Drexel University
Research Brief no. 11

Seeds to STEM Project: Supporting Nutrition and Health Choices for Minoritized Children in Urban Settings

By: Dara Bright
Drexel University

March 2022

Supervising Professor:

Dr. Toni May

Editors:

Dr. Penny L. Hammrich
Professor and Dean

Dr. Rajashi Ghosh
Associate Professor and Department Chair for Policy, Organization, and Leadership

Copy Editor:

Anthony Hopkins
Director of Marketing and Communications

Seeds to STEM Project: Supporting Nutrition and Health Choices for Minoritized Children in Urban Settings

Abstract

Enochs and Riggs (1990) developed the Teachers' Efficacy and Beliefs Instrument (TEBI) to evaluate educators' judgements about their ability to evoke student success; however, there has been inadequate psychometrics conducted on this instrumentation. This study provides a psychometrically sound instrument development and construct validation process for our modified version of TEBI. The qualitative data indicated that item revisions were required before quantitative data collection. The modified TEBI measure will inform the curriculum Pre-K STEM, nutrition, and literacy programming for an NIH-funded grant.

Aim

This research seeks to develop and validate instruments for a bilingual nutrition, STEM, and literacy Pre-K curriculum-based program to increase these literacy forms for minoritized children in urban settings.

Problem or Issue

The field of teacher education has effectively explored the concept of teacher efficacy and beliefs (TEB). It has been operationalized as educators' assessment of their own abilities to evoke change or improve their students' learning (Moran and Hoy, 2001). Research has linked teacher efficacy and beliefs (TEB) to instructional quality, effective teaching pedagogy, and positive learning experiences (Buric and Kim, 2020; Daumiller et al., 2021). Therefore, TEB are some of the most critical components to consider when discussing student academic outcomes and motivation (Schiefele and Schaffner, 2015), particularly for preschool, an important formative year for learning (Moran, 2019). Yet, there is also very little literature specifically focused on the TEB in the preschool space. The existing body of research evaluating TEB in preschool has primarily measured this construct qualitatively. While quantitative studies have solely relied on factorial analysis and Cronbach's Alpha for reliability and validity (Aslan et al., 2016; von Suchodoletz, 2018). These quantitative instruments utilize two statistical measures that are not considered sound based on psychometric standards (Dabaghi et al., 2020).

Therefore, there is a gap in the literature on sound instrumentation for TEB. As TEB is often context-specific, it becomes imperative that urban preschool teachers feel well-equipped with high-quality instructional content for STEM, literacy, and nutrition to educate their diverse student body. It is difficult for urban educators to *feel* well-equipped when there is a lack of STEM, nutrition, and literacy resources that centers their students' diverse ways of knowing and culturally sustaining teaching practices in these subject areas. Despite the literature offering a link between minoritized preschool student success and culturally relevant teaching practices (Durden et al., 2015), there remains a dearth in curriculum and preschool professional development to prepare urban educators to serve these populations.

This research project contributes to the body of literature by developing and validating several instruments related to TEB and content tasks to measure the impact of Pre-K curriculum developed for minoritized children in urban settings. The most utilized teacher efficacy instruments include the Teachers Efficacy and Beliefs Instrument (TEBI) and

Teacher Sense of Self Efficacy scale (SSES) (Enochs and Riggs, 1990; Tschannen-Moran and Hoy, 2001). Similar to other instrumentation, these two tools lack adequate psychometric validation and rely almost exclusively on factorial analysis and Cronbach's Alpha. As a result, we do not presently have a sound instrument to understand teachers' efficacy and beliefs at the pre-school level, which inhibits our ability to create a Pre-K curriculum appropriately.

