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A Psychometric Study of the Index of Learning Styles

Context for the Study

The *Index of Learning Styles*[©] (ILS) of Felder and Soloman [1] is widely used in engineering education [2] to assess preferences on four scales of a model originally proposed by Felder and Silverman [3]: Active-Reflective; Sensing-Intuitive; Visual-Verbal, and Sequential-Global. The ILS was developed based on the belief that the principal value of a learning styles model is to provide guidance to instructors on developing and using a balanced teaching approach. Thus, the philosophy and theory behind the development and use of the ILS are firmly in the 'fluid trait' category of learning styles instruments proposed by Hall and Moseley [4].

Research Questions

Discussions with students, after they had completed the ILS, revealed that a number of them were frustrated by the scale used in the instrument. The scale forces a choice between two possible responses for each item. Students' frustration with the scale arose when they encountered items in which they felt the two responses were equivalent, but they were forced to choose anyway. This feedback from students led to a collegial debate among the authors about the scale and its effects on the resulting scores and reliability. The major research question that evolved from this discussion was: what is the effect of the ILS scale on the distribution of scores and on reliability. A second research question was whether the scale had any effect on evidence for validity.

Methodology

A modified ILS was developed that used a five-option response scale with a neutral response in place of the two-option scale, which provides no neutral response. In addition, descriptions of the various learning styles in the ILS were developed so that students could be given feedback on their learning styles after completing the instrument. This student feedback was used as evidence of the validity. Both the modified ILS and the feedback were administered to focus groups before being used for the main data collection process.

Random samples of 1000 undergraduate and graduate students from each of three colleges—Engineering, Liberal Arts, and Education—were invited to participate in the study via email. 500 students in each random sample were asked to complete the ILS first and 500 were asked to complete the modified ILS first. Participants were informed that if they completed the instrument that they would be contacted two weeks later to ask them to complete the second form of the instrument. The total number of students who completed both forms of the instrument was 448, giving an overall response rate of 15 percent. Approximately 80 percent of participants were undergraduate students and approximately 50 percent of the participants were female.

Analysis of the data from the two forms of the ILS included response statistics, checks of internal consistency of the four scales using Cronbach's coefficient alpha, and an exploratory factor analysis to identify the components within each scale. The exploratory factor analysis was conducted within the SPSS program using principal component analysis and orthogonal Varimax rotation. The factor analysis results and student feedback were used to seek evidence for construct validity of the ILS scales.

Major Findings

- The mean scales scores of the two forms of the instrument were found to be equivalent. The variances for the modified ILS were substantially smaller than those of the ILS; F-tests showed that the differences in the variances were statistically significant with p-values less than 0.01.
- The internal consistency reliabilities of results from the modified ILS were higher for all four scales. The internal consistency reliability for the Visual-Verbal scale increased only 6% from 0.75 to 0.77. For the other three scales, however, the increase was substantial, ranging from 26% to 42%.
- Evidence for validity of the scales in the ILS provided by student feedback was very good for all of the scales for both forms of the instrument. Therefore it does not appear that the increased reliability associated with the use of a five-option response scale led to any improvement in validity.

Implications for Engineering Education

The most important implication for engineering educators is that the original ILS generated data with acceptable reliability and that the evidence for validity of the original form was good. Thus, the ILS can be used with confidence to give students an understanding of their learning preferences. It should not be used for "typing" individual students so that instruction can be matched to their preferred learning style. In addition, the ILS is appropriate for faculty members to use to get a sense of the range of learning styles in their classes.

Acknowledgment

References

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