

Enhancing students' learning to solve word problems in Thermodynamics based on Newman's Error Analysis

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In the engineering curriculum, courses are highly based on understanding of fundamental concepts. The traditional lecture format of introductory engineering courses presents many challenges to both teaching and learning. This action research aims at improving the performance of eight New Zealand Diploma in Engineering (Mechanical) students enrolled in Thermodynamics through enhancement of their learning to solve word problems based from Newman's Error Analysis. With the researcher's length of experience in teaching engineering courses, it has been observed that solving mathematical word problems has been a major issue in engineering education. A common view among teachers and students is that worded problems in engineering courses, especially in Thermodynamics, is an area where most students have difficulties and eventually fail their papers. In this study, the researcher employed the Newman's Error Analysis (NEA) procedure to identify the errors of the students in solving mathematical word problems in Thermodynamics. From these identified errors, the researcher has developed a study guide designed to enhance the students' learning of the course. The group of eight Year 1 students enrolled in DE5301 Thermodynamics were pre-tested and post-tested. The pre-test (diagnostic test) helped the researcher to identify the root cause of students' stumpy performance in solving mathematical word problems in Thermodynamics using the procedure of NEA. From the results of the post-tests (Progress Test), a statistical analysis determined if the intervention (developed study guide) had a significant effect. The researcher used this analysis in developing and testing the effectiveness of the study guide that was incorporated into the traditional procedure of lecturing the topic on mathematical word problems.