Abstract

Assessing Student Perceptions of High School Science Classroom Environments:
A Validation Study

By

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The purpose of this study was to assess the measures of the Science Laboratory Environment Inventory (SLEI), an existing classroom environment measurement instrument, to provide up-to-date norms and validation evidence for a U.S. secondary school population. This instrument's measures were established as a means of examining students' perceptions of their learning environment in science classrooms, and subsequently providing indicators of performance. Pedagogical changes have taken place in the science classroom fostered by the National Science Standards. This study included an examination of the SLEI measures using Mesick's validity framework including an in-depth analysis of the instrument's content, substance, structure, generalizability and external validity. Rasch measurement theory was employed to investigate specific components of the instrument including item fit, rating scale function, dimensionality and individual performance information.

Three hundred and fifty five high school science students completed the SLEI. Structural equation modeling was used to assess the dimensional structure of the measures of the instrument. Analyses revealed that a multi-dimensional model encompassing five distinct factors and excluding negatively worded items best characterized the SLEI measures. Multidimensional measures created by scaling the data to the Multidimensional Random Coefficients Multinomial Logit (Rasch) Model exhibited suitable rating scale structure, item quality, and reliability of separation.

Analyses by academic grouping revealed that students in high achieving courses had a more favorable perception of all aspects of their learning environments when compared to students in the regular courses. In addition, student perceptions of the lab were influenced by the extent of students' experience learning science. To determine whether differences observed by grade level could be attributable to biology learning experience versus experience in school, additional analyses were completed. The analysis revealed that differences in perception were consistent across academic achievement groups as well as experience level by first year and beyond (course level) rather than by grade level.

This validation study has provided additional and up-to-date evidence concerning the validity of SLEI measures. Coupled with the existing research revealing positive correlations between student perceptions of their learning environments and their academic achievement, the outcomes reported here provide a foundation for future assessment of the relationship between classroom environment and student achievement.

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Attributions

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Chapter 4:

Associate Professor Edward W. Wolfe- Ph.D. (Educational Research and Evaluation, Virginia Tech) Dr. Wolfe worked in collaboration on this chapter and development of the article entitled *Assessing Student Perceptions of High School Science Classroom Environments: A Validation Study.*

Professor Kusum Singh- Ph.D. (Educational Research and Evaluation, Virginia Tech) Dr. Singh worked in collaboration on this chapter and development of the article entitled *Assessing Student Perceptions of High School Science Classroom Environments: A Validation Study.*

Chapter 5:

Assistant Professor Erin Dolan- Ph.D. **(**Department of Biochemistry, Virginia Tech) Dr. Dolan provided the project with financial support through her grants. She also worked in collaboration on this chapter and development of the article entitled *Influential factors on student perceptions of the high school science laboratory environment.*

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