# Evaluating Students' Correlation Graphing Capability Using SOLO Taxonomy

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## Abstract

Many students often fail to accomplish correlation graphing tasks beyond scatterplot construction. This hinders students' capability of performing subsequent regression modelling tasks. Hence, a qualitative analysis of students' correlation graphing capability should be performed in order to identify which parts of correlation graphing they cannot fully grasp so as to be reinforced. To perform the analysis, an assessment instrument, the SOLO taxonomy of correlation graphing capability was derived from the SOLO taxonomy of Biggs and Collis (1982) consisting of five levels of achievement: Prestructural, Unistructural, Multistructural, Relational and Extended Abstract. In the context of correlation graphing, the prestructural responses are displayed by students who are able to use an appropriate graphing tool but without utilising graphic features: titles, labels, scales, axis and symbols. Those students who may use one of the graphic features in their scatterplots have achieved a unistructural level of achievement. Students whose scatterplots utilise all the graphic features but treat these as isolated entities and/or unrelated to scattering of data, attain a multistructural level of achievement. Integrating the relationship between the measurement, measurement unit, content and context of data and all the graphic features is regarded as a relational level of achievement. In attaining the extended abstract level of achievement, students should be able to deduce the qualitative relationship between two variables as unrelated, positively related or negatively related and reveal whether or not such relationship matches or mismatches with the empirical phenomena.

A random sample of twenty-three students studying in the Higher Diploma in Applied Statistics and Computing course was drawn to attempt seven questions on an individual basis in a test that was conducted in a computing laboratory. Question 1 was used to evaluate how much students understood the given data regarding the data context that was essential for choosing appropriate data in regression modelling. Question 2 was used to check how well students justified the reasonableness and meaningfulness of data measurements. Question 3 was to assess students' knowledge of scatterplot construction and proficiency in using Excel graphing tools. Question 4 focused on an appraisal of students' correlation comprehension. Question 5 appraised students' performance of statistical calculations using Excel. Question 6 checked how well students conducted statistical hypothesis testing and reasoned with testing results. Question 7 aimed at assessing students' ability to reason with correlation results and deduce its practical implications. After the SOLO analysis has been performed, the findings reveal information about which tasks students cannot accomplish and why they cannot accomplish. These findings therefore should be able to inform teachers especially novices to think how to structure the teaching and learning activities and enhance students' understanding of specific areas in correlation graphing they cannot fully grasp.

Keywords: scatterplots, regression modelling, levels of achievement