

Longitudinal Data Analyses: Methodology

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The research utilizes a longitudinal design characterized by repeated observations of 9th graders over a period of three years covering their secondary and post-secondary years. The design is critical in understanding the students' performance in various subjects from the beginning of high school into post-secondary education and beyond. It is important in the establishment of changes in the progression of the students throughout their educational processes (Van der Heijden, 2014). The research method relies on applied correspondence analysis on longitudinal data (repeated measures), log-linear model on longitudinal data, and the use of categorical variables for the educational longitudinal data. The following is a description of each of the analytical approaches utilized in the study.

Correspondence Analysis on Longitudinal Data

Correspondence analysis on longitudinal data utilizes the repeated measures ANOVA and MANOVA. The analysis tests the relationship between the categorical variables (Brzezińska, 2018). For example, there is an analysis of variance in math achievement from the test scores reported by the participating students at different levels (Barth, 2015). There is a comparison of the mean and variance of the student's performance across different grades to establish the mathematical achievements of the students. From the multiple observations, the analysis provides an accurate view of student performance over time (Beh & Lombardo, 2019). The primary advantage of the analysis of longitudinal data is easy graphical presentation. It is important in understanding primary and secondary data by providing a graphical assessment.

Log-Linear Model

The use of log-linear models in the analysis involves an assessment of the response variables with the goal of evaluating the associations between the discrete variables under

investigation. In a study of the student's progression in math performance, the analysis involves tests of the relationship between test scores in the subjects and other variables affecting student's performance such as motivation (Géryk, 2016). The analysis is conducted alongside the correspondence tests to provide an accurate view of the student's math efficacy across different grade levels.

Application of Categorical Variables

This involves an assessment of different categorical variables involving the math and science performance of 9th graders. Some of the categorical variables in the analysis included gender, age, motivation levels, learning environment, and the perceptions of learners towards STEM subjects. Using a log-linear model and correspondence analysis, there is an assessment of these variables over time to establish an association (Géryk, 2016). This is advantageous in the analysis of discrete continuous data. The categorization also makes graphical presentation easier for better analysis and understanding of the findings.

References

- Barth, A. (2015). The changing nature of attitude constructs: an application of multiple correspondence analysis on gender role attitudes. *Quality & Quantity*, 50(4), 1507-1523.
- Beh, E., & Lombardo, R. (2019). Multiple and multiway correspondence analysis. *Wiley Interdisciplinary Reviews: Computational Statistics*, 11(5).
- Brzezińska, J. (2018). Singular Value Decomposition Approaches in a Correspondence Analysis with the Use of R. *Folia Oeconomica Stetinensia*, 18(2), 178-189.
- Géryk, J. (2016). *Visual analytics of educational time-dependent data*. (Unpublished doctoral dissertation). Masaryk University, Czechia.
- Van der Heijden, P. G. (2014). *Correspondence analysis of longitudinal data*. Wiley Stats Ref: Statistics Reference Online.