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摘 要

本研究主要是使用 Flash 開發出可讓教師教學示範並可引導學生探索、做中學的「國中平面幾何基礎課程」數位教材，並以「建構式 van Hiele 五階段學習模式」設計學習活動，提供資訊科技融入數學教學模組的教學示例。最後探討資訊科技融入數學教學模組實施之後，對學生數學學習所產生的影響。

本研究採取不等組的前後測之準實驗設計，以研究者自行開發之學習成就測驗與課程意見量表為主要工具，並以桃園縣一所國中的兩個班級為研究樣本，實驗組接受資訊科技融入數學教學所設計的活動，控制組則實施相對應之傳統教學活動。實驗研究的主要發現如下：

- 一、實驗組學生在學習成就測驗後測中的基本層次試題得分上顯著高於控制組學生。
- 二、實驗組學生在學習成就測驗延後測總分與各層次試題得分上與控制組學生並無顯著差異。
- 三、實驗組不同性別的學生在學習成就測驗後測與延後測得分上都沒有顯著差異。
- 四、實驗組學生在學習成就測驗後測與前測得分差距的表現，不論是以 3/5 或 4/5 為標準的幾何思考層次來看，各思考層次水準學生的表現並無顯著差異。
- 五、實驗組數學高、中、低成就水準學生分別與控制組數學高、中、低成就水準學生在成就測驗後測得分上沒有顯著差異。
- 六、實驗組學生在學習成就測驗延後測與前測得分差距表現上，不論以 3/5 或 4/5 為標準的幾何思考層次來看，層次 2 的學生表現都顯著優於層次 0 的學生。
- 七、實驗組高數學成就水準學生在學習成就測驗延後測得分上顯著高於控制組高數學成就水準學生，但控制組中數學成就水準學生在學習成就延後測得分則顯著高於實驗組中數學成就水準學生。
- 八、實驗組與控制組在一個學期的教學實驗前後在數學態度問卷的得分上沒有顯著的改變。
- 九、有 86% 的學生願意再上資訊科技融入數學的類似課程，但是其中認為利用電腦學習有助於學科內容了解的學生約只有 70%。

最後根據研究結果與發現，提出若干建議以做為教師教學改進與未來研究之參考。

關鍵字:Flash、資訊科技融入教學、幾何探索、數位教材、教學模組

Integrating Technology into the Development of Mathematics Teaching Models and a Study of Its Effect on Junior High School Students' Learning of Basic Geometry Concepts

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ABSTRACT

There are three purposes in this study. First, to develop “basic geometry” digital teaching materials which can be used by teachers to present in class and by students to explore and learn by doing. Second, to design learning activities based on “constructive van Hiele five-phase learning model” as examples to integrate technology into instruction. Finally, to conduct a nonequivalent groups pretest - posttest quasi – experimental design to study the effect of this instruction implement on junior high school students' mathematics learning.

Two seven-grade classes from the same school in Tao-Yuan county were selected to be studied. One class was assigned as the experiment group and received the experimental treatment, the other class was assigned as the control group and did not receive any treatment. Research results were list as follows:

1. Students in the experimental group performed better on questions of basic concept in the posttest than students in the control group.
2. There was no significant difference in the retentive test for both groups.
3. There was no significant difference in the posttest and retentive test for boys and girls in the experiment group.
4. There was no significant difference in the difference between the posttest and the pretest for students with different van Hiele levels in the experiment group.
5. There was no significant difference in the posttest for students with high (middle or low) mathematics ability between two groups.
6. There was a significant difference in the difference between retentive test and pretest for students classified as van Hiele level 2 and van Hiele level 0 in the experiment group.
7. High mathematics ability students in the experimental groups performed better in the retentive test than those in the control group. However, middle mathematics ability students in the control group performed better in the retentive test than those in the experimental group.

8. In the study semester, students in both groups did not change significantly on the measures of mathematics attitude.
9. Eighty-six percent students in the experiment group liked to have similar courses in the future and 70% of them agreed that integrating technology into instruction helped their mathematics learning.

Based on the results, we proposed several suggestions for future teaching and research.



Keywords: Flash, Technology Integrated Instruction, Exploration of Geometry Concepts, Digital Teaching Materials, Teaching Model.