



# Achievement in Programming Skills of Industrial Robot and Attitudes toward Learning with Industrial Robot of Student Industrial Type of Course Srisongkham Industrial Technology College, Nakhon Phanom University

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**Abstract:** This research is experimental research. The purpose is to compare student achievement. Programmable robot control arm and attitudes toward learning. With student robotics Industrial technology in High vocational certificate level (Senior high school) of Srisongkham industrial technology College, Nakhon Phanom University. Registered in the course. Welding and sheet metal By specific method. Students are divided into 3 groups. Subjects: Electrical, Automotive and Electronic. The level of education is good. Group of 5 people, total 15 people, 2 experiments. The results showed that in the first experiment, Take the time to write a robot driver. From start to finish, ready to run. The highest score was 5.59 minutes. It took at least 5.11 minutes to write the robot control program. Attitude toward learning by robot showed that students have good attitude towards learning with all robots. I have seen the real work and have used the standard work program. Have a good job. He has been working in the field of robotics in the industry after graduation.

**Keywords:** Industrial robot 1; Attitude 2

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## 1. Introduction

Robotics and automation have a great influence on the industry because Thai robots education contributes to the development of logical thinking processes and inspire creativity (Logical Reasoning and Creativity). One of the problems of learning or controlling industrial robots is a student or a user who does not have enough robotics backgrounds. The content context is complex and difficult in a limit time. Learners or users lack imagination in visualization, trajectory, robotic work, and robotic control programs [1].

Srisongkham industrial technology college, Nakhon Phanom University is teaching in vocational education and in the course of industrial skills. All levels of high vocational certificate in the department which will be taught robot welding industrial control. From the study and teaching, it was found that the same teaching methods in the industry. The results of each group of students were different. Therefore, the researcher is interested to study with students in the field of industrial arts. Srisongkham industrial technology college, Nakhon Phanom University is compare learning achievement with industrial robot. It can be improve and develop the teaching and learning of industrial robots.

## 2. Materials and Methods

Research objectives compare to student achievement programmable robot control and the attitude toward learning. Industrial robot of students in 3 disciplines of Srisongkham industrial Technology College, Nakhon Phanom University.

I. Research samples include industrial students in the first year of high vocational education. (Graduated from Senior High School) There are 3 departments include Electrician department, Mechanical department and Electronics department. The registered in the course was welding and metal sheet selected by students. Each department had a good level of 5 students. Each person will conduct 2 experiments per person. Before the experiment, students will understand how to write commands with the program KUKA-SimPro3. Prior to programming experiments. Table in research samples in Figure 1

Sequence	Department	Number(person)	Grade Point Average
1	Electrician	5	3.20
2	Mechanical	5	3.21
3	Electronic	5	3.20

Figure 1. The table in research samples

II. The tools used in this research include Quiz and Welding robot. The researcher created the test and to use in teaching and learning unit. Welding work triangle technique. Trial size, welding position that show in Figure 2

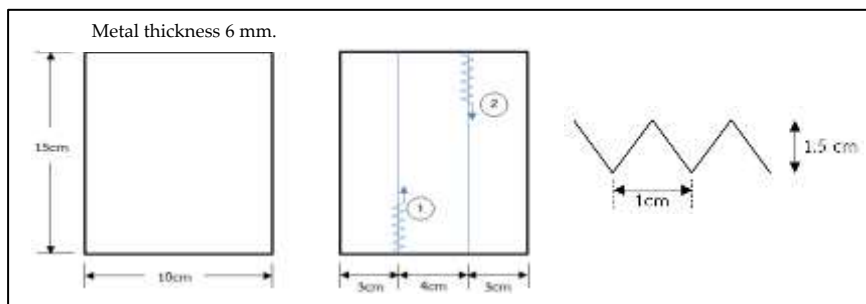


Figure 2. Trial size and welding position

The robot used in the experiment was a six-axis. Models used KUKA KR8 R1420ARC, Controller generation KR C4 ,Welding machine with Fronius electric in model: Trans Steel 3500,Gas welding of CO2,Wire measuring 1.2 millimeter. The equipment used in the experiment show in Fig 3.

