

DIFFERENCES IN UNDERSTANDING OF MECHANICS CONCEPTS BETWEEN HIGH SCHOOL STUDENTS WHO CHOOSE 'ADVANCED PHYSICS' AND THOSE WHO DO NOT

Anju Kouno and Shuji Munejiri

Presenting Author: Anju Kouno (m213883@hiroshima-u.ac.jp)
Graduate School of Advanced Science and Engineering, Hiroshima University, 739-8521, Japan

KEYWORDS: force concept inventory, high school student

We will present on a study where we administered the Force concept inventory (FCI) (Hestenes, 1992) on students at a girls' high school in Japan. In this high school, about 70% of the students learn basic physics (BP) in the first year of high school, and about 60% of them learn advanced physics (AP) in the second and the third years of high school. The students who choose BP are not only those who are going to major in science, but also liberal arts. In the second year of high school, students who do not choose AP are either liberal arts students or science students who do not choose AP. Comparing the group of students who choose AP, group A, with the group of students who do not choose AP, group B, their concept of mechanics may be different at the time they are learning basic physics. The purpose of this study is to investigate the mechanics concepts and misconceptions that group A and group B students have during their first year of high school when they are learning BP.

The FCI was administered as a pre-test in April at the beginning of the semester and as a post-test in February at the end of the semester. The numbers of students of group A and B were 167 and 134, respectively. The scores for all 30 questions of the pre-test for groups A and B were 8.8 and 7.4, indicating a significant difference between them. As for the questions on impetus and activation force, although groups A and B had similar percentages of correct answers in the pre-test, group A had a higher percentage of correct answers in the post-test.

In addition, multivariate analyses such as the confirmatory factor analysis and the structural equation modeling were conducted. The factor analysis assumes that a small number of latent factors exist behind the observed FCI data. The structural equation modeling is a method to analyze the relationships among those latent variables. In this study, we examined the relationship between latent variables in the pre-test and post-test and will discuss whether there are differences in the way and order of mechanics concept understanding between students who choose AP and those who do not.

REFERENCES

Hestenes, D., Wells, M. & Swackhamer, G. (1992), Force concept inventory. *The Physics Teacher* 30, 141-158.

The latest version of the FCI revised in 1995 and its Japanese version are available at PhysPort, Retrieved July 24, 2022, from <https://www.physport.org/assessments/assessment.cfm?l=5&A=FCI>

Proceedings of the IUPAP International Conference on Physics Education, ICPE 2022 5-9 December 2022, page 113, ISBN: 978-1-74210-532-1.