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Evidence in Action

A K20 Center Research Brief

Hands-on Summer Camp to Attract K-12 Students to Engineering Fields

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Introduction

The authors highlight a critical issue: declining interest and enrollment in STEM fields among U.S. high school students. Despite a growing demand for engineers, only a small fraction of high school graduates pursue engineering degrees. The study underscores the importance of early exposure to STEM through engaging, real-world experiences. The YESTexas Summer Camp at Texas A&M University-Kingsville (TAMUK) was developed to introduce students to engineering through engaging, real-world projects and technical activities. The camp aimed to spark interest in STEM careers and provide students with a practical understanding of engineering disciplines.

Methodology

Research Design:

The study used a mixed-methods program evaluation approach, combining surveys, daily feedback, and observational data to assess the camp's effectiveness.

Sample:

Thirty high school students from 12 schools were selected based on GPA, school attendance, and family income. The group was balanced in terms of age and grade level, with students grouped into teams for collaborative learning.

Data Analysis:

Data were collected through:

- Daily oral evaluations
- A comprehensive post-camp survey
- Student-written reflections
    - Quantitative responses were analyzed for trends in interest, skill development, and satisfaction, while qualitative feedback informed program improvements.

Results

The camp significantly increased students' interest in engineering:

- 80% reported increased interest in engineering careers.
- 93% expressed a desire to study engineering after the camp.

Students reported gains in:

- Teamwork and documentation skills
- Confidence in STEM abilities
- Awareness of engineering disciplines
- Hands-on projects were especially impactful. Students valued the real-world relevance, faculty engagement, and the opportunity to work in university labs.

Application into Practice

To replicate this intervention, schools or districts can:

1. **Partner with Local Universities:** Collaborate with engineering departments to access labs, faculty, and graduate student mentors.
2. **Design a Curriculum to Provide a Variety of Activities:**
    a. Include hands-on projects across multiple engineering fields.
    b. Ensure projects are fun, team-based, and tied to real-world problems.
    c. Consider instructor expertise and available resources when designing activities.
3. **Recruit Effectively:**
    a. Use GPA, attendance, and interest in STEM as selection criteria.
    b. Promote the program through school counselors, teachers, and local media.
4. **Provide Incentives:**
    a. Offer stipends, meals, and transportation to reduce barriers.
    b. Recognize student achievements with awards and competitions.
5. **Evaluate and Iterate:**
    a. Collect daily feedback and post-program surveys.
    b. Adjust curriculum and delivery based on student input.

This model is adaptable to various educational settings and can be a powerful tool for increasing student engagement in STEM.

Work Cited

Yilmaz, M., Ren, J., Custer, S., & Coleman, J. (2010). Hands-on summer camp to attract K–12 students to engineering fields. IEEE Transactions on Education, 53(1), 144–151. https://doi.org/10.1109/TE.2009.2026366