint committee
- Create a cross walk from the traditional course to the CBE hybrid course
- A learning sequence sheet will help in justifying the competency to contact hours
- It is best to run a course as a lecture/lab traditional delivery before converting to a CB/H model, just to create a cross walk

- In a traditional model, the faculty does primarily teaching (Sage on the Stage), and some assessment.
- In a competency-based model, the faculty does primarily assessment, and less teaching than in the traditional model.
- The faculty becomes a learning facilitator, both in the Lab (still teaching the hands-on skills), and also within the LMS (Canvas).



# Lessons Learned And Recommendations

- **Students:** Students like the 24/7 access to the course materials, and knowing what is expected of them for the assessments.
- **Faculty:** Faculty like the consistency in the curriculum, and that all materials are developed, so they do not have to spend time preparing for a class. They also like the flexibility of time on campus.
- **Employers:** Employers like the more accessible classes for their employees, and better prepared graduates. They really like the assessment model of student accountability.
- **College:** Increase in enrollment, increase in retention (SSI), and knowing that the other 3 stakeholders are happy.

**Project Management:** It is important that there is a process in place to not only develop the curriculum for the ATE project, but also track the progress of the project, assign tasks to individuals, and to let the stakeholders view the progress.

**Microsite:** A great way to give everyone access to view documents is through an ATE Central Microsite, which is actually a website that ATE Central will host and is free for active ATE projects.

**Tracking Software:** Starting out, this could be as simple as a spreadsheet that will show tasks and estimated completion dates. The HOME4TECHS project used SmartSheet, which is a very simple project management software that is relatively inexpensive.

**Data Management:** Make sure all developed material goes into a common location that is backed up by the IT department. I store to locations in the Cloud, to a passport USB drive, and in the course shells within Canvas. Coordinate this with the LMS Director.

**Consistency** is an important thing to the students at NSCC. Not only are all the documents built in a standard format, but also the LMS course layout is an important standard.

**LMS** formatting is especially critical. At NSCC, many students did not have great experience taking online courses (primarily Gen Ed), since every Instructor would setup a course differently. The standardization in our LMS was a best practice in our student focus groups.

**Learning Objects** have a specific format in PPT and Word, with text colors, margins, headers, etc.

## A Few Lessons Learned:

- This is a team effort. Support each other and have a common cause with the end goal in mind. Don't be critical of each other.
- Student learning behavior will follow the assessment model. The employers wanted more hands-on learning. By requiring Skills Assessments, students wanted more lab time.
- Online was new for us, so we had to change the faculty culture. We also had to change the student culture.
- We learned not to use the CBE term, but how the elements of CBE are embedded in the model



- This model has moved the student learning off the shoulders of the faculty, to the student. Students are responsible for their learning, and when they take their assessments.
- Employers really like this model since all of the curriculum is developed. A positive thing for the companies was if they sponsored students into a course that had two sections with two different instructors, the students get the same learning experience. Reducing the variance.

- CBE type of technical courses must have a solid structure. How we did technical courses before did not need as much structure.
- Until our Ind. Tech. hybrid courses, online courses were a wild west rodeo. 10 different courses, and they may all look different. Huge negative for the students.
- Our faculty needed to become more literate in the digital world (not just computer literate), due to the moving online, and they needed a support structure.

- Faculty and developers had to become more literate in the digital world, such as:
  - Cloud based applications and storage
  - Internet/browser basics
  - Networking basics (Ethernet, WiFi, 4/5G)
  - Portable devices (phones, phablets & tablets)
  - Powerpoint for a graphics container
  - Using a camera for photos and videos
  - Snagit for capturing portions of computer screen
  - Create instructional videos
  - Load the videos to YouTube
  - Use the LMS system on a computer and cell phone
- It is important that the project team determines what part of the development process that the faculty do, versus what the support personnel will do.

# Academic Standards

# Define the Terms used in the Curriculum:

**Knowledge:** Knowledge is the theoretical or practical understanding of a subject. It is important to understand that a student cannot develop skills without first having knowledge.

