# TESTING THE EFFECTIVENESS OF WORKED OUT EXAMPLES IN AN INTERACTIVE COMPUTER AIDED LEARNING TOOL

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### Abstract

This study investigated the extent to which the instructional format in terms of worked out examples had an impact on learning efficiency among undergraduate students in understanding correlation and regression concepts in statistics. The investigations were carried out in order to test the effectiveness of teaching learning process by means of worked out examples.

It was hypothesized that correlation and regression analysis topic can be efficiently understood with the help of 'worked out examples illustrated using computer aided multimedia tool' as compared to traditional method of learning (Chalk blackboard method). The study was based on the sample consisting of 66 undergraduate students of science faculty which were divided in two homogeneous groups. These students were taught by two different teaching processes. Participants of experimental group were trained using multimedia tools which consist of carefully designed worked out examples [2, 3]. Participants of control group were trained by Chalk blackboard method. Subsequently, they solved the series of test problems. Dependent variables were perceived as performance of the test.

Results showed that performance of experimental group was better than control group. The study comes to the conclusion that multimedia based instructional material seems promising for the undergraduate students in learning correlation and regression concepts. [1]

## 1   INTRODUCTION

This study was started with the intention to design a computer aided learning tool consisting of carefully selected worked out examples [1]. This may foster the under-

standing the subject. This study was carried out to investigate the extent to which the instructional format in terms of worked out examples had an impact on learning efficiency among undergraduate students in understanding correlation and regression concepts in statistics [5].

It was hypothesized that, studying the topic on correlation and regression analysis with the help of 'worked out examples illustrated using computer aided multimedia tool' is more efficient than studying it by the traditional chalk blackboard method [10]. On the basis of this objective, the following hypothesis were formulated. The null hypothesis is that there is no significant difference between two teaching methods verses learning with the help of the worked out examples, students can learn more efficiently.

The Other objectives are :

- To provide numerous self paced practice examples to students,

- To facilitate independent learning.

- To foster the development of self motivation.

## SAMPLE

A random sample of 66 students is selected from three colleges, two from rural area and one from urban area. The sample is drawn by systematic sampling by selecting odd number for control group and even number for experimental group when the students are ranked according to their merit in $12^{th}$ standard. Sixty six undergraduate students of the First Year Science (Mean age 18.8, 34 Female, 22 Male) are divided into two homogeneous groups. Half of the participants are involved in learning with computer aided worked out examples ($n_1 = 33$, experimental group)and the other half in learning by traditional method ($n_2 = 33$, control group).

## 2 METHODS

a: Design and develop computer aided learning tool by applying cognitive theory of multimedia learning with special application principle 'The worked out example effect'.[11].

b: Participants of the experimental group were trained using multimedia tools (based on combination of multiple examples which are interrelated type) and participants of the control group were trained by conventional method of teaching. Two tests were carried out. The first one is at the beginning of the experiment to test the knowledge of the individual about the subject (T1). Subsequently, they had to solve a series of two test papers (T2 and T3),at the end of the experiment. Dependent variables were perceived as the difference between the scores. (Score of T2 + Score of T3 - Score of T1), i.e. performance of the test results.

# 3 ANALYSIS OF THE DATA AND INTERPRETATION

## Descriptive Statistics Regarding the Test Score of the Students:

Comparison of the frequency distribution of (CG) and the experimental group (EG) implies that the Experimental Group (EG) has achieved comparatively high scores as compared to the control group. Frequency Distribution of G shows positive sleekness, means scores are clustered at lower side of range. While that of EG shows negative skewness which implies that scores are concentrated around high values. This in turn implies that understanding the topic with 'worked out examples illustrated using computer aided multimedia tool' is more effective.

## Analysis of Scores of Control and Experimental Group

The following table illustrates the analysis of the two groups.

| Group | Size | Mean Score | SD | coefficient of skewness | Coefficient of Kurtosis | Coefficient of Variation | Range |
|-------|------|-----------|-----|------------------------|------------------------|--------------------------|-------|
| Control | 33 | 44.6 | 11.031 | 0.165 | - 0.843 | 0.247 | 41.0 |
| Experimental | 33 | 57.0 | 10.016 | - 0.683 | 0.666 | 0.173 | 45.0 |



