Titel: How Students´ Disciplinary Attitudes and Beliefs Affect Learning In Introductory Statistics Courses

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Abstract:

How Students´ Disciplinary Attitudes and Beliefs Affect Attitudes and beliefs are frequently studied concepts in statistics education research. A main reason for this is that both are associated with learning success. However, very little is known about the mechanisms that induce these relationships between beliefs about statistics, attitudes towards statistics and learning success. Some studies find a mediating role of self-perceived learning engagement and applied learning strategies. However, studies finding such a relationship with more objective behavioral measures than self-reports are lacking.

To provide this evidence, this thesis first develops a conceptualization and a measurement instrument for beliefs about statistics. To objectively record learning behavior, it develops a digital learning platform that in particular is designed for a scientific use of the resulting digital behavioral traces, tests their operationalization in the field and documents the connection between the measured constructs and learning success. Following these preliminary studies, this thesis tests numerous structural equation models to estimate the mediating effect of various learning behavior dimensions.

The main results show that the association between attitudes towards statistics and learning success is indeed partially mediated by learning engagement and the distribution of learning. However, a smaller part of the association is also due to a spurious correlation that can be explained by the high-school graduation average. Such mediating relationships cannot be directly identified for beliefs about statistics. However, there is a relationship between beliefs and attitudes, so that beliefs are also linked to learning behavior through this mediation.

Further analyses indicate, however, that attitudes towards statistics (can) change during a statistics course. This suggests further research into how current attitudes are related to current learning behavior. At the same time, this limitation strengthens the relevance of the effect found, as already the initial attitude is linked to learning behavior throughout the course. A further investigation in addition shows that the relationships found do not necessarily remain stable when interventions are made in teaching, which demonstrates that intervention studies should always investigate all possibly induced effects.