**Skills:** Skill is the actual performance or demonstration of a technical task. Skills are the proficiencies developed through training or experience.

**Abilities:** Ability is defined as the capacity to perform. The knowledge learned and the skills developed in a technical course should give the student the ability to perform in the workplace.

**Competencies:** Competency is a set of demonstratable characteristics and skills that enable, and improve the efficiency of, performance on a job. Competencies are not skills, but they are similar to skills. A competency is an over arching statement on a job description, which is many times not measurable. Outcomes are measurable, and thus outcomes are used to build a competency.



**Competency:** Use RSLinx to establish communications between a computer (with PLC programming software) and Allen Bradley PLCs (L5000, SLC-500, PLC-5 & ML1000).

## **Module Outcomes:**

1. Configure RSLinx to communication with a ControlLogix 5571 controller.
2. Identify all the hardware communication ports on the PLCs used in the course (232, USB, DH+, Enet)

## **Skills Assessment:**

1. Create an Ethernet driver in RSLinx to communicate with a 1756-ENET module and go online
2. Create an RS-232 driver in RSLinx to communicate with an SLC-500 processor and go online.
3. Create a USB driver in RSLinx to communicate with the controller.

## **Knowledge Required:**

1. What is an IP address? What is a subnet mask? How does an Ethernet port get an IP address?
2. How to determine the IP address of a 1756-ENET module
3. How to drill down to a controller from a driver in RSLinx
4. How to use RSWho to view the drivers and communications within a ControlLogix system
5. How to create a driver in RSLinx
6. What cables are required between the computer and PLC processors

**CBE** was a negative term to the Higher Learning Commission (accrediting body for colleges in Ohio) when we first started our conversion (2014/15).

**HLC** finally setup some good guidelines when dealing with CBE initiatives in 2015/16, comparing Direct Assessment, Credit CBE, Hybrid CBE and Prior Learning Assessments.

Inform your **Chief Academic Officer** about your project and ask what forms, if any should be submitted.

It is important to keep all programs **Financial Aid** eligible through the DOE. We kept the same credit/contact hours for all our courses and explained to internal constituents that we implemented Competency-Based Learning tools into our courses that mirrored the Quality Matter standards.

**Direct Assessment** was a method of CBE that some colleges focused on (primarily Universities). In this method, the complete program was based on Competencies and not credit hours. This system many times did not utilize Faculty for student interaction during the learning process. This was a big negative to most accrediting organizations.

The NSCC Competency-Based/Hybrid model utilized existing technical courses, keeping the same credit and contact hours, but implementing Competency-Based tools into the course, as well as a much more robust method of assessment.

Also, the technical faculty were directly involved with the development of the curriculum and are the “Instructor of Record” for the courses, and the Instructor assigned to a schedule class is the only person who can perform the skills assessments. The knowledge assessments are housed in the Canvas system.

- Outcomes must be aligned to a competency, which should align to the workplace
- A Quality Matters alignment table is used to align the outcomes to the competencies
- Outcomes must be measurable
- Students must know what is expected of them. The term “Understanding” is not measurable

- The term CBA stands for Competency-Based Assessments. This assessment must be in place to assess mastery in a CBE model.
- Since the course content is parsed into multiple modules (8 modules for the NSCC model), there will need to be an assessment for each module, to prove mastery, so the student can move to the next module.
- There will be more assessments for students to take (and for faculty to create) in a CBE model



# Assessment Model

- CAEL is an organization that started as an effort to build a model where student were awarded college credit for experiential learning.
- Portfolio is a common method for getting college credit by documenting the learning and the experience of the student. The challenge is that many times this method of review is not objective. An assessment model will give an accurate assessment of a student. Some experienced students may be good storytellers, but really do not have the required skills.
- Credit by Proficiency – Actually putting a student through the same assessments that the students in a course are required to take, is the best way to award Prior Learning credit.

