

Abstract

The study is divided into two main phases. The first phase is the curriculum design of trigonometric function in its graph and properties. The second phase is the study of the learning effectiveness of the Computer Assisted Instruction (CAI) curriculum on students of grade 10.

The first phase of curriculum design consists of two parts. The first part is the development of teaching software and the second part is the design of teaching processes. The teaching contents are trigonometric functions in its graph and properties. The principles and theoretical basis of the design in the development of teaching software and teaching processes are based on related theories. On completion of the design, the teaching software was produced by using the software of GSP(Geometer's Sketchpad) and the teaching plan was completed according to the design of the teaching processes.

The second phase focuses on the leaning effectiveness of students. This part includes quantitative and qualitative study. The quantitative study took a Quasi-experimental approach using pretest-posttest nonequivalent-groups design. The experimental samples were taken from the Yuet Wah College in Macau. The 81 grade 10 students from two different classes were randomly divided into two groups. One class was utilized as an experimental group, the other class used as a control group. The experimental group received the computer-assisted instructional curriculum while the control group received the traditional classroom teaching curriculum. The experiment lasted for 4 weeks. After the completion of the experimental teaching, a comparison of the changes in learning achievements and learning altitudes was made between the two groups. In addition, in order to explain the experimental data, a qualitative study was used. It included the class observations and interviews with students from the two

groups. In addition, the results in the testes and the experimental group's attitude of using Computer Assisted Instruction (CAI) were analysed. It is hoped that this research will enhance the usage of computers in the teaching of mathematics. The main discoveries from the statistical analysis of the data are as follows:

1. Mathematical learning achievements

- (1) There was no significant difference in the mathematical learning achievements between the students in both groups after the experimental courses. However, the experimental group still showed greater progression.
- (2) There was no significant difference in the mathematical learning achievements between high-level students in both groups after the experimental courses. However, the experimental group still showed smaller progression.
- (3) There was no significant difference in the mathematical learning achievements between middle-level students in both groups after the experimental courses. However, the middle-level students in the experimental group showed the greatest progression compared with the high and low-level students in the same group.
- (4) There was no significant difference in the mathematical learning achievements between low-level students in both groups after the experimental courses. However, the experimental group still showed greater progression.

2. Mathematical learning attitudes

- (1) There was no significant difference in the mathematical learning altitude between the students in both groups after the experimental courses. However, the learning altitude towards mathematics had grown positively in all the advance and the experimental group still showed greater progression.
- (2) There was no significant difference in the mathematical learning altitude between high-level students in both groups after experimental courses.

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(3) There was no significant difference in the mathematical learning altitude between middle-level students in both groups after experimental courses. However, the learning altitude towards mathematics had grown positively in all the advance and the experimental group still showed greater progression.

(4) As for the mathematical learning altitude, the low-level students in the experimental group has grown positively while the low-level students in the control group has shown a negative progression. As far as the mathematical learning altitude is concerned, the low-level students in the experimental group got significantly higher result than those of the control group.

4. The result of the test

The experimental group students had better performance on diagram symbol tests but not on algebra symbol tests.

5. Experimental group's attitude and reaction towards the Computer Assisted Instruction(CAI)

The students of the experimental group had positive attitudes toward using computer-assisted instruction methods, especially the middle-level and the low-level students.

Key Words: Computer Assisted Instruction(CAI), Traditional Teaching, Experimental Group, Control Group, Mathematics Learning Altitude, Mathematics Learning Result, GSP(Geometer's Sketchpad).