

# ARITHMETIC EXPRESSIONS WITH MULTIPLE OPERATIONS – HOW TO SOLVE IT?

Robert Gunnarsson

School of Education and Communication, Jönköping University, Jönköping, Sweden

Imagine that you are not aware of the mathematical laws, rules and conventions. How would you then solve the problem of calculating an arithmetic expression? And, if there were conventions that you felt somewhat acquainted with, how would you know when to apply them? In this poster, it is discussed what students do, their actions, when students solve arithmetic expressions with multiple operations.

The aim of the study presented in this poster is to describe how students solve arithmetic expressions, and possibly to find out whether there could be other actions, or possibly other errors, not captured by previous studies, in students' solutions. Several previous studies have shown that students misinterpret or misuse arithmetic conventions (Blando, Kelly, Schneider & Sleeman 1989; Glidden, 2008; Headlam, 2013; Pappanastos, Hall & Honan, 2002). Particularly, Blando et al (1989) and Headlam (2013) characterized the types of errors students made. However, I argue that none of the studies above challenged the order of operations convention alongside with the left-to-right convention. Instead, in this poster the following task is discussed:

“Calculate the following:  $5 \times 3 + 2 \times 4 \times 5 + 3 \times 2$  “

The task was one of 10 tasks included in a pencil-and-paper test given to 84 students (Yr 8) in eight classes in four different schools in Sweden. Data from the tests show that the students use a set of different actions, sometimes related to arithmetic conventions and sometimes seemingly at random. Particularly, we have found that the central double multiplication ( $2 \times 4 \times 5$ ) causes students to solve the task in several unconventional ways and to reveal previously unreported actions.

## References

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