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## **UNDER-ESTIMATING CHILDREN IN THE TASKS THEY ARE GIVEN: IMPLICATIONS FOR MATERIALS DEVELOPERS**

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### **Context of the study**

The *Science For All Project* is researching and developing skills-based learning and teaching materials for Grades 4 to 6 (Std.2 - 4). The full paper will describe some of the classroom research conducted in order to inform the development of the materials.

### **Theoretical Background**

The Threshold Project (Macdonald 1990) researched the teaching and learning patterns in ESL primary classrooms from 1985 to 1991, and paid particular attention to science lessons. The Threshold reports analyze the predominant mediation strategies used by teachers who must explain difficult concepts to pupils in a second language, and see the classroom interaction of these teachers being constrained by a paradigm of *the one-who-knows showing the-one-who-does-not-know*. The effect of this apparently supportive model of teaching is that learners do not become autonomous problem-solvers. A part of the solution is in changing the nature of the tasks which learners must do, and the way those tasks are mediated by the teacher. In attempting to design tasks which are meaningful and have developmental value for children we are guided by Vygotsky's concept of the "zone of proximal development" (1962).

A finding of the Threshold Project is that Std.3 pupils are able to reason, *in their mother tongue*, far more effectively about a science topic than would be thought from hearing or reading them answering questions in English (the medium of instruction). More than this, conventional teaching and testing was under-predicting the intellectual abilities of pupils. Curriculum materials which offer the teacher support in giving the children higher-quality tasks can help to correct this under-stimulation and under-estimation of the children.

This paper reports our preliminary findings on children's ideas and competencies with respect to reproduction, growth and development in living things.

### **Research Questions**

- 1 Are the tasks which pupils are given in traditional, well-managed schools under-estimating their abilities and if so,
- 2 are the more demanding tasks which we are developing in the *Science for All* materials too demanding for these pupils to achieve satisfaction and success?

### **Methodology**

The research was directed to sensitising ourselves to the normal practices of the school and of the teacher, and to finding the right level of cognitive demand in the tasks which we were

developing.

We used a participant research model in that the school was explicitly a role-player in the development process, various teachers took part in workshops and the science teacher contributed to all the workshops in which draft materials were planned and critique.

We used naturalistic data collection as far as possible, in that data came from field notes of normal lessons, from focus-group work with 6 children and contributions by the teachers who attended the workshops. Later the study was extended to a wider sample in Standard 2 and Standard 3 in two schools with a specific set of tasks, based on simple content (growth of a bean).

## **Findings**

Our findings suggest that primary pupils are often given tasks which are based on an under-estimation of what they could do, given some guidance and more challenge.

The majority of pupils in the larger study were well able to germinate and grow beans, interpret a simulated journal of bean growth and transform the numerical and descriptive information to tabulated form, and then transform that information in the table to a bar-chart showing growth downward and upward. They are able to interpret information from any of the formats (journal, table or bar-chart). However, these tasks are not commonly expected of children in Std.2 and 3.

The smaller focus-group study indicated that Std.2 children can follow diagrammatic instructions to make a fruit-fly trap, maintain the trap, make a journal, and record stages of development of the fruitflies through a complete life-cycle.

## **Implications**

Curriculum development projects must research the quality of tasks which they set for pupils. The traditional preoccupation with factual knowledge constrains children's cognitive abilities in skills such as observation, different forms of recording, processing and transforming information.

In Vygotskian terms, children are being given problems which they could solve unassisted, while their learning potential is not realised because they are not being challenged in their zone of proximal development.