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Algebra for All Research Report

The Impact of the CUNY Algebra for All Program on Teachers' Beliefs and Practices About Teaching and Learning Mathematics

Celia Cruz and Rabab Abi-Hanna

Purpose

Several studies in mathematics education revealed a strong association between teachers' beliefs and practices related to mathematics teaching and learning. Generally, teachers who believe that mathematics is a static collection of facts, procedures and skills carry out mathematics instruction in the same approach, whereas teachers who perceive mathematics as an inquiry and dynamic discipline utilize practices that engage students in meaning making and conceptual understanding (Thompson, 1992; Stipek, 2001; Beswick, 2007; Lamichhane, 2017; Marshman, 2018; Swars, 2018; Hughes, 2019; Muhtarom, 2019). Consequently, most of these studies suggest that beliefs can be influenced and thereby changed.

The framework of the Lehman College Algebra for All (A4A) program is guided by a constructivist approach. That is, students need to take an active role in their mathematics learning. This allows an opportunity to influence teachers' perceptions of math teaching and learning through the program. This study seeks to determine the extent of influence the program has on teachers' beliefs and practices. Specifically, this study aims to answer the following questions:

1. How does the CUNY Algebra for All program impact teacher-participants' beliefs regarding teaching and learning mathematics?
2. How are their new beliefs aligned with their current teaching practices?
3. How has the Algebra for All program met teacher-participants' expectations? What do they think could have been done differently in the Algebra for All program?

Methodology

An IRB was obtained to collect data from 34 teacher-participants. The purpose of the research was explained to the A4A participants. Consent forms were distributed via Google forms. To collect anonymous data from participants, pre- and post-surveys, and an open-ended questionnaire were created using Microsoft forms. Quantitative data were analyzed using descriptive methods. Qualitative data were coded to find common themes.

Conclusion

The findings suggest that most of the teacher-participants experienced a positive change with respect to their beliefs and practices based upon the surveys and open-ended questionnaire. Most

of the teacher-participants indicated traditional beliefs and practices before participating in the program. These beliefs and practices reflected a more constructivist inclination after teacher-participants have engaged in the Algebra for All program. Over-all, most of the teacher-participants agreed that the program met their expectations.

Significance of Findings

Given the opportunity to be exposed to learning theories and experiences based on constructivist beliefs and practices in teaching mathematics, teacher-participants expressed inclination to constructivist beliefs and practices in their own classrooms. Moreover, such experiences allowed teacher-participants to develop a deeper conceptual understanding of the mathematics content in middle and high school as revealed by their qualitative responses to the open-ended questionnaire.

Recommendation

Based on our findings, we recommend a comparison of teacher-participants' beliefs and actual classroom practices.

Next Steps

The authors are currently working on articles that reflect the quantitative and qualitative findings of this research for publication.

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