

COGNITIVE AND SOCIAL CHANGE IN YOUNG CHILDREN DURING  
LOGO ACTIVITIES: A STUDY OF INDIVIDUAL DIFFERENCES

by

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(i)

CERTIFICATE

I certify that the substance of this thesis has not already been submitted for any degree and is not being submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.



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ABSTRACT

The purpose of the thesis was to evaluate the response of young children who differ in the way they process information when they are placed in Logo environments.

The evaluation entailed a preliminary review of the Logo computer language, of reflectivity/impulsivity within the metacognitive domain and of conservation abilities and spatial skills. The role played by computers, particularly when the Logo language was used, in the social interactions of their users was also examined and the focus for each of these was their characteristics in relation to young children. Finally a model for individual differences was selected for use in the study.

In order to carry out the evaluation, a class of Kindergarten children was chosen, a Logo environment initiated and a program involving on-going development in the use of Logo was carried out. At the same time, two other Kindergarten classes who by virtue of the school not having access to computers, would not have exposure to Logo, were chosen to act as control groups for the study.

Research in the use of Logo to date, has not been of a longitudinal nature and there has been on-going debate about the merits of quantitative and qualitative data in relation to expected outcomes from the use of Logo.

The study therefore involved the collection of data for statistical analysis

and behavioural observations over a period of some fifteen months. Pre- and post-testing was carried out in the areas where change in the subjects could be anticipated. To highlight any differential effects of the Logo environment, a model of individual differences was used in the study, based on the work of Luria. The Luria tests for the children's successive information processing ability, simultaneous information processing ability and cognitive control were used to categorize the children, and monitor results of children with particular patterns of ability.

The statistical evidence for significant differences between the Logo and non-Logo groups was strong. The children in the Logo group changed quite dramatically in relation to reflectivity/impulsivity, with there being behavioural observations to support the statistical results that the children had become more reflective. On the other hand, their non-Logo peers had shifted towards higher levels of impulsivity, during the fifteen month period. Even some of the children who at the outset of the study were classified as reflective, had moved away from this. This can be logically accounted for by the age of the subjects, with six year olds being characterized by a style of impulsivity. This therefore makes the movement towards reflectivity by the Logo group, all the more impressive.

At the same time, there was also significant statistical evidence and behavioural observations to support it, that children in the Logo group developed more sophisticated spatial skills than their non-Logo peers -

skills not normally developed by six year olds. Similarly, the children in the Logo group were hastened in their development of conservation abilities.

One area where some change was anticipated but did not occur was in the area of problem solving. Research to date indicates that this is an area where enhancement in problem solving skills has been directly attributable to the use of Logo. However, the children in the Logo group did not outperform their non-Logo peers in problem solving tasks. This was also true in the development of Literacy and Numeracy skills, where both groups developed equally.

Children who had high simultaneous information processing ability performed better than other types of information processors, and this would seem to be at least partly due to the geometric nature of Turtle Graphics.

In general, children in the Logo group developed normally in social skills, and there was evidence of enhanced abilities to negotiate and remain focussed in their conversations. Social interaction also seemed to play a role in the development of planning skills, and for some children an enhancement of their cognitive control seemed to have resulted through their increased focussing abilities.

The findings of the study confirm many of the research findings put forward to date. Some findings - no significant developments in problem solving abilities - were different and some, including the shift towards reflectivity, seemed to yield much stronger responses than had previously been gained with young children in a Logo environment. Overall, these differences in the results may well be attributed to the somewhat longitudinal nature of the research and the attempt to confirm statistical evidence by behavioural observation. The study also contributes in a unique way to the body of research because of the use of the model of individual differences as a referential framework, which permits a wider, yet more focussed interpretation of the statistical evidence.

The study furthermore, makes a practical contribution to the process of schooling. The actual work done with the children in introducing them to Logo and then leading them through a progressive discovery of ways they could use it, could be used in any typical classroom environment where the teacher had access to computers and was personally committed to the use of Logo in accordance with the Papert "philosophy".

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