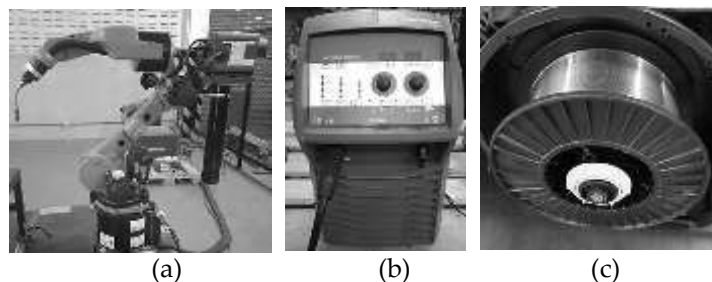


Figure 3. The equipment used in the experiment (a) 6-axis Robotics (b) Welding machine and (c) Wire measuring 1.2 mm

### 3. Experimental Results

The results of programming experiments. According to the test set. The students in each subject tested. By the 1<sup>st</sup> time, all students have not used KUKA-SimPro3 program to practice welding position. In the second, students practice the positioning of the KUKA-SimPro3 program. Then save the results, find the average time programming and the accuracy of programming. Result show in Figure 4.

Number (person)	Department					
	Electrical		Mechanical		Electronic	
	1 <sup>st</sup> time	2 <sup>nd</sup> time	1 <sup>st</sup> time	2 <sup>nd</sup> time	1 <sup>st</sup> time	2 <sup>nd</sup> time
1	✓	✓	✗	✓	✗	✓
2	✗	✓	✗	✓	✗	✓
3	✗	✓	✓	✓	✗	✓
4	✗	✓	✓	✓	✓	✓
5	✓	✓	✗	✓	✗	✓

Note : sign ✓ indicates correct and ✗ is invalid.

Figure 4. Table in compare the accuracy of positioning and the accuracy of programming

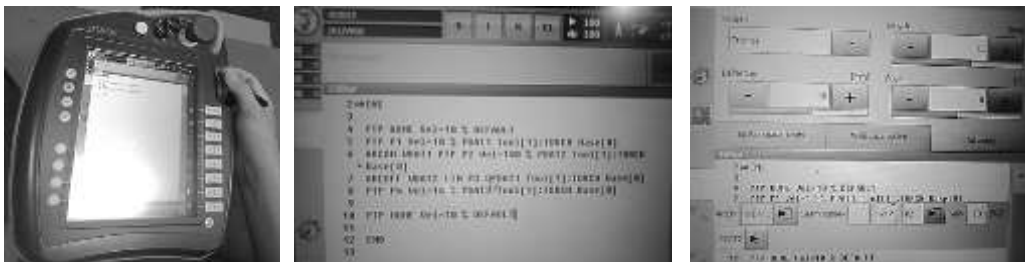


Figure 5. Programming with KUKA-SmartPad

Compare the results of the average time to program before and after the program with the KUKA-SimPro3. Show in Figure 6

### 4. Conclusions

The purpose is to compare student achievement. Programmable arm robot control and attitudes toward learning with student robotics industrial technology in High vocational certificate level (Senior high school) of Srisongkham Industrial Technology College, Nakhon Phanom University. By the 1<sup>st</sup> time analysis of robot driver programming found that the field of electronics technicians. The average time spent on programming was the maximum of 5.59 minutes. The lowest average spending time was mechanical department 5.56 minutes. And the results of programming robot control program in the 2<sup>nd</sup> time. It was found that students in all branches spent less time than the 1<sup>st</sup> time. And the least time spent in programming is electronic department. The average time is 5.10 minutes.

Attitude toward teaching and learning by industrial robots. Found that students of all disciplines have a positive attitude towards learning with robots. Since seeing the actual work and

the program commands are standard. Have a good job. He has been working in the field of robotics in the industry after graduation.

