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Author(s)	Agnes Chang
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NIECER RESEARCH PROJECTS

Early Metalearning Strategies

Dr Agnes Chang
Principal Investigator

Objectives

The study attempted *to* investigate whether (a) pri*mary* school teachers teach metalearning strategies to their pupils, and (b) whether Primary Five pupils can be taught metalearning strategies through Mathematics, Science and Social Studies. An interview was carried out in the pre-intervention stage to find out whether teachers considered that they taught metalearning strategies. The intervention stage involved the trialling of particular strategies during Mathematics, Science and Social Studies lessons. The effectiveness of those strategies were examined through post-intervention interviews and test results,

Methodology

Two neighbourhood government primary schools having pupils with similar social economic backgrounds were invited to participate in the study. One was randomly chosen to be the experimental school and the other the control school. Two teachers in the experimental school were selected by their principal to be the "experimenting teachers" and two classes taught by the experimenting teachers formed the experimental classes. Two classes in the control school formed the control classes.

Intensive discussions took place between the experimenting teachers and Project Team members for three weeks before the intervention study, which spanned over ten weeks. The control teachers were not involved in the training. Though intact classes participated in the study, only 20 pupils were randomly chosen to be tested on a set of 13 metalearning tasks. This is because one-to-one testing was used and was very time-consuming. Besides the pre- and post-testing on metalearning tasks, observations of classroom learning were also carried out during the intervention period. The experimenting teachers were interviewed before and after the intervention while the control teachers were only interviewed once. The pre-intervention interviews were conducted *to* ascertain whether metalearning strategies were being taught to pupils and the post-intervention interviews were conducted to assess the strengths and weaknesses of the intervention strategies.

Summary of the Research Findings

1. Usual teaching approaches of the experimenting and control teachers before intervention

They did not ask or teach their pupils *to:*

1.1 explain the steps in solving a Mathematics/Science problem;

1.2 suggest alternative solutions to a problem;

1.3 read their texts and do self-questioning

1.4 draw diagrams to show relationships between related concepts;

1.5 identify their own mistakes and correct them; and

1.6 generate their own mathematical problems.

2. Effects of Metalearning Intervention

Has the metalearning intervention been successful in helping pupils to develop metalearning strategies?

2.1 *The* results showed that the difference between the pre-post tests differences *of* the experimental and control pupils was statistically different at the .0001 level. It is important to note that the control pupils did much better at the pre-test and yet after the intervention, *the* experimental group overtook the control group by a wide margin on the post-test.

2.2 A two-way ANOVA to test within subject effects reveals that statistically significant changes did take place within the two groups between the pre-test and post-test stages.

2.3 However, the two-way ANOVA to test within subject effects reveals that statistically significant changes did take place within the two groups between the pre-test and post-test stages.

2.4 There was also an interaction effect between *Time* and *School* which means that while the experimental group did impressively better for the post-test, the control group did less well.

2.5 Pupils from both experimental classes did exceptionally well for Mathematics in the final examination after the intervention. Results for Science and Social Studies were not impressive. These results *tie* in with the opportunities for exposure to and practice with the metalearning strategies in class.

2.6 Detailed analysis of the metalearning tasks showed that the mathematics and science items were better comprehended and attempted in the post-test, More alternative solutions were given and better elaborate explanations were offered. Hypothesis formulation was not taught and a problem requiring hypothesis formulation did not show my improvement. Feedback from *the* teachers indicated that social studies was *not* considered an important subject and hence little attempt was made to stimulate pupils to think critically. This is reflected in the poor scores for the three social studies items.

2.7 Experimental pupils who were interviewed were unanimous in their preference for the teaching approach using metalearning strategies. They felt that they were made to think more as a result of the activities underpinning metalearning.

3. The Characteristics of a Student using Metalearning in Problem Solving

He/She

3.1 was relaxed, confident and well-spoken;

3.2 was persevering; attempted all tasks; did not give up easily;

3.3 spent more time reading the problem before attempting to solve the problem;

3.4 demonstrated a systematic approach in problem-solving;

3.5 attempted to explore many different ways of solving a problem and tried to find out different possible solutions *to* a problem;

3.6 was able to give a full and elaborate answer without much probing from the interviewer;

3.7 was able to pinpoint reasons underscoring failure to solve a problem; and

3.8 preferred to work alone.

The weaker pupils showed characteristics which were quite the opposite of the characteristics mentioned above.

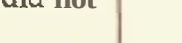
4. Experimenting Teachers' Feedback on the Intervention

4.1 They felt that the EM1 and EM2 pupils should be able to benefit from the metalearning strategies.

4.2 In order for pupils to get into the habit of using metalearning strategies, pupils should be taught such strategies as early as Primary Three.

4.3 Time constraint was the main stumbling block in why the teachers did not use some of the intervention strategies.

Positive feedback was obtained from both teachers and pupils on the use of metalearning activities in learning. With the ever increasing emphasis on teaching pupils to think and reflect, apply and analyse (refer to the Mathematics and Science Syllabuses), it is imperative that metalearning strategies should be integrated into the teaching of concepts across the different subjects and taught to upper primary pupils. This would help to ease their transition from primary to secondary schools where greater cognitive demands are made on them. Though the experimental pupils were average/below average in their cognitive ability, they responded very well to learning and applying metalearning strategies. This augurs well for improving the learning and achievement of average and low achievers.



Other researchers in the team were:
Ho Wah Kam, Seng Seok Hoon,
Tey Sau Hing, Muriel Lim-Quek, Amy Fam,
Goh Ngoh Khang, Chia Lian Sai and Sim Wong Kooi.

Researcher's e-mail contact:
CHANGSCA@nievax.nie.ac.sg