USE OF FORCE CONCEPT INVENTORY TO ASSESS THE CONCEPTUAL KNOWLEDGE OF SECONDARY LEVEL STUDENTS IN FORCE AND WAVE CONCEPTS

A PROJECT REPORT PRESENTED

BY

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to the Board of Study in Science Education of the

POST GRADUATE INSTITUTE OF SCIENCE

in partial fulfillment of the requirement

for the award of the degree of

MASTER OF SCIENCE

of the

UNIVERSITY OF PERADENIYA

SRI LANKA

2004

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Abstract

Force and wave concepts are fundamental for the study of physics and they form the base of several other physics concepts. The main objective of this study is to investigate students' understanding of these concepts, assess understanding levels between gender groups, streamwise and gradewise differences and to examine whether practical- based remedial teaching will enhance students' performance.

The instrument used was a diagnostic test at grade 10 level, consisting of fifty multiple choice questions modeled on the Force Concept Inventory which covers the basic concepts of Newtonian mechanics. Classes from grades 11 to 13 were taken from Kandy and Trincomcalee district schools as samples. The test items were grouped into five topics, Newton's 1st, 2nd and 3rd Laws, Oscillation and Resonance and the Wave concept.

Results of the analysis showed no notable differences in knowledge levels between genders and between mathematics and biology streams in grade 12. But in grade 13, mathematics students fared much better than biology students. Grade 12 students performed better than grade 11 students but the differences in scores were made mostly in numerical problems.

In order to examine whether practical remedial measures increased performance, a class of 35 students of grade 11 in the low performance categories were selected based on their responses to the diagnostic test. The class was divided into six groups and group practical activities were assigned to them. 12 work sheets were also prepared for the twelve activities. The results indicate substantial increases in performance in practical applications but not much in theory. This is because certain concepts cannot be taught by practical work alone. Also, it was found that the students lacked competence in interpreting graphs.

The researcher's opinion is that, in order to strengthen practical applications in learning physics concepts, frequent workshops should be organized for teachers and the students' progress be assessed through annual practical examinations.