Number (person)	Department					
	Electrical		Mechanical		Electronic	
	Time of programming (minute)		Time of programming (minute)		Time of programming (minute)	
	1 <sup>st</sup> time	2 <sup>nd</sup> time	1 <sup>st</sup> time	2 <sup>nd</sup> time	1 <sup>st</sup> time	2 <sup>nd</sup> time
1	5.52	5.25	6.01	5.31	5.57	5.44
2	5.23	5.09	5.58	5.24	6.12	5.09
3	6.02	5.57	5.43	5.16	5.51	5.27
4	6.05	5.51	5.22	5.04	5.40	4.58
5	5.11	5.04	5.56	5.15	6.10	5.15
$\Sigma$	27.93	26.46	27.80	25.90	28.80	25.53
$\bar{X}$	5.58	5.29	5.56	5.18	5.59	5.11
SD.	0.4362	0.2402	0.2895	0.1017	0.3336	0.3230

Figure 5. Table of test results average time to program before and after

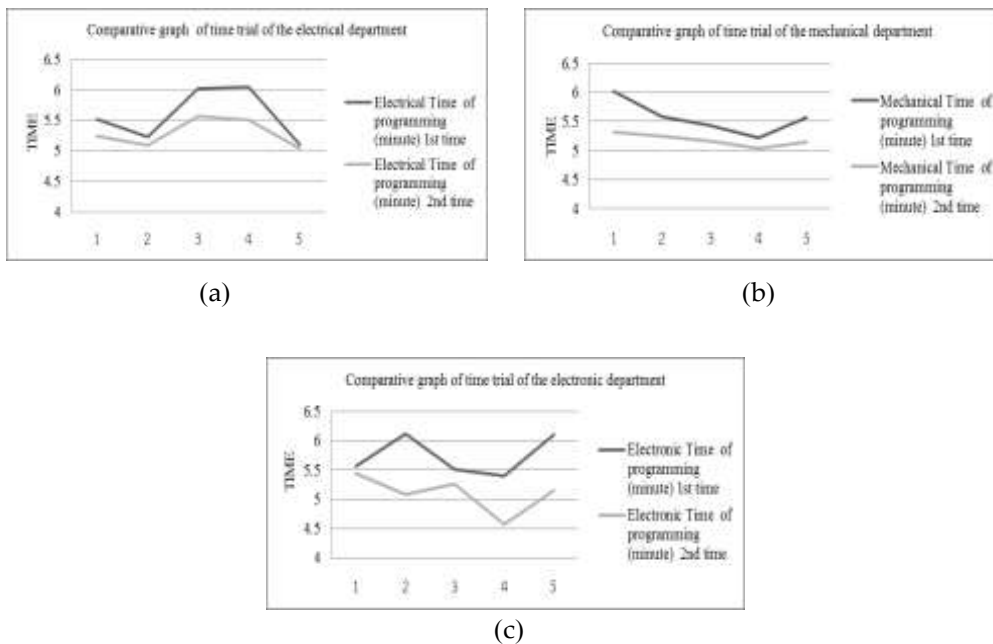


Figure 6. (a) The graph compares the time trial of the electrical department, (b) The graph compares the time trial of the mechanical department, and (c) The graph compares the time trial of the electronic department

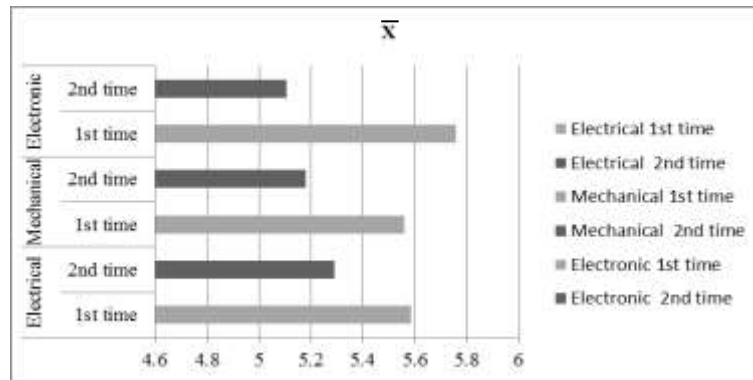


Figure 7. The comparative graph of average time to programming



Figure 8. Process before and after programming experiments

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