

Algebra tasks in a word problem and non-word problem context – a multilingual project

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We are interested in second language students solving algebra problems in both a word context and non-word context. When solving word problems in mathematics, Gerofsky (1996) identifies the need of seeing the story-line in the word problem, the pieces of information in it and a question. Lager (2006) studied the types of reading challenges in algebra problems. A minor misreading might lead to a correct but irrelevant solution path. Lager suggested dealing with this by an explicit focus on mathematics register when teaching mathematics for second language learners. This is in line with Barwell (2009), who gave a research overview on word problems and suggested the need of special attention to teaching the genre of word problems for second language students, for example by modifying problem formulations, compare and discuss what difference these modifications make.

Students often find working with algebra difficult and, for example, Kieran (1992) noted that new-beginners in algebra often read algebraic expressions from left to right and might ignore the brackets. Petersson (2013) noted that non-word test tasks in algebra were in average more challenging to students who immigrated during school years 1-7 than to those who immigrated during school years 8-9. In an on-going study there are also indications that students in the latter student category sometimes do not know the meaning of some words with mathematical meaning, which is in line with Lager (2006). Together these two observations lead to the assumption that early and recent immigrants meet different challenges with respect to linguistic and mathematical aspects. The purpose of the suggested study is to explore this assumption further.

Cummins (2008) gave empirical and linguistic base for separating between students who had conversational or/and academic proficiency respectively in the new language. Cummins gave an approximate time span of reaching conversational proficiency in about two years and academic proficiency in five to seven years. He also suggested learning subject content through a second language demands context support and cognitive challenging exercises.

Research question

Research subjects will be students in school year 9 since it is the last compulsory school year and thus has the largest span of experiences from on one hand

Swedish language and on the other hand mathematics teaching from Swedish and foreign school systems. The students will be categorised into four language categories; early or recent immigrants (with two years in Swedish mathematics classroom as delimiter), other second language learners and native speakers.

Our research question is: For each language category, we want to study students' achievement, solution strategy and the students' use of linguistic registers in mathematics.

Discussion

We want to discuss design of test instrument and methods for data collection. We suggest the instrument for data collection to be a classroom test. The reasons for this are that the number of informants will be large enough to display a wide range of solution strategies and how they are distributed among different student categories.

The test instrument should contain algebra tasks that vary in the following aspects: Text intensity in problem formulations, mathematical level of the task and algebra content that cover different areas such as solving equations, using parentheses and dealing with algebraic expressions. (Some suggested examples will be given during the presentation).

We suggest to measure general proficiency in Swedish language through students' achievement in the national test in Swedish.

References

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