Frequency Distribution of Two Groups
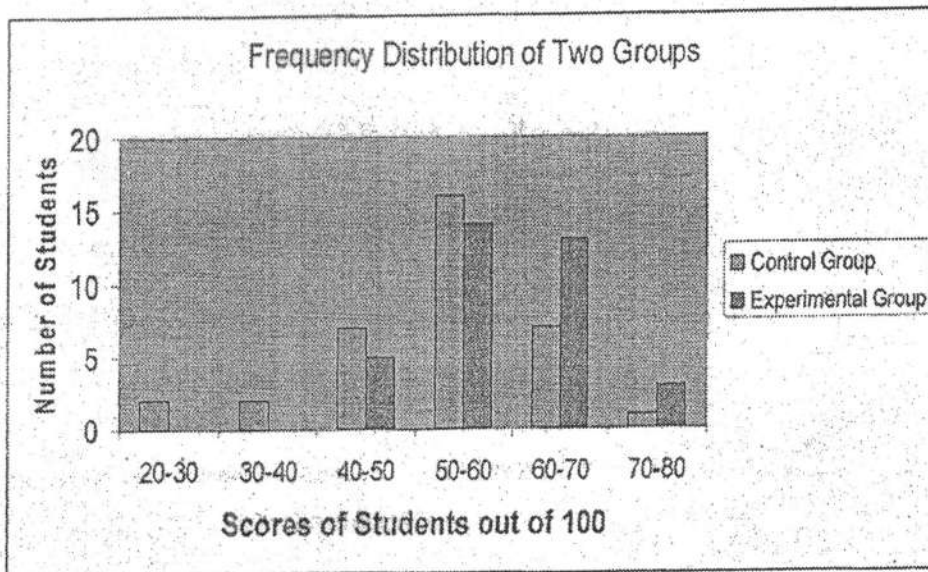
## 2. a: Inferential Statistics

$Ho : \sigma_1^2 = \sigma_2^2$    Verses $H_1 : \sigma_1^2 \neq \sigma_2^2$.

To test Ho: (Equality of Two Variances) The following table illustrates the F Test.

| Group | N | Mean | variance | F-ratio | p-value |
|-------|----|--------|----------|---------|---------|
| 1 | 33 | 44.606 | 121.684 | 1.213 | 0.588 |
| 2 | 33 | 58.000 | 100.313 | | |

Equality of variances is established with p-value = 0.588

### 2.b: Inferential Statistics

Testing equality of two means is illustrated in the following table.

| Group | n | Mean | Standard Deviation | Difference in Means | t-value | p-value |
|-------|----|--------|--------------------|---------------------|---------|---------|
| 1 | 33 | 44.606 | 11.031 | 13.394 | 5.164 | 0.000 |
| 2 | 33 | 58.000 | 10.016 | | | |



**Equality of Two Variances**
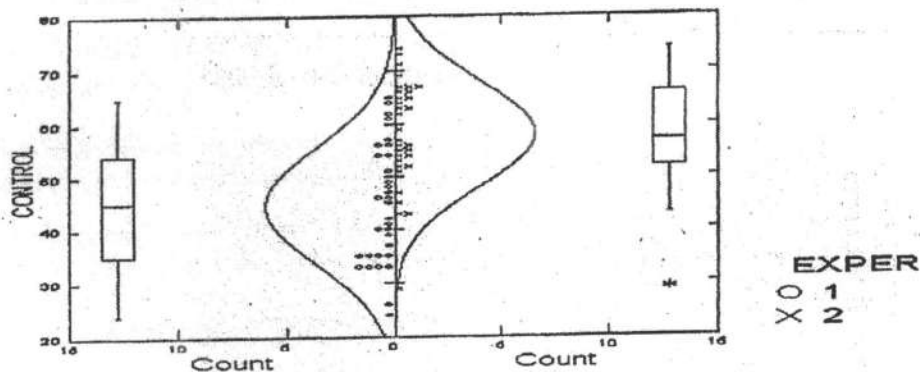
H$_1$ (i.e. average score of the experimental group is greater than average score of the control group) is accepted.

**Inference:** The difference between the two methods of teaching as discussed above is highly significant. The alternative hypothesis *i.e.* average scores of the experimental group is greater than the average scores of the control group is accepted.

## 4   CONCLUSION

Worked out examples are more efficient for learning new tasks because they reduce the load in working memory, thereby allowing the learner to learn the steps in problem solving. Learning from worked out examples is a faster way of learning which plays an important role in the education process. It also develops the reasoning process of the learner.

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