

## **The Factorial Structure of the Approaches and Study Skills Inventory for Students (ASSIST) in Australia: An Exploratory Factor Analysis**

Ayse Aysin BILGIN\*

Macquarie University, Department of Statistics, Australia [ayse.bilgin@mq.edu.au](mailto:ayse.bilgin@mq.edu.au)

Tamas GANTNER

Macquarie University, Department of Statistics, Australia [tamas.gantner@students.mq.edu.au](mailto:tamas.gantner@students.mq.edu.au)

Petra L. GRAHAM

Macquarie University, Department of Statistics, Australia [petra.graham@mq.edu.au](mailto:petra.graham@mq.edu.au)

Nearly a quarter of century ago, Marton and Saljo identified two learning approaches, namely deep and surface approaches, for university students using qualitative research methods. Their research has been followed by others from both qualitative and quantitative perspectives, and various survey tools are developed to identify students learning approaches. There is no doubt in the pedagogical literature that students approach learning in different ways. These ways could be related to many different factors such as their learning environment, what they learn or whether they have enough time to learn. Although the number of published research articles on approaches to learning is growing exponentially, there is very little research specifically in statistics students' learning approaches, especially students who do not major in statistics but who have to study statistics as part of their compulsory undergraduate program, such as psychology, biology or accounting students. The aim of this study was to use principal components analysis (PCA) to evaluate the factorial structure of the Approaches and Study Skills Inventory for Students (ASSIST) as a measure of learning approaches in a sample of statistics students. The ASSIST survey is intended to comprise a three-factor structure: deep, surface and strategic learning approaches. The data collected for this study consisted of 392 students across seven different statistics units in an Australian university where almost half of the surveyed students were international students. Results indicated that using PCA nearly 66% of the variation was explained by three factors. These factors distinctly separated the component subscales of the three learning strategies, although the subscale "monitoring effectiveness" appeared to have some overlap between the Strategic and Deep Approaches. The results of this study align with the proposed constructs of three distinctive learning approaches, although we suggest that due to cross loadings on strategic and deep approaches, researchers should be cautious with their interpretations.

**Keywords:** Statistics education; Service teaching; Learning Approaches