

Overcoming Reading Barriers in an Inclusive Mathematics Classroom with Linguistic and Visual Support

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Abstract : The importance of written language in a democratic society is non-controversial. Students with physical, learning, cognitive or developmental disabilities often have difficulties in understanding information which is presented in written language only. These students suffer from obstacles in diverse domains. In order to reduce such barriers in educational as well as in out-of-school areas, access to written information must be facilitated. Readability can be enhanced by linguistic simplifications like the application of easy-to-read language. Easy-to-read language shall help people with disabilities to participate socially and politically in society. The authors state, for example, that only short simple words should be used, whereas the occurrence of complex sentences should be avoided. So far, these guidelines were not empirically proved. Another way to reduce reading barriers is the use of visual support, for example, symbols. A symbol conveys, in contrast to a photo, a single idea or concept. Little empirical data about the use of symbols to foster the readability of texts exist. Nevertheless, a positive influence can be assumed, e.g., because of the multimedia principle. It indicates that people learn better from words and pictures than from words alone. A qualitative Interview and Eye-Tracking-Study, which was conducted by the authors, gives cause for the assumption that besides the illustration of single words, the visualization of complete sentences may be helpful. Thus, the effect of photos, which illustrate the content of complete sentences, is also investigated in this study. This leads us to the main research question which was focused on: Does the use of easy-to-read language and/or enriching text with symbols or photos facilitate pupils' comprehension of learning tasks? The sample consisted of students with learning difficulties (N = 144) and students without SEN (N = 159). The students worked on the tasks, which dealt with introducing fractions, individually. While experimental group 1 received a linguistically simplified version of the tasks, experimental group 2 worked with a variation which was linguistically simplified and furthermore, the keywords of the tasks were visualized by symbols. Experimental group 3 worked on exercises which were simplified by easy-to-read-language and the content of the whole sentences was illustrated by photos. Experimental group 4 received a not simplified version. The participants' reading ability and their IQ was elevated beforehand to build four comparable groups. There is a significant effect of the different setting on the students' results $F(3,140) = 2,932$; $p = 0,036^*$. A post-hoc-analyses with multiple comparisons shows that this significance results from the difference between experimental group 3 and 4. The students in the group easy-to-read language plus photos worked on the exercises significantly more successfully than the students who worked in the group with no simplifications. Further results which refer, among others, to the influence of the students reading ability will be presented at the ICERI 2018.

Keywords : inclusive education, mathematics education, easy-to-read language, photos, symbols, special educational needs

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