

# Profiles of motivation and arithmetic performance

*Change and stability from first to second grade*

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## Abstract

Research on students' motivation in mathematics has shown that in average students' motivation will decrease throughout elementary school (Jacobs, Lanza, Osgood, Eccles & Wigfield, 2002). However, most research on student's motivation and academic performance is variable oriented and has mostly investigated adolescents' motivation in mathematics. There is still little knowledge of what kind of patterns young children have in their mathematics motivation and performance, and how these patterns develop over time.

The purpose of this study was to identify different profiles of student motivation and arithmetic performance by using a person-oriented approach to observe changes and stability from first to second grade.

This was enabled by the following research questions:

- I. *What kind of profiles can be identified in children's motivation (i.e., interest and competence perceptions in mathematics) and arithmetic performance (i.e., arithmetic fluency and word problems)?*
- II. *How is the change and stability in group membership from first to second grade?*

The design of this study was longitudinal, and data from two time points were used. The data utilised in this study was a part of a larger research project, *iSeeNumbers* at the University of Oslo. Children's mathematics motivation was measured using CVIM (Competence, perceptions and interest in mathematics), arithmetic fluency using Regnefaktaprøven (Arithmetic fluency test) and word problems using WISC-Regning (WISC-arithmetic). All tests were administered at both time points. The sample consisted of 217 students. Data was administered and analysed by using "IBM SPSS Statistics 26", where descriptive analyses, correlational analyses, two-step cluster analysis, analysis of variance (ANOVA) and chi-square test was completed. In connection to two-step cluster analysis, ISOA (I-states as object analysis) was used, as it allows for observing short-term developmental stability and change over a certain period of time.



The results from the main analysis, two-step cluster analysis, revealed five distinct student profiles of motivation and arithmetic performance. Profiles that were identified; group 1 *high performance-high motivation* (15.4%), group 4 *low performance- low motivation* (17.1%), group 3 *average performance- low interest* (20.30%), group 5 *low performance-high interest* (23.0%) and group 2 *average performance- high motivation* (24.2%)

The change and stability from time point 1 to time point 2 was overall quite stable, as 43% of the students stayed in the same group. It was unlikely that students in the group characterised as *high motivation and high-performance profile* changed to group that was characterised as *low performance and low motivation profile*. Some students did change their group membership, but they changed to groups that were quite similar to each other.

The findings from this study showed that different patterns of motivation and arithmetic performance can be discovered amongst young school-aged children, and it appears that mathematics motivation and performance do not always go hand in hand. Both arithmetic skills and motivation play important roles in education. Therefore, weak arithmetic skills and low motivation may be considered as a risk factor in relation to children's future mathematical development. The current study showed that it is most likely that some children might need support for increasing motivation in mathematics learning, some for arithmetic skills, and some children might need support in both motivation and arithmetic.