- Assessment is the responsibility of the faculty.
- Student skills and knowledge are both assessed by the faculty in the HOA process.
- Knowledge is also assessed through an online assessment for each module that faculty developed, which consists of M.C. and T.F. questions. LMS is used to assure students cannot cheat.
- LMS efficiency saves faculty valuable time
- The assigned instructor objectively determines if a student passes a module, and the course.

# What is an Open Lab model?

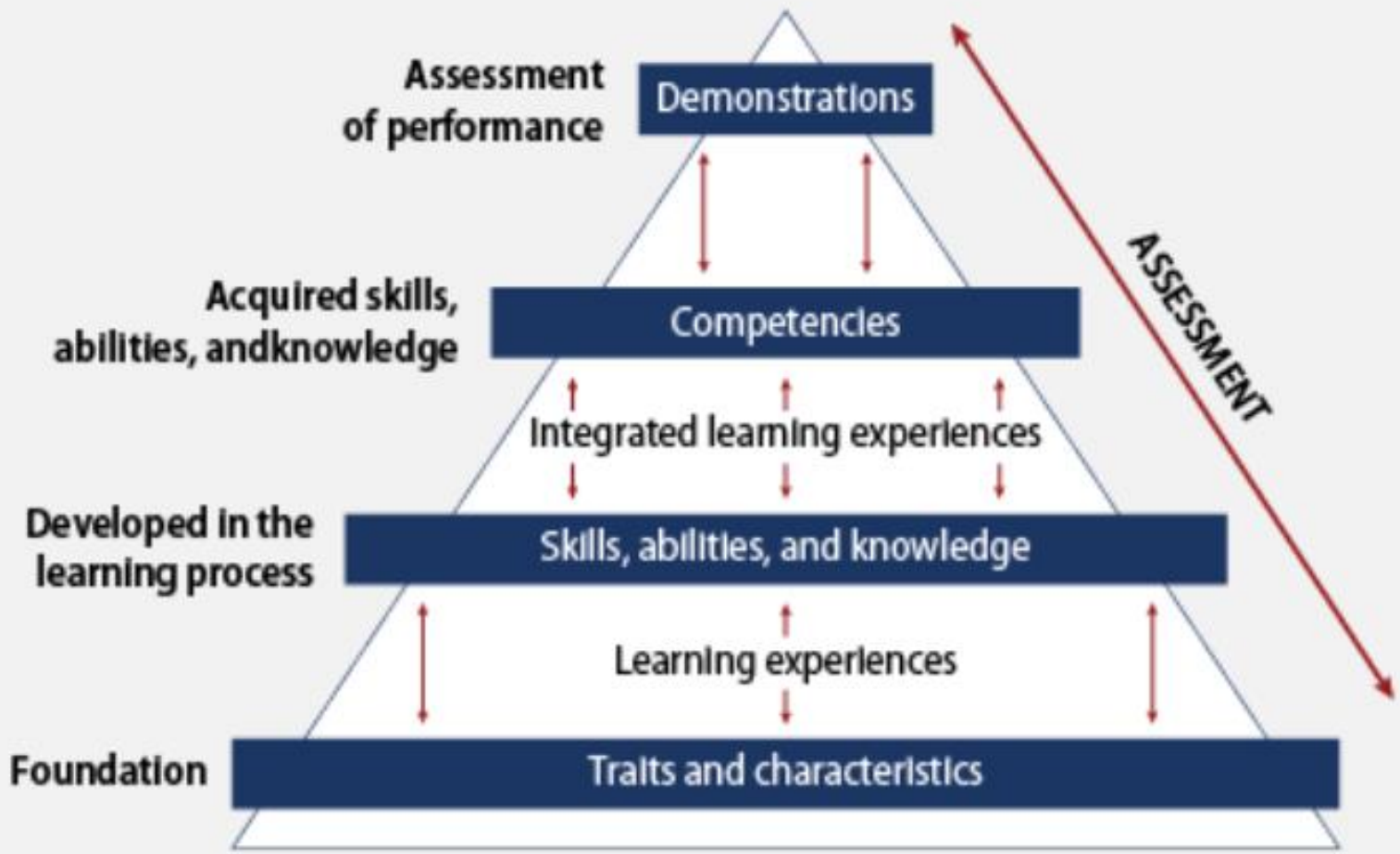
NSCC initially tried an open lab model, but students were confused when they did not see a scheduled time on the semester schedule.

