DIFFERENCES IN KNOWLEDGE REPRESENTATION

ABOUT NEWTON'S LAWS OF MOTION

BETWEEN TWO GROUPS OF

PHYSICS STUDENTS

A PROJECT REPORT PRESENTED

BY

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Abstract

This project report titled, Differences in knowledge representation about Newton's laws of motion between two groups (Grade 12 and Grade 13) of Physics students is based on a study which examines the differences in knowledge representation between two groups of school students with different levels of study of the unit on Newton's laws of motion.

Twenty eight of grade12 (group I) and thirty one of grade13 (group II) Physics students from two National schools in Trincomalee district participated in this study. Group I had completed this unit at G.C.E (O/L), and group II had studied it further at G.C.E (A/L). A list of forty-two objectives as statements were presented for the understanding of Newton's laws of motion and defined as the content boundaries of the assessment.

Differences in knowledge representation of two groups were assessed by three types of assessment namely a diagnostic test, an interview and a concept-mapping task. The diagnostic test consisted of 10 structured essay items and the interview consisted of 7 items. Students constructed three separate concept maps for the three Newton's laws of motion.

All items in the diagnostic test and interview elicited a response that could possibly be related to the objective. The items in the diagnostic test and interview were grouped into five titles as (I) straight line motion, (II) Newton's first law of motion,(III) second law of motion,(IV) third law of motion, and (V) momentum and collision in order to assess the differences in the knowledge representation between the two groups of students. Title (V) was meant only for group II.

The students' responses generated for the diagnostic test were subjected to the coding scheme of the five categories and the responses generated for the interview were subjected to the coding scheme of the four categories. Then, each item in the diagnostic test and interview were analyzed to determine student's understanding of, and identify misconception about, Newton's laws of motion.

The Chi- square test was used to determine whether a true difference exists between the two groups of students. Analysis of variance (at 5% significant level) reveals that there was no significant difference in the knowledge representation about straight-line motion and in the 1st law of motion between the two groups of students. For the 2nd law of motion and the 3rd law of motion there was a significant difference shown only in the diagnostic test.

Analysis of variance of concept maps reveals that there was no significant difference in the knowledge representation about Newton's laws of motion between the two
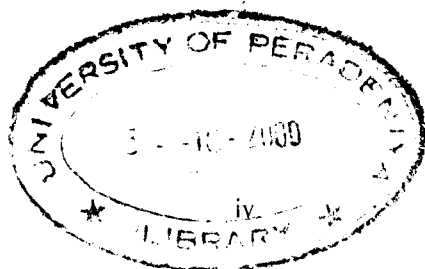
groups and both groups were at same level in putting inappropriate concepts and links in concept maps of 1st, 2nd and 3rd law of motion.

The study also provides evidence that most of the group II students continued to have misconceptions of Newton's laws of motion similar to group I students even after they have studied these laws of motion in more detail at G.C.E (A/L) class.