Course Assessment- Part B: Your Results & Analysis

COMPLETE #638

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EET 219- Programmable Logic Controllers- Kalie Brunton- Part B- Winter 2024

*** Part B: Your Results DIRECTIONS 1. Report the outcome achievement data gathered via the assignments, tests, etc. you identified for each outcome (question 3) of your Part A. (Only include data for students who completed the course. Do not include students who withdrew or earned an incomplete) Data for all 3 outcomes should be reported below.**

The first assessed course outcome focused on students' familiarization with PLC system components and the degree to which they became able to identify functionality and appropriate application of these components. Written assessment and a final practical/oral assessment was given in order to gauge student success regarding this course outcome. All students demonstrated a satisfactory understanding of when to use which component (for example, selecting the use of digital cards when adding push buttons or indicator lights to the system and selecting the use of analog cards when adding potentiometers or proportional valves to the system). The final exam included a programming challenge that was unique to each student, meaning that no two programs ended up the same and each student had to complete his own work, though collaboration/collective brainstorming was allowed. The worst grade received on this final exam was a B.

The second assessed outcome involved a look at students' budding programming proficiency. This outcome was assessed with weekly labs. Each week for seven weeks (after initial construction of the trainer boards), students were presented with a different programming challenge. Each challenge progressively required more advanced programming instructions and different hardware. These were not timed challenges. As long as the objective was achieved, full credit was given. Some students finished quicker than others, but success for these labs was overall very high. For these programming labs, there was a near 100 percent completion rate (98.5 percent).

The third and final assessed outcome concerned students' ability to accurately wire a system according to a schematic diagram. The first two labs periods of the course were devoted to construction and wiring of the trainer boards. Each student built his own, and of the ten boards that were constructed, eight worked as intended upon initial power-up. Two boards did not function as intended, but the students were able to troubleshoot the system and diagnose the problem in both cases. Troubleshooting is a critical skill for electro-mechanical technicians; these two initially malfunctioning boards provided an opportunity to develop this skill. All students eventually got their boards to work and all students achieved this course outcome to satisfaction.

*** Outcome #1**

Know the basic components and their functions that are common to programmable logic controllers.

*** % of students who successfully achieved the outcome (C or above)**

100

*** Outcome #2**

Create, monitor, and edit programs for different applications, utilizing basic instructions.

* % of students who successfully achieved the outcome (C or above)

100

* Outcome #3

Implement proper ground isolation and signal wiring for use with PLC communications.

* % of students who successfully achieved the outcome (C or above)

100

* ANALYSIS 3. What contributed to student success and/or lack of success?

Not every student had the same level of ability/understanding when entering this course or exiting it. However, all students were able to complete each challenge for each lab. I attribute this success to the collaboration/collective brainstorming that I allowed during the lab periods. Individual students each had their own system and were required to do their own work on that system, but everyone was allowed to talk to everyone else and get help and ideas. As a result, even students with less ability/understanding were able to get their systems to work as intended, eventually. Lab periods were generally lively, with students walking around to each other's projects to get ideas.

* 4. Helping students to realistically self-assess and reflect on their understanding and progress encourages students to take responsibility for their own learning. Please compare your students' perception of their end-of-term understanding/mastery of the three outcomes (found in student evaluations) to your assessment (above) of student achievement of the three outcomes.

Half of the class completed the survey for the course. I was most pleased to see the responses in which they assessed their level of understanding at the beginning of the course compared to their level of understanding at the end of the course. All students that responded indicated that their understanding of the subject improved significantly. Some of them did indicate that they now considered their understanding of the subject to be at an "expert" level, which is realistically probably not the case. Yet I am still delighted by this assessment of theirs, as it reveals that they feel competent and confident in their abilities to work with PLCs as technicians, which is the goal of the course. I tell students at the outset that it is impossible to convey every piece of knowledge to them over the course of the course; the goal is to significantly increase their knowledge base and to give them the foundational tools so that they have the ability to continue to develop their knowledge and abilities on their own. Both I and the students evidently agree that we achieved that goal together.