Research Findings

This study utilized the five types of validity evidence developed by the Standards for Educational and Psychological Testing (AERA et al., 2014). These five types of validity evidence include content, response process, consequential/bias, internal structure, and relationship to other variables. The first three types of validity evidence are collected qualitatively. The latter two forms are evaluated quantitatively through Rasch measurement analysis. The study's TEB instrument modified the existing TEBI to align with national standards for preschool education. Our Subject Matter Experts (SMEs) and content panels reviewed the modified TEBI survey and offered feedback based on their expertise in our preliminary findings for content validity evidence. Modifications were made based on their suggestions and alignment indicators. Subsequently, the second form of validity evidence was collected, response process, in which cognitive interviews were conducted. Several item-specific modifications were made based on sample participants' feedback on the instruments. The last form of evidence collected thus far, consequential/bias evidence, sought to assess whether the instrument caused the participants to have negative emotional responses. Only one participant indicated that they felt uncomfortable during the survey. They did not teach the content we were inquiring about, which led us to revise our instructions at the beginning of the survey.

Conclusion/Discussion

This process of developing and validating the TEBI, and associated subject matter tasks, has shown that this iterative method is invaluable to creating a solid educational measure. It is crucial that when scholars develop their own instruments, we are intentional about ensuring that the instrument has undergone a rigorous and psychometrically based development and validation process. Alternatively, if scholars elect to utilize existing instruments, they must document evidence aligned with the appropriate construct. There are negative consequences to utilizing unsound instrumentation and unvalidated items, such as the subgroups of the intended population being excluded and experiencing discrimination/bias from participating in the study.

Research Implications

This instrument development process will continue to undergo additional iterations of validation. After this process, the Pre-K teacher instruments offer a promising opportunity to evaluate teachers' pedagogical practices and beliefs appropriately. It also offers an instrument for researchers to adequately develop curriculum programming to ensure high-quality instruction.

Acknowledgements

This project is supported by an NIH SEPA Grant (2021-2026). The author would like to acknowledge the grant's Principle Investigator, Dr. Jacquie Genovesi, Co-Investigator: Dr. Toni May (Co-PI), and Dr. Kathleen Provinzano (Senior Researcher) for the opportunity to work on this research.

References

Aslan, D., Tas, I., & Ogul, I. G. (2016). Pre-and in-service preschool teachers science teaching efficacy beliefs. *Educational Research and Reviews*, 11(14), 1344-1350.

Burić, I., & Kim, L. E. (2020). Teacher self-efficacy, instructional quality, and student motivational beliefs: An analysis using multilevel structural equation modeling. *Learning and Instruction*, 66, 101302.

Dabaghi, S., Esmaielzadeh, F., & Rohani, C. (2020). Application of Rasch analysis for development and psychometric properties of adolescents' quality of life instruments: a systematic review. *Adolescent health, medicine, and therapeutics*, 11, 173.

Daumiller, M., Janke, S., Hein, J., Rinas, R., Dickhäuser, O., & Dresel, M. (2021). Do teachers' achievement goals and self-efficacy beliefs matter for students' learning experiences? Evidence from two studies on perceived teaching quality and emotional experiences. *Learning and Instruction*, 76, 101458.

Durden, T. R., Escalante, E., & Blitch, K. (2015). Start with us! Culturally relevant pedagogy in the preschool classroom. *Early Childhood Education Journal*, 43(3), 223-232.

Morgan, H. (2019). Does high-quality preschool benefit children? What the research shows. *Education Sciences*, 9(1), 19.

Schiefele, U., & Schaffner, E. (2015). Teacher interests, mastery goals, and self-efficacy as predictors of instructional practices and student motivation. *Contemporary Educational Psychology*, 42, 159-171.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and teacher education*, 17(7), 783-805.

von Suchodoletz, A., Jamil, F. M., Larsen, R. A., & Hamre, B. K. (2018). Personal and contextual factors associated with growth in preschool teachers' self-efficacy beliefs during a longitudinal professional development study. *Teaching and Teacher Education*, 75, 278-289.

Author Biography

Dara Bright is a PhD student at Drexel University in the Education program. Dara earned her Bachelor of Arts degree in Government from The College of William and Mary (2018) and her Master of Science degree in Public Policy from Georgia Institute of Technology (2019). While at Drexel University, she is a Research Assistant in the Methods Lab. Dara's research interests focus on utilizing measurement instruments to aid in understanding students' experiences and

inform policies on closing the opportunity gap in K-12 STEM spaces and access to higher education.