Lab time was schedule one day per week, with extra lab time scheduled on an “as needed” basis. Instructors found that the extra lab time schedule either right before, or right after the scheduled lab time was the most popular.

The set lab time assured the student that the Instructor would be available during this time to get assistance and to perform the skills assessment.

Only the Instructor of record can perform the skills assessment (Hands-On Assessment)

**FIGURE 1**  
**A conceptual learning model**



Source: U.S. Department of Education, 2001.

A traditional model has typically 2-3 written or online assessments.

A CBE model has many more assessments so the faculty can determine mastery of the knowledge/skill of each student in each module.



- **Develop A CUrriculuM**
- 5-7 Industry SMEs meet for 2-3 days to identify all the duties and tasks required for a technology or a job
- At least part of your competencies should be obtained from a DACUM, which you can then say are validated.
- VET all competencies through the Industry SME group
- Do not start from scratch. Start with Competencies and Outcomes from other ATE projects.

# DACUM results for a Class 2 Water Operator in Ohio.

DACUM is an Ohio State format

**DACUM Research Chart for Class 2 Water Operator**

Duties		Tasks				
A	Manage Source Water	A-1 Identify source water area	A-2 Collect raw water samples	A-3 Review raw water lab results	A-4 Develop source water protection program	A-5 Implement source water protection program
		B-1 Complete facility inspection	B-2 Monitor SCADA system	B-3 Obtain chlorine sample results	B-4 Obtain fluoride sample results	B-5 Obtain turbidity sample results
B	Manage Treatment Processes	B-13 Adjust water treatment rate	B-14 Adjust chemical feed rates	B-15 Fill chemical day tanks	B-16 Backwash filters	B-17 Regenerate water softeners
		B-24 Calibrate bench top meters	B-25 Change flow charts	B-26 Refill bulk chemical storage	B-27 Unload chemical deliveries	B-28 Complete daily worksheet
		C-1 Collect SOC samples	C-2 Collect VOC samples	C-3 Collect TTHM/HAA5 samples	C-4 Collect radiological samples	C-5 Collect lead & copper samples
		C-13 Collect organics samples (e.g., benzene, carbon tetrochloride, toluene)	C-14 Collect crytosporidium/ giardia samples	C-15 Collect special bacteria samples	C-16 Collect dissolved oxygen samples	
D	Manage Distribution Processes	D-1 Monitor chlorine/ chloride residual levels	D-2 Develop backflow prevention program	D-3 Implement backflow prevention program	D-4 Inspect booster stations	D-5 Inspect water towers
		D-13 Maintain hydrants	D-14 Exercise valves	D-15 Read meters	D-16 Maintain meter pit integrity	D-17 Rotate booster/lift station pumps
		E-1 Develop preventive maintenance program	E-2 Change oil/fluids in equipment (e.g., motors, compressors)	E-3 Grease equipment (e.g., pumps, valves)	E-4 Test-run equipment (e.g., pumps, valves, generators)	
E	Perform Preventive Maintenance	E-12 Calibrate	E-13 Calibrate	E-14 Calibrate	E-15 Oversee	E-16 Rebuild

