

Thesis Title	A Comparative Study on Problem-Solving Skill for Conventional and Problem-Solving Laboratory Instruction
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Candidate	Mr. Kitipong Pongjampa
Supervisors	Dr. Choosak Plienpoo Assistant Professor Praophan Plienpoo Associate Professor Chaleomphol Numkang
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Abstract

This research aimed to study a problem-solving ability achieved from a set of laboratory instruction. A comparison of problem-solving ability obtained from two types of laboratory instruction : conventional and problem-solving ones, were made to evaluate instructional efficiency. It was believed that students learned problem-solving laboratory would have higher problem-solving ability than those who learned from a conventional one. Two sets of laboratory worksheets and their respective test items were major research tools of the study.

An operational amplifier controlling a domestic heater was used as a contextual medium for both types of laboratory. Three trouble shooting were set up in the circuit acting like a problem-solving source. They were the faults from : using wrong measuring instruments, using wrong bias for a switching transistor, and the mal-function of the circuit. Two types of laboratory were developed from the said content. The conventional laboratory using normal experimental step was adapted from the existing laboratory. The problem-solving laboratory employing problem-solving experimental style was newly developed which was validated and approved by five lab-experts with the acceptance index ranging from 3.4 to 4.6 of 5 rating scale.

Thirty test items were used to measure students' problem-solving abilities. They were of four multiple choices test items focussing on 3 irregular situations in temperature

controlling system. The test items were developed and validated by test experts. The approving indices were : 0.42 on difficulty, 0.46 on discrimination, and 0.68 on its reliability.

Students from Lamphun Technical College were used as research population. Forty students were randomly selected from the first year second semester electronic students. Twenty of them were assigned as an experimental group working with problem-solving laboratory work while another twenty were assigned as a controlled group working with conventional laboratory work. Both groups were pre-tested and post-tested to find out average achievement and T-test was used to test the difference between the two means.

It was found that a significant difference at 0.05 level on problem-solving abilities between the two groups. The findings there was indicated that students who worked with problem-solving laboratories had better performance in this respect. The experimental group had higher average score than the control group in understanding of problem-solving process, problem-solving identification, hypothesis setting, alternative strategies surveying and choosing, problem-solving executing, and result conclusions. The experimental results could be shown respectively in the following figures 31%, 60%, 65%, 50%, 83% and 35%. The study also showed that 13% of the average scores of students increased in working on the hysteresis of operational amplifier situation which was lower than those in working on the collector-emitter junction of switching transistor and on relay situations of back e.m.f. where 55% and 44% of these achievements increased. The study indicated, however, a problem about the experimental process in problem-solving laboratory work. They consumed much longer time than that used in the conventional type.

Keywords : Problem-solving Laboratory Sheet / Conventional Laboratory Sheet / Experimental process in problem-solving