GPA

Evidence in Action

A K20 Center Research Brief

STEM Club Participation and STEM Schooling Outcomes

Michael A. Gottfried and Darryl N. Williams,
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Introduction

This intervention brief explores the research article titled "STEM Club Participation and STEM Schooling Outcomes" by Michael A. Gottfried and Darryl N. Williams, published in 2013. The study investigates the relationship between participation in school-based STEM clubs (math and science clubs) and students' success and persistence in STEM fields. The authors highlight the critical role of scientists and engineers in ensuring national security, solving critical problems, and enhancing the standard of living. Despite this, there is a concern about the declining quantity and quality of American youth pursuing STEM careers. The study aims to understand how non-formal, school-based STEM activities influence students' academic performance in STEM subjects and their likelihood of selecting a STEM major in college.

Methodology

Research Design:

The study employs a longitudinal design using data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). The research design includes both baseline regression models and propensity score matching to evaluate the relationship between STEM club participation and STEM outcomes.

Sample:

The sample consists of 3,223 students who participated in the Add Health study. Of these, 202 students participated in math or science clubs, while the remainder did not. The sample includes students from diverse demographic backgrounds, including variations in gender, race/ethnicity, and socioeconomic status.

Data Analysis:

The analysis involves two main approaches:

1. **Baseline Regression Models:** These models estimate the relationship between STEM club participation and high school math and science GPAs, as well as the probability of selecting a STEM major in college.
2. **Propensity Score Matching:** This method matches students who participated in STEM clubs with similar students who did not, based on a range of covariates, to estimate the average treatment effect of club participation on STEM outcomes.

Results

The study found that participation in STEM clubs positively influences students' academic performance and persistence in STEM fields. Key findings include:

- **Math and Science GPAs:** Participation in math clubs is associated with a 0.25 increase in math GPA, while participation in science clubs is associated with a 0.25 increase in science GPA. These results are robust even after controlling for a range of covariates.
- **STEM Major Selection:** Students who participated in math clubs are more likely to select a STEM major in college, with odds ratios indicating a significant positive relationship. However, the relationship between science club participation and STEM major selection is not statistically significant.
- **Demographic Differences:** The positive effects of STEM club participation are generally consistent across gender and race/ethnicity. However, the benefits are more pronounced for non-poverty students compared to poverty students.

These results suggest that STEM club participation can enhance students' academic performance in STEM subjects and increase their likelihood of pursuing STEM careers.

Application into Practice

To replicate the intervention in a school context, the following steps can be taken:

1. **Identify Target Students:** Focus on students who show an interest in STEM subjects and those who may benefit from additional support, including students from diverse demographic backgrounds.
2. **Implement STEM Clubs:** Establish math and science clubs that provide engaging, hands-on activities and opportunities for students to explore STEM topics. Ensure that clubs are accessible to all students, including those from low-income backgrounds.
3. **Monitor Participation and Outcomes:** Track students' participation in STEM clubs and their academic performance in STEM subjects. Use data to identify areas for improvement and to ensure that clubs are meeting students' needs.
4. **Provide Support and Resources:** Offer resources and support to club sponsors, including training and materials. Partner with local STEM organizations, universities, and industries to enhance the quality of club activities and provide students with real-world STEM experiences.

Work Cited

Gottfried, M. A., & Williams, D. N. (2013). STEM club participation and STEM schooling outcomes. *Education Policy Analysis Archives, 21*(79). http://epaa.asu.edu/ojs/article/view/1361