DACUM format  
for Control  
Technicians  
DACUM format by  
NOCTI group in MI

<b>A.</b>		<b>BASIC ELECTRICAL CONTROLS</b>
		Control panel wiring standards
		Wiring & Troubleshooting electrical control systems
	1	Install communication cable and low voltage cable
	2	Install/repair/replace starters
	3	Demonstrate knowledge of electrical safety (NFPA 70E)
	4	Install/maintain relays
	5	Perform panel/box inspections
	7	Troubleshoot/replace/install circuit boards
	8	Operate electrical/electronic test equipment
	9	Perform electrical calculations
	55	Interpret electrical schematics (combine with 56)
	56	Maintain schematic documentation (combine with 55)
<b>B</b>		<b>COMPUTERS/NETWORKING</b>
		Configuring laptop hardware devices
		Using Windows Explorer for disk (drive) utilities
		Installing and removing software
		Network basics and hardware
		Ethernet Basics
		Overview servers and workstation operations
		Troubleshooting a network problem
	50	Use operating systems
	51	Use computer software (tasks covered in technical topic areas)
	54	Use laptop for troubleshooting and installation
	62	Maintain servers and clients using RADMIN
<b>C</b>		<b>DISCRETE CONTROL (PLC &amp; HMIs)</b>
		See Allen Bradley PLC-5/RSLogix5 Dacum
		See Allen Bradley ControlLogix/RSLogix5000 Dacum
	37	Create/modify ladder logic for PLC-5



**AMTEC Duties and Tasks from Original Turbo-DACUM Session**

DACUM format  
for Control  
Technicians  
DACUM format by  
NOCTI group in MI

<b>A</b>		<b>MECHANICAL EQUIPMENT</b>
	<b>1</b>	<b>Troubleshoot/repair/replace brakes &amp; clutches (electromechanical and mechanical)</b>
	<b>2</b>	<b>Troubleshoot/repair/replace gears</b>
	<b>3</b>	<b>Troubleshoot/replace belts, sheaves/pulley</b>
	<b>4</b>	<b>Troubleshoot/maintain chains and sprockets</b>
	<b>5</b>	<b>Troubleshoot/repair/replace cams</b>
	<b>6</b>	<b>Troubleshoot/repair/replace seals and o-rings</b>
	<b>7</b>	<b>Troubleshoot/repair/replace bearings and bushings</b>
	<b>8</b>	<b>Troubleshoot/repair/replace shafts</b>
	<b>9</b>	<b>Perform alignment and balancing</b>
	<b>10</b>	<b>Troubleshoot/repair/replace motors (AC and DC)</b>
	<b>11</b>	<b>Maintain couplings</b>
	<b>12</b>	<b>Maintain fans</b>
	<b>13</b>	<b>Install/maintain valves (cut-off, pressure relief...)</b>
<b>B</b>		<b>PNEUMATIC/HYDRAULIC EQUIPMENT</b>
	<b>14</b>	<b>Troubleshoot/repair/replace pneumatic/hydraulic valves</b>
	<b>15</b>	<b>Troubleshoot/repair/replace cylinders and intensifiers</b>
	<b>16</b>	<b>Troubleshoot/repair/replace hoses and tubing</b>
	<b>17</b>	<b>Adjust pressures and flows mechanically and electronically</b>
	<b>18</b>	<b>Maintain fluid levels for hydraulic systems</b>
	<b>19</b>	<b>Replace filters on hydraulic/pneumatic systems</b>
	<b>20</b>	<b>Troubleshoot/repair/replace gauges</b>
	<b>21</b>	<b>Troubleshoot/repair/replace pneumatic/hydraulic pumps</b>
	<b>22</b>	<b>Troubleshoot/replace accumulators</b>
	<b>23</b>	<b>Troubleshoot/repair/replace air motors</b>
	<b>24</b>	<b>Maintain vacuum system on pneumatic equipment</b>
	<b>25</b>	<b>Maintain filtration systems</b>
	<b>26</b>	<b>Adjust switches and controls on hydraulic/pneumatic system</b>
	<b>27</b>	<b>Install/design hydraulic/pneumatic components to upgrade/enhance systems</b>

