KISSCE - ENGAGEMENT

KISSCE - COLLEGE ACCESS

Evidence in Action

A K20 Center Research Brief

Participation in Structured STEM-Focused Out-of-School Time Programs in Secondary School: Linkage to Postsecondary STEM Aspiration and Major

Hsun-Yu Chan, Hyejin Choi, Meseret F. Hailu, Melinda Whitford, & Sheila Duplechain DeRouen

2020

Introduction

This intervention brief explores the impact of structured STEM-focused out-of-school time (OST) programs on secondary school students' aspirations and enrollment in STEM majors in college. The authors examined literature on the importance of STEM education for economic growth and innovation, highlighting the lagging performance of U.S. students in STEM compared to peers in other industrialized nations. They emphasized the potential of OST programs to enhance STEM interest and identity, addressing gaps in existing research by examining the longitudinal effects of these programs on students' STEM aspirations and major choices.

Methodology

Research Design:

The study employed a longitudinal design using data from the High School Longitudinal Study of 2009 (HSLS, 2009), which followed a nationally representative sample of ninth-graders over several years.

Sample:

The final analytical sample consisted of approximately 20,970 students who provided data on their participation in structured STEM OST programs during eighth grade.

Data Analysis:

The authors conducted path analysis to explore the relationships between OST program participation, self-efficacy beliefs, interest in STEM, and academic performance. They used propensity score analysis to address self-selection bias and applied inverse probability of treatment weighting (IPTW) to account for complex sampling design.

Results

The study found that participation in structured STEM-focused OST programs in eighth grade positively influenced students' self-efficacy beliefs, interest in STEM, and academic performance in ninth grade. These early experiences were linked to a higher likelihood of aspiring to and choosing a STEM major in college. However, continued participation in OST

programs during high school was not significantly related to STEM aspirations or major choice. The results also highlighted sociodemographic disparities in OST program participation, with Latinx and Black students participating less frequently than their white peers.

Application into Practice

To replicate this intervention, schools should:

1. **Identify and Promote STEM OST Programs:** Schools should identify existing STEM-focused OST programs and actively promote them to students, particularly targeting underrepresented groups.
2. **Provide Access and Support:** Ensure that all students, regardless of socioeconomic status, have access to these programs by offering scholarships or subsidized participation fees.
3. **Encourage Early Participation:** Emphasize the importance of early participation in STEM OST programs. Starting in middle school, schools should build a strong foundation of interest and self-efficacy in STEM fields.
4. **Monitor and Evaluate:** Continuously monitor students' participation and progress in these programs, and evaluate the impact on their STEM aspirations and academic performance.

Work Cited

Chan, H.-Y., Choi, H., Hailu, M. F., Whitford, M., & Duplechain DeRouen, S. (2020). Participation in structured STEM-focused out-of-school time programs in secondary school: Linkage to postsecondary STEM aspiration and major. Journal of Research in Science Teaching, 57(8), 1250-1280. https://doi.org/10.1002/tea.21629