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# Children are Natural Scientists

## Learning Science in Early Childhood and Early Primary Years

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## KEY IMPLICATIONS

1. Science curriculum for Singaporean young children aged 6-8 may be planned with the knowledge that they have basic science process skills.
2. Science and English literacy can be integrated to allow children to learn words with contextualised meanings.
3. Teachers of young learners may pay attention to their discourse patterns during the science activities to better support the children's science content-, process- and attitudinal development.

## BACKGROUND

Although the science achievement of Singaporean students is well recognised, science is introduced in the school curriculum at a later age as compared to other countries. To date, there are few studies on Singapore preschool science education and no studies about Primary One and Two students learning science. Hence, there is limited empirical evidence to support science curriculum making in the early childhood years.

## FOCUS OF STUDY

The aim of this research is to examine how young Singaporean children engage in science learning. In particular, we examine the science process skills that children engage and how the children interact with their teachers during science activities.

## KEY FINDINGS

The children were able to engage various basic, but not integrated, science process skills. In two science activities, the K2 children demonstrated a total of 24 nuanced science process skills that could be grouped into: (a) doing science, (b) talking science, and (c) extensions and expansions. The Primary Two children engaged with the POE (predict-observation-explanation) strategy with versatility (Teo, Yan, & Goh, 2016). The discourse patterns of three teachers differed in the number of turns in teacher-student talk, the purpose of "why" questions asked, the content of the discourse, and the orientation of the discourse (content, attitudinal, or process-oriented). This, in turn, shaped the learning that took place. Children from all three grade levels experienced difficulty expressing their ideas due to limited vocabulary and oftentimes confused the terms, drew incorrect causal relationships, and expressed alternative conceptions.

## SIGNIFICANCE OF FINDINGS

### Implications for Practice

Teachers should plan lessons with the knowledge that children do not enter the science classroom on a blank slate but have some basic science process skills. A variety of science activities may be planned to develop a range of science process skills. Teachers may wish to

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enrich the discourse with children to shape their content knowledge, process skills, and positive attitudes towards science.

### Implications for Policy and Research

While Singaporean early childhood education focuses on building numeracy and English literacy skills, it may be possible to teach the latter by using science as the context for children to learn and apply words with accuracy and understanding.

### Proposed Follow-up Activities

More science activities, with a focus on developing integrated science process skills and English literacy, may be written and enacted with more children of different learning abilities and backgrounds.

## PARTICIPANTS

Two pre-schools and one primary school took part in the study. The number of participants that took part in each school and level are provided in the table below:

*Table 1. Number of participants in the study.*

| Participants | Preschool A | Preschool B | Primary 1 | Primary 2 |
|---|---|---|---|---|
| Children | 11 | 17 | 16 | 14 |
| Teachers | 1 | 1 | 1 | 1 |
| Researchers | 2 | 3 | 2 | 2 |

## RESEARCH DESIGN

The research procedure involved three stages: (a) curriculum design by the research team, (b) curriculum deliberation with the teachers, and (c) curriculum implementation. The teachers selected the same four activities. Each group was divided into three smaller groups and instructed by a researcher and/or teacher. The duration of each activity was about 1 hour. All lesson activities were video- and audio-recorded. One teacher and three children from each group were interviewed at the end of the four activities.

## REFERENCE

Teo, T. W., Yan, Y. K., & Goh, M. T. (2016). Using Prediction-Observation-Explanation-Revision to Structure Young Children's Learning of Floating and Sinking. *Journal of Emergent Science*, *10*, 12–23

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## Request for more details

Please approach the Office of Education Research, National Institute of Education, Singapore to obtain a copy of the final report.