A Study of the Learning Achievement in Mechanic Equilibrium by using a supplementary exercise with grade 10 students of Demonstration School of Suan Sunandha Rajabhat University

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***Abstract***

The main purposes of this research were to study the achievement learning in Physics 1 on Mechanical Equilibrium Force for 10th grade students of the Demonstration School of Suan Sunandha Rajabhat University by using skill-enhancing exercises and to compare achievement learning in Physics 1 on Mechanical balance of force for 10th grade students of the Demonstration School of Suan Sunandha Rajabhat University before and after by using the drill exercise.

The samples of the study were 12 student of the academic year 2020. The purposive random sampling method was employed to select the subject from student for 10th grade of the Demonstration School of Suan Sunandha Rajabhat University. The research format is (One-Group - Pretest Posttest Design). The research instruments were the achievement learning test and drill exercises. The statistics employed for data analysis were average, percentage, standard deviation and Wilcoxal range sequence values.

***Keywords:*** *Drill exercise, Learning achievement, Physics, Mechanical equilibrium force*

***Introduction***

 Currently, the learning strategy for physics is not completely successful. According to the investigation of the problems inside the physics class, it can clearly be seen that the major concern is the achievement results in physics in the topic of “Force equilibrium” which due to the lack of mathematic skill and analytical skill. As a consequence, the achievement result become low.

 This concerns demonstrates that students still lack of mathematical sill in physics. The another strategy that can be used to make students success is the usage of tutorial exercise which can develop analytical skill and problem-solving skill in physics to be more understandable and precise.

 Therefore, the researchers are interested to study about the achievement results of the physics learning with the integration of the tutorial exercises for 10th grade student from Rajhaphat Suansunantha university that are facing the problem of their physics study about “force equilibrium”. The approach is to compare the result from the examination of physics 1st about “force equilibrium” before and after the class in order to have the students to practice and develop their problem-solving skill and have a strong basic knowledge for studying physics in the future.

1. ***Research strategy***

 Population in this study are 42 of 10th grade students from Rajhaphat Suansunantha university demonstration school who enrolled in 2nd semester, academic year 2020.

 Group of samples in this study are twelve of 10th grade students from Rajhaphat Suansunantha university demonstration school who enrolled in 2nd semester, academic year 2019. These group are specially selected.

1. ***Equipment in this research***
2. Four sets of physics tutorial exercise for 10th grade students
3. Four set of examination for achievement evaluation of the study about “force equilibrium” for 10th grade students. Each test composes of 10 questions with 4 multiple-choices and 5 questions for subjective test. Hence, the total is 15 questions.
4. ***Data collection method.***
5. Arrange a pretest with the examination for achievement evaluation of the study.
6. Before the experiment, inform the students about the learning strategy such as dividing the topics of the study and having the tutorial exercises for the students.
7. Perform teaching by introduction of the physics tutorial exercises for students to practices by spending only 30 minutes each day.
8. After the experiment, arrange a post test with the same set of examination.
9. ***Data analysis and the statistics.***

*Data analysis*

1. Calculate the average value and standard deviation of the scores from the examination performed by the students before and after learning.
2. Compare the result of the physics examination about “force equilibrium” for the 10th grade student class with the integration of the tutorial exercises by using completed program SPSS/PC for window version 11.5 to perform “Wilcoxon” signed rank test.

 Table 1 : Average value and standard deviation of the scores before and after the class

|  |  |  |
| --- | --- | --- |
| Test time | N | Score |
| X |  | Percentage % | S |
| Before the class | 12 | 20 | 3.58 | 17.9 | 0.9 |
| After the class | 12 | 20 | 15.58 | 77.9 | 1.31 |

From table 1, It can be observed that the average score of the students before the class is 3.58 which is equal to 17.9% and the average score of the students after the class is 15.58 which is equal to 77.9%. Moreover, the standard deviation of the scores before and after the class are 0.9 and 1.31 respectively.

Table 2 : The efficiency of the physics tutorial exercises about “force equilibrium” for 10th grade students according to the standard 75/75.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scores** | **Total****scores**  |  | **S** | **%** |
| The physics tutorial exercises | 40 | 31.25 |  1.54 | 78.12 |
| The result of examination after the class with the physics tutorial exercises | 20 | 15.58 | 1.31 | 77.91 |

From table 2, It can be observed that the physics tutorial exercise about “force equilibrium” for 10th grade students has an efficiency equal to 78.12/77.91 which is higher than the standard 75/75.

Table 3 : The analysis of the difference in the examination scores between before and after the class with the integration of the tutorial exercises by using program SPSS/PC for window version 11.5

|  |  |  |  |
| --- | --- | --- | --- |
| Test time |  | S | Z |
| Before the class | 3.58 | 0.9 | -3.072\* |
| After the class | 15.58 | 1.31 |

 \*With the statistical significance at level .01

 From the data analysis in table 3, It can be seen that the students who study in the class with the integration of the tutorial exercises about “force equilibrium” have a higher score than before starting the class with the statistical significance at level .01.

***Conclusion***

1. The students who study in the class with the integration of the tutorial exercises raise their examination scores with the increased in the average scores to 77.9% and the standard deviation is 1.31. Furthermore, according to the result from the research, it can be seen that the physics tutorial exercise about “force equilibrium” for 10th grade students created by the researchers has an efficiency equal to 78.12/77.91 which is higher than the required standard of 75/75.
2. From the results of the physics examination about “force equilibrium” for twelve of 10th grade students from Rajhaphat Suansunantha university demonstration school after doing the four set of tutorial exercises, it can clearly be seen that all students improve their scores to higher than before they study with the tutorial exercises with the statistical significance of .01.

***Discussion***

Regarding the study, the 10th grade students tend to have a higher score when they study with the physics tutorial exercises than when they start the class. This is due to

1. The researcher systematically created the physics tutorial exercises which is reasonable to the age and capability of the students as well as let them easily understand the basic concept and the way to solve the physics problems.
2. The researcher integrated the physics tutorial exercise to the leaning strategy by categorizing from easy level to difficult level, and the content is continual and match with their physics curriculum.

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