

A Well-Balanced Approach: Using Guided Play to Teach Children Science Concepts



Nicole E. Larsen, Vaunam P. Venkadasalam, & Patricia A. Ganea

BACKGROUND

- Guided play can provide children with conceptual knowledge and experimentation skills.^{1,2}
- Prior to the age of 8, most children do not correctly balance asymmetrical objects.³
- In prior research, 4- and 5-year-olds did not learn how to balance objects from exploratory play.⁴
 - Six- and 7-year-old with incorrect theories about how to balance objects did learn from exploratory play.⁴

Research Question

Can 5-year-olds learn how to correctly balance objects through guided play?

METHOD

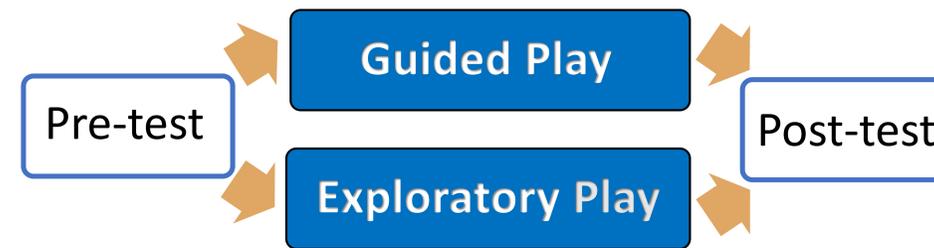
Participants

32 five-year-old children (ongoing $N = 31$; $M = 5.49$, $SD = 0.28$).

Measures

Children were shown four pairs of objects, two same weight and two different weight trials. They were asked to predict where object pairs would balance on a beam and explain their reasoning.

Procedure



Conditions

1. **Guided Play:** Children were guided through an activity about how to balance objects.



2. **Exploratory Play:** Children explored the beam and objects without guidance.



RESULTS

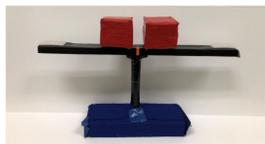
Coding Scheme

Answers were coded as correct if children placed the pair of objects in the correct position and were able to explain their reasoning.

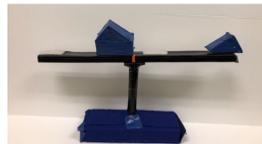
Test Phase Explanation Scores (Total of 8)

- 2 Answers referencing distance from the middle as the variable affecting balance.
- 1 Answers only referencing weight as the variable affecting balance. Answers with incorrect placement of objects.
- 0 Answers referencing an irrelevant variable (e.g. colour), or irrelevant explanations (e.g. I like it there).

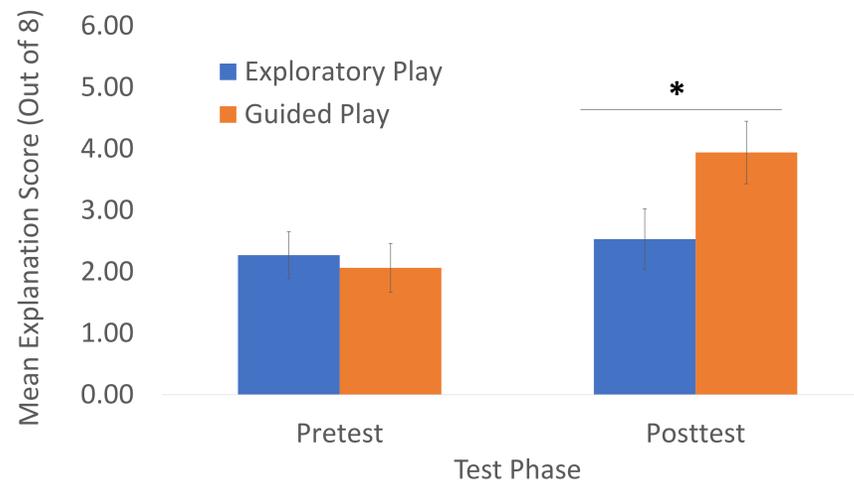
Same Weight



Different Weight



Mean Explanations by Test Phase and Condition (SE)



A mixed ANOVA showed a main effect of test phase ($p = .003$) and significant interaction between test phase and condition ($p = .02$).

Children in the Guided Play Condition scored higher at post-test than at pre-test ($p < .001$). In contrast, children in the Exploratory Play condition showed no improvement from pre- to post-test ($p = .57$).

DISCUSSION

- Young children acquire scientific concepts when guided compared to when they explore on their own.
- Guidance can scaffold learning of science concepts – in exploratory play children are often unable to produce the evidence needed to facilitate their learning.
- Guidance can aid in knowledge acquisition before children's naïve misconceptions become entrenched.

REFERENCES

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2. Schwichow, M., Zimmerman, C., Croker, S., & Härtig, H. (2016). What students learn from hands-on activities. *Journal of Research in Science Teaching*, 53(7), 980–1002.
3. Karmiloff-Smith, A., & Inhelder, B. (1974). If you want to get ahead, get a theory. *Cognition*, 3(3), 195–212.
4. Bonawitz, E. B., van Schijndel, T., Friel, D., & Schulz, L. (2012). Balancing theories and evidence in children's exploration, explanations, and learning. *Cognitive Psychology*, 64, 215–234.

