



# The Relationship Between Conceptual Knowledge and Type of Algebraic Errors Made



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## Introduction

- Many students struggle with algebra which is necessary for higher math.
- Conceptual understanding has been linked to procedural skill (*Rittle-Johnson et al. 2001*).
- Relationship between conceptual knowledge and the type of errors made has not been thoroughly investigated.
- Hypothesis: Students with greater conceptual knowledge will make less conceptual and procedural errors.

## References

- Rittle-Johnson, B., Siegler, R. S., & Alibali, M. W. (2001). Developing conceptual understanding and procedural skill in mathematics: An iterative process. *Journal of Educational Psychology*, 93(2), 346–362. doi: 10.1037//0022-0663.93.2.346

## Methods

- **Subjects:** 15 high school students in grades 9 through 12
- **Measures:**
  1. **Conceptual knowledge task:** 17 questions assessing understanding of algebraic properties. Accuracy on this task was used as an indicator of conceptual knowledge.
  2. **Strategy selection task:** Algebraic problems. Errors coded as conceptual or procedural (**Figure 1**).

*Figure 1. Examples of Conceptual and Procedural Errors*

Conceptual Error Example	Procedural Error Example
Distributive Property Error: $10(x + 5) = 60$ $10x + 5 = 60$	Whole Number Error: $15 - 2 = 14$

## Results

*Table 1. Pearson Correlation between Conceptual Knowledge, Procedural Error, and Conceptual Error*

	1.	2.	3.
1. Conceptual Knowledge	-		
2. Procedural Error	-.44	-	
3. Conceptual Error	-.39	.97*	-

Note: \* indicates a significance level of  $p < .05$

## Discussion

- Conceptual and procedural errors were highly correlated.
  - Students lacking procedural skills may possess lower conceptual understanding.
- The correlations between conceptual knowledge and the errors are insignificant likely due to low number of participants.
  - Recruit more participants to test the hypothesis.
  - Study is ongoing.
- Results have potential educational applications
  - Provides insight into students' problem-solving behavior.

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