MASSEY UNIVERSITY

LOGO PROGRAMMING: INSTRUCTIONAL METHODS AND PROBLEM SOLVING

by

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Abstract

This study was conducted to examine the effects of the learning of programming on the problem solving abilities of primary school children. Two programming languages were used: LOGO and BASIC. The aim of the study was threefold. First, the study compared the two programming languages in the development of problem solving skills. Second, this study compared the effectiveness of two different instructional methods in the teaching of LOGO programming: process-oriented and content-oriented approaches. The third aim of this study was to examine the social interactions among the learners who engaged in LOGO and BASIC programming.

The sample for the study comprised 73 subjects drawn from a primary school in Palmerston North, New Zealand. Subjects were screened initially on their background knowledge in programming to ensure that they did not possess any substantial knowledge in programming before participating in the study. The subjects were then randomly assigned to four groups: LOGO process-oriented, LOGO content-oriented, BASIC, and control. These groups of subjects were then pre-tested on a number of problem solving measures: Rule-naming task, Tower of Hanoi, Torrance Test of Creative Thinking, Object Assembly, Block Design, Picture Assembly, and PAT Mathematics. The intervention phase in the form of learning programming of either LOGO or BASIC then took place for the three experimental groups. During the intervention, observations on the social interactions of teachers and students in the learning environment were also made. At the end of the 20 week intervention, subjects were then post-tested on their problem solving skills.

The findings revealed that students who learned LOGO programming were able to demonstrate transfer of problem solving skills to a near-transfer context but not to a far-transfer context when compared to students who learned BASIC. Also, students who learned LOGO programming using a process-oriented approach demonstrated better transfer of problem solving skills to a near-transfer context with complicated problems than did students who learned LOGO programming using a content-oriented approach. Classroom observation during the intervention phase also showed that there were more substantive verbal and non-verbal interactions among

students who learned LOGO compared with students who learned BASIC. Also, students in the process-oriented group were involved in more classroom interactions than students in the content-oriented group.

The main conclusion from this study is that LOGO programming could be used to facilitate the development of problem solving skills among students. In particular, the process-oriented approach, which focuses on the processes of problem solving, could be used to assist students further in the development and transfer of problem solving skills. As well, LOGO programming could also facilitate more social interactions among the students, especially if the instructional method provides such an emphasis.

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