DACUM format  
for Control  
Technicians  
DACUM format  
by NOCTI group  
in MI

General Mills, Inc.  
Controls Technician  
Duties, Tasks and Steps

A.			BASIC ELECTRICAL/ELECTRONIC	Tools and Equipment
	3		Demonstrate knowledge of electrical safety	
		a	Ladder safety	Common hand tools
		b	Hazards related to moving equipment	Specialized tools
		c	Electrical safety	
		d	CPR	
		e	Shock hazards	
		f	Pinch points	
		g	Personal Protective Equipment	
			--safety glasses	
			--hard hat	
			--jewelry	
			--shoes	
			--gloves	
			--hearing protection	
			--respirators	
			--body harness	
			--clothing (long sleeves, non-flammable, 100% cotton, etc.)	
		h	Slip and fall hazards	
		i	Slings and lifting equipment	
		j	Confined space entry	
		k	Hot work permits	
		l	Scaffold safety	
		m	Fire extinguishers (types and operation)	
		n	HAZCOM	
		o	Asbestos hazards	
		p	PCB hazards	
		q	Blood born pathogen	
		r	Emergency response procedures	
		s	Machine guarding	
		t	Potential hazards (energy, chemical and engulfment)	
		u	Lock out/tag out procedures	
		v	Burn safety	



- The grades the students are awarded in the NSCC Ind. Tech hybrid courses are: A, B or F.
- The hands-on assessment (HOA) must have 100% mastery, so students have to get 100. This is not averaged into the grade. It is required.
- The knowledge & application assessment (KAA for short) is the cognitive, online assessment. Student have to get at least an 80% on this assessment to pass the module. They have two tries at taking KAA in each module.
- 16 assessments in each course (8 online, 8 hands-on)

# Employer Engagement

**External Data**

**Topic Resources**

Job Descriptions  
DACUM Comp.  
WFD Demand  
Employer RT  
Corp. Faculty

**Job Classifications**

Maintenance Mechanic  
Electrician  
Machine Setup

**Delivery of Product**

**Credit Cert/Degrees**

2 Yr. AAS, ATS, AIS  
One-year Cert.  
Gainful Empl. Cert.  
Apprenticeships

-----  
Ind. Automation Maint. Cert.  
Industrial Elect. Cert.  
Industrial Maintenance Degree  
Automation Cert.

**Short Term Public Classes**

Students come to the college  
4 hr. to 24 hr. courses  
Credit or N/C

AB PowerFlex 525 VFDs

**Contract Training**

Students come to the college  
College delivers at company  
4 hr. to 24 hr. courses  
Credit or N/C

-----  
AB PowerFlex 525 VFDs  
Intro to AB ControlLogix

**Internal Product**

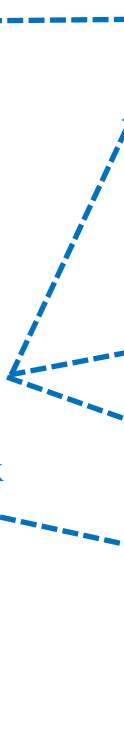
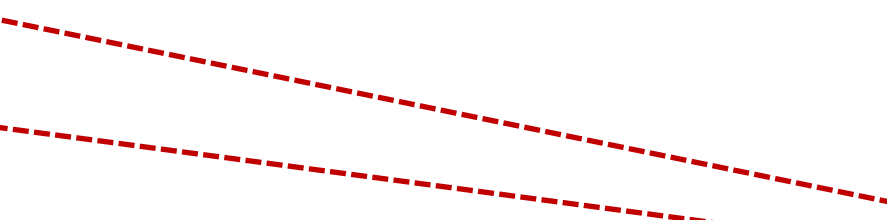
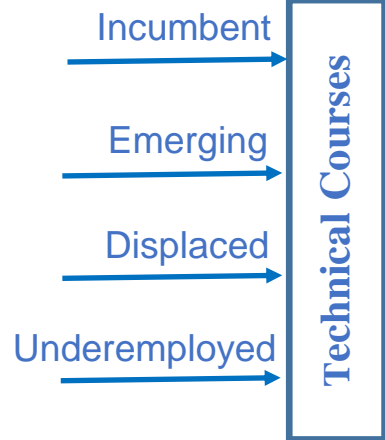
**Technical Topics**

