

An Exploratory Sequential Design: A Mixed Methods Model for the Statistics Learning Assessment with a Bayesian Network Representation

Authors : Zhidong Zhang

Abstract : This study established a mixed method model in assessing statistics learning with Bayesian network models. There are three variants in exploratory sequential designs. There are three linked steps in one of the designs: qualitative data collection and analysis, quantitative measure, instrument, intervention, and quantitative data collection analysis. The study used a scoring model of analysis of variance (ANOVA) as a content domain. The research study is to examine students' learning in both semantic and performance aspects at fine grain level. The ANOVA score model, $y = \alpha + \beta x_1 + \gamma x_2 + \varepsilon$, as a cognitive task to collect data during the student learning process. When the learning processes were decomposed into multiple steps in both semantic and performance aspects, a hierarchical Bayesian network was established. This is a theory-driven process. The hierarchical structure was gained based on qualitative cognitive analysis. The data from students' ANOVA score model learning was used to give evidence to the hierarchical Bayesian network model from the evidential variables. Finally, the assessment results of students' ANOVA score model learning were reported. Briefly, this was a mixed method research design applied to statistics learning assessment. The mixed methods designs expanded more possibilities for researchers to establish advanced quantitative models initially with a theory-driven qualitative mode.

Keywords : exploratory sequential design, ANOVA score model, Bayesian network model, mixed methods research design, cognitive analysis

Conference Title : ICDPHDT 2019 : International Conference on Developmental Psychology, Human Development and Theories

Conference Location : Copenhagen, Denmark

Conference Dates : June 11-12, 2019