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Flow charts for experimental procedure of the first example

- Out = graph see figure (3)

**Figure 3** A projectile (a ball) moving under the force of gravity is at its maximum height when $t_1 = 20$ and $v_y = 0$ and minimum height when $t_1 = 5$. At that moment, the ball is traveling horizontally.

Flow charts for experimental procedure of the second example
- Out = graph see figure (4)

Fig. 4 For a fixed initial velocity (ball) and if air resistance is ignored, a projectile’s trajectory will have a maximum range for an elevation angle of \( \pi/4 \) rad. [8]. The range is the horizontal distance the projectile travels to reach the same height from which it started.

3. Methodology

1. The researcher divided the samples into 2 groups, experiment group and controlled group by random. Fifty students of experiment group study projectile motion by using Mathematica program and fifty students of controlled group study projectile motion by using projectile motion experiment.
2. Get both experiment group and controlled group to take pre-test by using 30 items of achievement test.
3. Let experiment group study projectile motion, using Mathematica program and controlled group study projectile motion, using projectile motion experiment set.
4. Get both experiment group and controlled group to take 60 minutes post-test by using 30 items of achievement test.

Instruments

1. The instruments used for projectile motion experiment are Mathematica program and projectile motion experiment set.
2. The instruments used for collecting data is the 30 items of achievement test.

Data analysis

1. Analyze the physics achievement of PIT’s students studying projectile motion by using Mathematica program and PIT’s students studying projectile motion by using experiment set of projectile motion, finding the average \( \bar{X} \) (The simplest number used to characterize a sample is the mean, which for \( N \) values \( x_i \), \( i = 1, 2, \ldots, N \)) is defined by

\[
\bar{X} = \frac{1}{N} \sum_{i=1}^{N} x_i \quad (13)
\]
and the sample standard deviation (SD) is the positive square root of the sample variance, i.e.

\[ SD = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (x_i - \bar{X})^2}. \]  

(14)

We may therefore write the sample variance \( SD^2 \) as

\[ SD^2 = \frac{1}{N} \sum_{i=1}^{N} x_i^2 - \left( \frac{1}{N} \sum_{i=1}^{N} x_i \right)^2, \]  

(15)

from which the sample standard deviation is found by taking the positive square root. Thus, by evaluating the quantities \( \sum_{i=1}^{N} x_i \) and \( \sum_{i=1}^{N} x_i^2 \) for our sample, we can calculate the sample mean and sample standard deviation at the same time.

2. Compare pre-test and post-test of physics achievement of PIT’s students, studying projectile motion experiment by using Mathematica program and PIT’s students studying projectile motion by using and experiment set of projectile by t-test independent.

4. Results and Discussion

The results of analyzing Pre-test and post-test physics achievement; projectile of PIT’s students are as the following. From table (1) finding an average of the pre-test of physics achievement, projectile motion of experiment group, studying projectile motion experiment by using Mathematica program is 12.04 and an average of the pre-test of physics of controlled group studying projectile motion by using projectile motion experiment set is 13.30. Using t-test independent Sample to compare achievement finds that the experiment group and controlled group’s achievement is different insignificantly. From table (2), Finding the average of physics achievement, projectile motion by using Mathematica program is 24.38 and the average of controlled group studying projectile motion by using projectile motion experiment set is 20.82 Using t-test independent sample to compare achievement finds that controlled group studying projectile motion by using Mathematica program is significantly higher at level of 0.01. It means the achievement of PIT’s students studying projectile motion by using Mathematica program is higher than the achievement of PIT’s students studying projectile motion by using projectile motion.

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<td>Statistics Sample</td>
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<td>( N )</td>
</tr>
<tr>
<td>----------</td>
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<tr>
<td>Experiment group</td>
</tr>
<tr>
<td>Controlled group</td>
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Table 2 The result of physics achievement study, projectile post-test

<table>
<thead>
<tr>
<th>Statistics Sample</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>SD</th>
<th>t-test</th>
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<tr>
<td>Experiment group</td>
<td>50</td>
<td>24.38</td>
<td>1.772</td>
<td>12.04</td>
</tr>
<tr>
<td>Controlled group</td>
<td>50</td>
<td>20.82</td>
<td>1.289</td>
<td></td>
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5. Conclusions

The achievement of PIT's students studying projectile motion by using Mathematica is higher than the achievement of PIT's students studying projectile motion by using projectile motion experiment set at level of 0.01.

Explanation

The achievement of PIT's students who use Mathematica program is higher than the achievement of PIT's students studying projectile motion by using projectile motion experiment set. Examining hypothesis finds that the achievement of PIT's students using Mathematica program is higher than the achievement of PIT's students studying projectile motion by using projectile motion experiment set at level of 0.01 which relates to the specified hypothesis of study since Mathematica program is an easy program. It can be experimented at home or at university. It inspires students to study because it's strange and new for studying which related to the act of education 1999 B.E. part 4 section 22-23 to encourage students to study naturally and efficiently, let students study autonomously, encourage students to enjoy learning, to understand lessons well and make students creative as the purposes of study.

6. References


The Development of Appropriate Instructional Models for Statistics Students: a Case Study of the Mathematical Statistics Course

Yuree Worawichaiyan (Rajamangala University of Technology Thanyaburi), ureew@yahoo.com, ureewdummy@gmail.com

Abstract

This research aims to develop an appropriate instructional model for the Mathematical Statistics course and to investigate the results obtained from this model to teach statistics students. The population was the statistics students of the Faculty of Science and Technology, Rajamangala University of Technology Thanyaburi in Pathumthani province. A sample of 48 students who registered in semester 2/2010 and 2/2011 was selected by purposive sampling. The midterm examination paper of this course was a tool for collecting data. The obtained data were analyzed by analysis of variance, estimation of the mean, standard deviation, coefficient of variation, and standard error of the estimated mean.

The research results showed that the instructional model of the Mathematical Statistics course affects the mean score of the definition content but does not affect the mean score of the proving theorem content.

Keywords: instructional model, teaching model

1. Introduction

The Mathematical Statistics course is a course that has contents relevant to the proof of statistical theories. To prove the theories, defined and undefined terms and axioms are required. Therefore statistics students need to be able to recognize definitions and axioms before proving the theories. If the students cannot remember definitions, it will result in their understanding on the proof of the theories. In addition, learning outcomes expected to occur with the students in this course that they will have process skills in proving the theories which are a reasoning process may not be achieved.

As a result, the learning outcomes of the students will be expected to follow them. An instructor needs to develop a teaching model to suit the nature of the course and of the students. The teaching model development should be based on the application of the science of teaching.

2. Literature Review

The instructional model for the Mathematical Statistics course is developed based on the information processing theory of Klausmeier and the learning theory of Gagné, cited in [1]. The information processing theory of Klausmeier states that if the rote is repeated several times, it will help learners remember the information later. Gagné
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