Basic Electrical  
Handtools  
Powertools  
Ind. Safety  
Pneumatics  
Hydraulics  
Mech Print Read  
Motor Control Cir  
Motors & VFDs  
PLC Basics  
AB CompactLogix  
AB ControlLogix  
Ethernet basics  
Rigging  
Pumps  
Pipefitting basics  
Machine Repair

**Technical Courses**

IND120 IE1  
IND121 IEII  
IND223 M&C  
PLC200 PLCI  
IND134 IFPI

Types of Students



# Show Electrical Course Sequence And Course Overview Sheets

**Oversight Group:** At some colleges this would be an Advisory Board for a program. The BILT model was implemented at Terra State CC in Ohio. This group is like a steering committee for their technical curriculum.

**Technical Topic Roundtables:** Our project team found the best way to get input on a topic such as the content of a PLC course, or a fluid power course, is to hold an industry roundtable. This consists of 3-4 SMEs in a 45-minute Zoom meeting. An outline is sent to each 1 week ahead of time, consisting of no more than a 2-page outline of topics that will be reviewed. Input is documented, then sent back out to the small group for their final review. A special focus should be on the hands-on skillset that is required. The nice thing about using Zoom, is the college can do a one-on-one meeting with an SME if they cannot get to the Zoom meeting. Most of all, respect their time and thank them for their input.

**Communicate** the results of the Roundtable back to the Oversight Group and explain how the curriculum will be adjusted to improve effectiveness and/or access.



- How does the Technology division at SECC Iowa engage employers?
- Accrediting bodies like a comprehensive employer engagement strategy
- Purpose of an Advisory Board
- Purpose of an Industry Roundtable
- Purpose of a Focused Industry Visit
- Industry Consortia (Adv. Mfg. Consortium & Lean Mfg. Consortium)

