Witty Lead-in: Learning Algebra Problem-Solving Strategies

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Abstract

The abstract should be one paragraph, indented 1/8 inch on both sides, in 9 point font with single spacing. The heading "**Abstract**" should be 10 point, bold, centered, with one line of space below it. This one-paragraph abstract section is required only for standard six page proceedings papers. Following the abstract should be a blank line, followed by the header "**Keywords:**" and a list of descriptive keywords separated by semicolons, all in 9 point font, as shown below.

Keywords: Mathematics Education; Mathematical Cognition; Probabilistic Models

Introduction

Content-wise, here we have two identical problems:

(A) Solve for x:
$x * 6 + 66 = 81.9$

(B) When Ted got home from his waiter job, he multiplied his hourly wage by the 6hr he worked that day. Then he added the $66.00 he made in tips and found he had earned $81.90. How much does Ted make per hour?

Though questions (A) and (B) present the same information, much can be said about how the presentations of these two problems affect how students and teachers diagnose their respective difficulty level, and therefore how likely they are to reach the correct answer. When asked which format best facilitates acquisition of mathematical

Questioning Formalism First

It is widely believed among mathematics teachers that symbolic representations of algebra problems are easier than story problems testing the same information and thus should be introduced first [CITE a bunch of the dudes nathan cites in that first paper we read]. Indeed, problems expressed in symbolic notation are comprised of more easily manipulable components than verbal problems, as all the relevant parts of the problem are present in the symbols and students do not have to identify the key parts of the problem from within a story context. On the other hand, verbal problems can ground the scenario in a more relatable, real-life manner, which may heighten students intuition or provide insight into what problem-solving strategy to use. Though surveys in Nathan (2012) show that teachers think symbolic problems are likely to be solved correctly, Koedinger and Nathan (2004) show a disparity in the teachers' beliefs and students' performance, as students in their study show a higher rate of success for verbal problems.

Koedinger and Nathan (2004) propose what they call the *verbal hypothesis*, which states that the earlier acquisition of language gives students an advantage on comprehending and thus solving story problems over symbolic problems.

While Koedinger and Nathan (2004) show that the difference in levels success students have with story problems versus equation problems is largely due to the strategies most common for each type of problem and the success rates of those strategies, they only hint at theories of why some strategies are more successful than others and they provide no discussion of how students choose what strategy to use for a given problem.

Arithmetic Interference on Algebra

Singapore

Single- versus Double-Reference Algebra Problems

Koedinger and Nathan 2008

Model

Our model attempts to synthesize the work of.... and...

Second Level Headings

Second level headings should be 11 point, initial caps, bold, and flush left. Leave one line space above the heading and 1/4 line space below the heading.

Results

Result synopsis

Results with 2004 data
Results with 2008 data

Third level headings should be 10 point, initial caps, bold, and flush left. Leave one line space above the heading, but no space after the heading.

Discussion

Use standard APA citation format. Citations within the text should include the author's last name and year. If the authors' names are included in the sentence, place only the year in parentheses, as in Nathan (2012), but otherwise place the entire reference in parentheses with the authors and year separated by a comma (Nathan, 2012). List multiple references alphabetically and separate them by semicolons (Nathan, 2012; Koedinger & Nathan, 2004). Use the "et al." construction only after listing all the authors to a publication in an earlier reference and for citations with four or more authors.

Indicate footnotes with a number[1] in the text. Place the footnotes in 9 point type at the bottom of the column on which they appear. Precede the footnote block with a horizontal rule.[2]

Number tables consecutively. Place the table number and title (in 10 point) above the table with one line space above the caption and one line space below it, as in Table 1. You may float tables to the top or bottom of a column, or set wide tables across both columns.

Table 1: Sample table title.

Error type	Example
Take smaller	63 - 44 = 21
Always borrow	96 - 42 = 34
0 - N = N	70 - 47 = 37
0 - N = 0	70 - 47 = 30

Figures

All artwork must be very dark for purposes of reproduction and should not be hand drawn. Number figures sequentially, placing the figure number and caption, in 10 point, after the figure with one line space above the caption and one line space below it, as in Figure 1. If necessary, leave extra white space at the bottom of the page to avoid splitting the figure and figure caption. You may float figures to the top or bottom of a column, or set wide figures across both columns.

CoGNiTiVe ScIeNcE

Figure 1: This is a figure.

Acknowledgments

References

Koedinger, K. R., & Nathan, M. J. (2004). The real story behind story problems: Effects of representations on quantitative reasoning. *Journal of the Learning Sciences*, *13*, 129–164.

Nathan, M. J. (2012). Rethinking formalisms in formal education. *Educational Psychologist*, *47*, 125–148.

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[1] Sample of the first footnote.
[2] Sample of the second footnote.