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THE APPLICATION OF MASTERY LEARNING IN THE TEACHING PROCESS

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Abstract

The teaching method of mastery learning is focused on the process of mastering small units – modules of the educational material to which prescribed material is divided. This paper deals with analysis and evaluation of the results obtained in the subject Physics I, teaching using the mastery learning approach in comparison with the results of the traditional teaching method. As this paper will demonstrate, teaching Physics I via mastery learning led to higher effectiveness because the students of the experimental group have been much more successful than the students of the control group with the traditional teaching method applied.

Key words

pedagogical research, mastery learning, modules of educational material, teaching process, mastery learning in Physics I, analysis and evaluation of didactic test

Introduction

Scientific and technical progress give way to the discovery of new information. Our students are expected to acquire a lot of new knowledge and skills. Although an engineering education places more emphasis on individual learning, working with literature, projects processing, laboratory exercises, and so on, it is still possible to improve the level and effectiveness of conventional lectures and exercises while applying new teaching methods. One such method is mastery learning. To proceed more efficiently it seems useful to work with small groups of students built up on the multiple intelligences theory [3].

This article deals with students´ results achieved by tasks solved through didactic tests.

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Mastery Learning and its Applications

For the application of mastery learning in university courses we must take into account the different conditions of the educational process. The teaching process is usually divided into lectures, exercises, laboratory exercises, or practice. Educational material of one term is split from 1 to 4 modules according to the themes. The mastering of small units – modules of educational material allows students further individual study [2].

Application of Mastery Learning in the Subject Physics 1

The study of Physics for The Faculty of Materials Science and Technology in Trnava is divided into two parts. Lectures are given in the first and second year of study. Teaching Physics I, which is included in the summer term of the first year of studies, is carried out with the format: 2 hours of lectures and 2 hours of exercises. The exercises are used to improve understanding and mastering the prescribed teaching material. The general characteristic is that in the study of physics and other science subjects, students have many problems with the understanding of the prescribed material and it is therefore necessary to seek new, more effective ways of teaching [6]. One of the reasons that cause problems in the study of science (i.e. physics, mathematics, chemistry, as well as many technical subjects) is a low redundancy in the language of these subjects compared with the redundancy of natural language [1]. The core problem is that misunderstanding the importance of one or even several words in a sentence of natural language understanding, does not prohibit one from comprehending the sentence as a whole.

In physics, or other natural or technical subjects often incomprehension of one word of content results in the misunderstanding of the entire meaning of the context. Understanding the context of natural language in this respect is much easier. The aim of mastery learning in the subject Physics should be, first of all that students should thoroughly understand the fundamental concepts and technical terms and be able to utilize knowledge of Physics in the subsequent subjects.

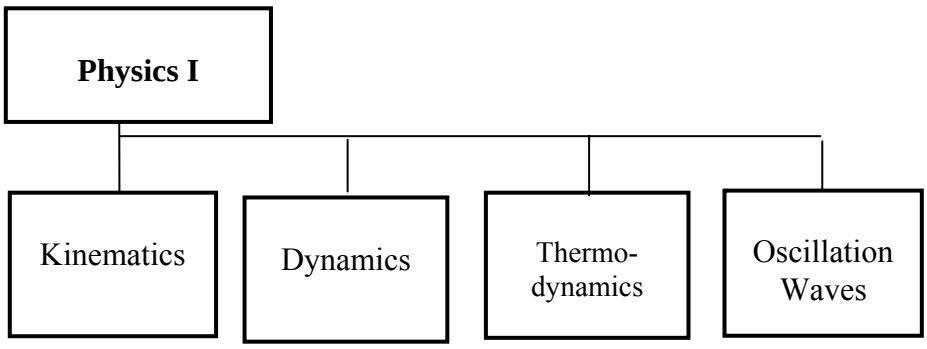

Fig. 1. *Structure of work modules in the subject Physics I*

Empirical Research

Hypothesis: Through mastery learning, students of the experimental group achieve better results in the didactic test focused on understanding than traditional classroom students.

Identification of the Sample of Respondents

The basic sample consisted of the first year students MTF STU (study programs Applied Informatics and Automation in Industry, Quality of Production, Industrial Management). Two groups were chosen from this basic set at random. According to the results of the written work, the group of students had been divided into control and experimental groups as such:

Experimental group: 40 students.

Control group: 28 students.

Research Methods

Research methods used for statistical description and verification of the hypothesis was natural pedagogical experiment, didactic test, and Mathematics - Statistical methods (F-test and t-test)

Realization of the Research

Research was carried out in normal conditions for the MTF STU in the exercises of Physics I in two groups:

Control group: traditional teaching.

Experimental group: the teaching method of mastery learning.

Statistical Description

The students were given a didactic test, so-called NR test, at the end of the experimental research. The educational test was aimed at the understanding by Niemierko taxonomy of educational objectives, with a maximum of 26 points. Results of students in the experimental and control groups in the didactic test with a maximum of 26 points were the following:

STATISTICAL VALUES OF THE DIDACTIC TEST

Table 1

Group of students / Statistical characteristics	Control + Experimental	Control	Experimental
Arithmetical average	57,9 %	43,5 %	72,3 %
Variance	34,77	24,5	45,04
Standard deviation	5,8	4,9	6,7
Variational interval	71,15%	80,8 %	61,5 %
Maximum	94,25 %	88,5 %	100 %
Minimum	23,1 %	7,7 %	38,5 %

Control group: $\bar{x}$ = 43,5 % (11,3 points).

Experimental group: $\bar{x}$ = 72,3 % (18,8 points).

The difference in the score: 28,8 %.

As a standard procedure for the data processing, providing the normality of the data distribution, we used F-test and t-test to compare the variances and the mean values, respectively [5], [7].

T-test confirmed, that at the 0.05 level of significance by means application of mastery learning in the exercises in the subject Physics I, students of the experimental group achieved better results than the control group students with traditional teaching.

Benefit

The application of mastery learning in physics represents one of the ways to enhance teaching effectiveness of this subject as to streamline and improve the quality of the educational process. This contribution highlights the appropriateness of the use of activation methods in the teaching process. The mastery learning method promotes a better understanding of students' ability to apply knowledge gained in Physics, thereby increasing the readiness of students to study technical subjects.

Conclusion

Due to their ability to master each module, students are highly expected to demonstrate superior knowledge and skills, gradually increasing their confidence in their own abilities (an achievement that occurs rarely where traditional teaching methods are practiced).

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