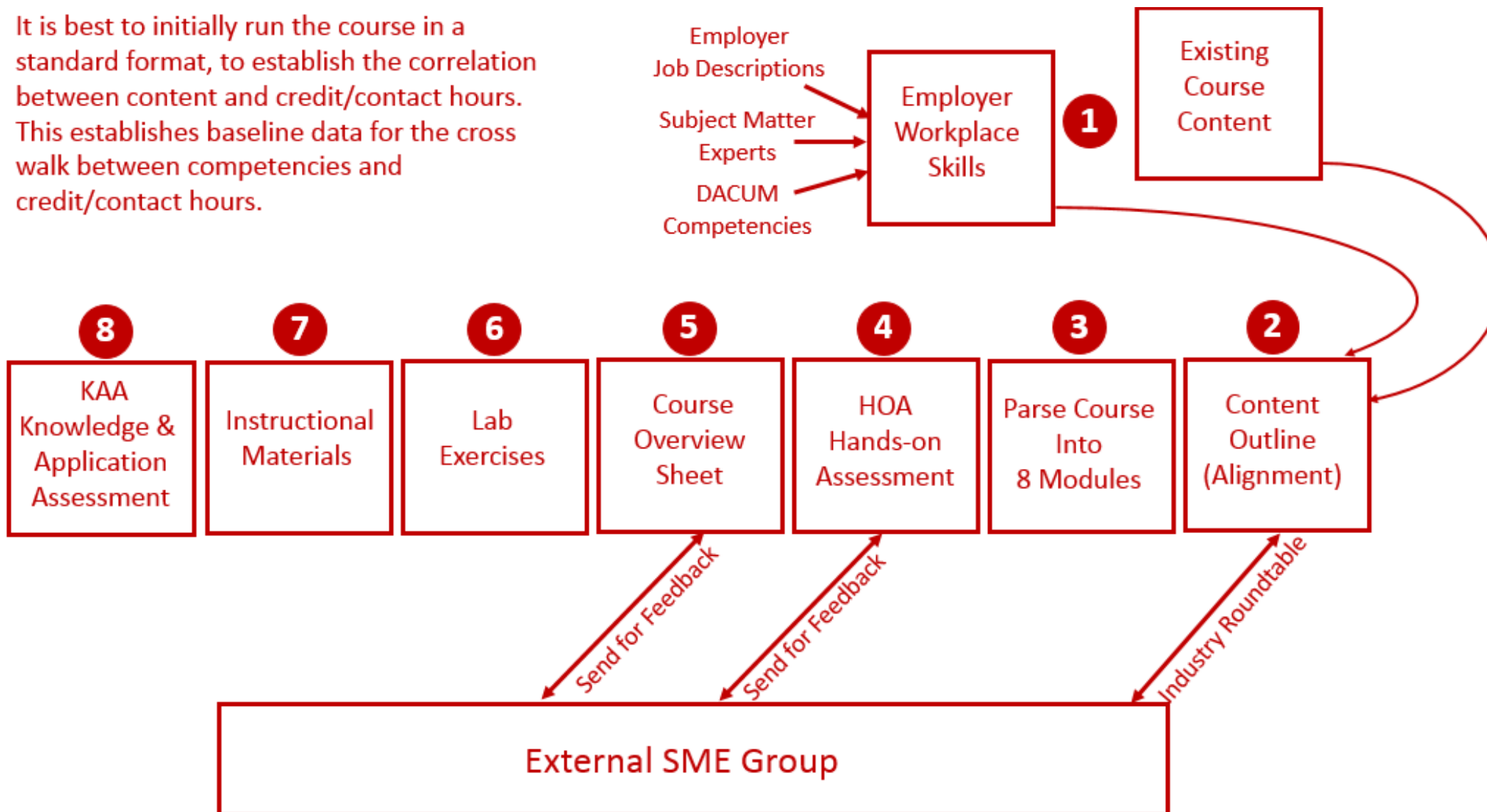
# Importance of an External SME group

- SME stands for Subject Matter Expert
- 4-6 of these SMEs should be identified to vet information through as part of the development process
- It is important to have all knowledge and skills development, align to the workplace
- This will be done through validated competencies, and measurable outcomes

# Review Existing CB/H Technical Courses

# Reverse Design:

It is best to initially run the course in a standard format, to establish the correlation between content and credit/contact hours. This establishes baseline data for the cross walk between competencies and credit/contact hours.



Hands-On	Course Topics	Design
	Course Outcomes	Design
	Performance Assess.	Assessment
PPT/PDF Reading Videos	Lab Exercises	Preparation
	Instructional Mat.	Preparation
	Online Assessment	Assessment
	Practice Quizzes	Preparation



Development Shells

Home

Modules

Grades

Announcements

BryteWave Course Materials

Smarthinking Online Tutoring

Studio

Microsoft OneDrive Materials

Smarthinking Online Tutoring

Studio

Smarthinking Online Tutoring

Studio Online Tutoring

Studio

Microsoft OneDrive Smarthinking Online Tutoring

Studio Online Tutoring

Studio

Studio

Microsoft OneDrive Smarthinking Online Tutoring

Studio

Studio

Microsoft OneDrive

Course Evaluations

Attendance

Submit Final Grades

Files

People

Discussions

Expand All

View Progress

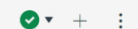
Export Course Content

Publish All

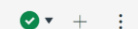
+ Module



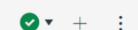
Course Overview | Start Here



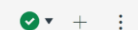
MODULE 1: Basic PLC Operation and Communications



MODULE 2: AB SLC-500 and RSLogix 500 Basics



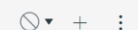
Performance Assessment #1



MODULE 3: AB SLC-500 Timers, Counters and Subroutine Instructions



MODULE 4: AB PLC-5 and RSLogix 5 Basics



Performance Assessment #2



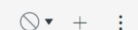
MODULE 5: AB CompactLogix, ControlLogix and Studio5000 Basics



MODULE 6: AB CompactLogix & ControlLogix: Data Types, Timer & Counter Instructions



MODULE 7: AB CompactLogix & ControlLogix Compare and Move Instructions



MODULE 8: PLC Troubleshooting & Maintenance



How To Get Started?  
Choose 1 course to start with.

# The End of the Presentation