* 5. Did student achievement of outcomes meet your expectations for successfully teaching to each outcome (question 4 from Part A)

Absolutely. All students received a B or better on the final exam (assessment of outcome #1), the lab completion rate was 98.5 percent (assessment of outcome #2), and all students were able to construct a working PLC trainer board, though some troubleshoo

* 6. Based on your analysis in the questions above, what course adjustments are warranted (curricular, pedagogical, student instruction, etc.)?

Ultimately, I am pleased with student success in this course. But this is only my second time teaching the course, and I am frequently taking note of things that I would like to do differently next time. I believe it is effective to include oral assessment methods of a student's knowledge, as some students perform better when conversing about their knowledge than taking a written exam. While I included oral assessment this year, it wasn't formalized. It took more the form of asking them questions about what they were doing while they were doing it. Next year, I would like to try formalizing the oral portion of the exam, letting the students know in advance that it is indeed a portion of their exam. Some students were able to execute the challenge successfully, but did not have the clearest verbal responses about what they were doing and why. I'd like to try formalizing the oral exam portion in order to encourage students to put intentional effort into articulating their knowledge and ideas and see if this contributes to their confidence level and also develops their ability to be able to convey what they know to employers.

7. What resources would be required to implement your recommended course adjustments (materials, training, equipment, etc.)? What Budget implications result?

No additional resources are required.

*** 8. Describe the results of any adjustments you made from the last assessment of this course (if applicable) and their effectiveness in student achievement of outcomes.**

This is the first time I have assessed this course.

9. Describe how you explain information about course outcomes and their relevance to your students.

The students and I go over the syllabus in the first class period of the term. The goal of this is to mentally prepare them for the pace and content and inform them about what to expect as far as course outcomes. Over the course of the term, I try to often highlight what I consider to be the most important outcome for any course – pointedly asking the students if they know more than when they came in for the day. I hope that this reminds them that the goal of technical education is not meaningless assessment or rigid adherence to dubiously relevant standards. The goal is continuous learning and elevation of our abilities.

10. Please describe any changes/additions to instruction, curriculum or assessment that you made to support students in better achieving the CGCC Institutional Learning Outcomes: ILO #1: Communication. The areas that faculty are focusing on are: "Content Development"and/or Control of Syntax and Mechanics" and ILO #2: Critical Thinking/Problem Solving. The areas that faculty are focusing on are: "Evidence" (Critical Thinking) and/or "Identify Strategies" (Problem Solving). ILO #4: Cultural Awareness. The area that faculty is focusing on is: "Openness" (Encouraging our students to "Initiate and develop interactions with culturally different others") ILO #5: Community and Environmental Responsibility. The area that faculty are focusing on are: "Applying Knowledge to Contemporary Contexts" and "Understanding Global Systems" ILO#3 - Quantitative Literacy - "Application/Analysis" and/or "Assumptions"

Relevant to ILO #2, in order to encourage the development of students' critical thinking/problem solving, I tried to take a more "hands-off" approach this year than I did last year, regarding student troubleshooting. When their project isn't working, most often I see the problem right away and am tempted to guide them directly to it so that they don't get frustrated. However, this year I consciously tried to avoid direct guidance, though I could still do better next year. I want to encourage their troubleshooting ability and their ability to "identify strategies." Rather than point them toward the problem I see, I would prefer to ask them questions that help them to develop their own methods for solving the problem.
Another addition to my curriculum this year was "documentation scavenger hunts." A key function of an electro-mechanical technician is sorting through device documentation to find the information you need. I believe this supports ILO #3 regarding quantitative literacy. Rather than give the students every relevant number, parameter, and piece of information that they need, I would like them to be able to scan a datasheet/manual to locate and interpret that information, as this is a key that separates exceptional technicians from mediocre ones.