

THE EFFECT OF PRODUCTIVE FAILURE ON MATHEMATICS MORE-KNOWLEDGEABLE STUDENTS

by Endah Retnowati, Djamilah Bondan Widjanti, Endang Listyani, Husna Arifah

ABSTRACT

This study aims to describe whether there is a productive failure effect on students who have advanced level of knowledge. Productive failure is a learning strategy in which students are challenged beyond their thinking capacity so that they experience mistakes in solving math problems, then are given feedback so they can learn from these mistakes. To achieve this goal, a worked example-based mathematics learning experimental research was designed in terms of cognitive content and students' knowledge transfer abilities. In this lesson, worked examples serve as feedback. Students learn from a set of problem solving first, then a set of worked examples. The effects of productive failure have previously been widely studied, but in this study the aspects of high element interactivity and high prior knowledge were added as novelty research. Prior to the experiment being carried out, a diagnosis/identification of students' initial abilities was carried out, preparation of learning schemes and learning implementation plans, so that the level of difficulty of the material corresponded to the cognitive level of the research participants. The experiment was carried out in four phases: introductory, acquisition, retention and far transfer. During the experiment, the division of the test class was in accordance with the design used. Several experiments or tests with modified treatments will be carried out in accordance with the results of empirical data analysis to finalize the resulting final design. After the experiment was carried out, an assessment was made of the ability to transfer through written tests that were retention and far transfer. For more knowledgeable, productive failure instructional designs can allegedly direct students to develop various problem-solving strategies, but for problems with low-element interactivity. A total of 89 students who took the Differential Equation took the Heat Equation course, in which all the prerequisite knowledge had been studied before. Students also have knowledge of this heat equation. The productive failure method did not prove to have a significant effect on retention and transfer abilities for students at the end of the semester for advanced mathematics courses, compared to the worked-example method. Diagnosis of students' initial ability levels is very important for teachers to be able to apply learning methods that are suitable for students.

Kata Kunci: *problem solving, worked example, cognitive load theory (CLT), instructional design, productive failure, transfer, mathematics*