Needle in a Haystack? Seeking Causal Evidence about How STEM Experts Improve Student Outcomes

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Program characteristics
- Programs are diverse (in terms of content areas, foci, goals, and roles for STEM experts)
- Programs always include other elements beyond involvement of STEM professionals. For example:
  - STEM experts lead inquiry-based learning activities in many programs
  - College or university faculty and students teach courses in several summer programs for K-12 students

Types of Research Reported
- Outcome domains:
  - Attitudes
  - Content knowledge or skills
  - Knowledge about a STEM field
  - College enrollment or persistence
- Types of studies:
  - One-group, pre-post comparisons
  - Quasi-experimental designs
  - Random control trials

Approach to Summarizing Results
- Programs grouped by level of STEM experts’ involvement:
  - Primary dimension of interest
  - An important dimension among others
  - One dimension among many
- Also grouped by setting:
  - School-based activities
  - University- or college-based summer programs
  - Competitions and out-of-school programs

Summary of Results
- Findings varied within and across programs
- Consistent with some prior research
  - Most studies reported positive outcomes for student participants
  - Challenging to disentangle distinct program elements (including role of STEM expert)
- Majority of papers were more formative than summative
- Perhaps involving STEM experts in K-12 education contributes to positive outcomes for students … but the research designs cannot yet support causal conclusions

Next Steps
- Outline steps for systematic research agenda about using STEM experts
- Outreach to informal science and mentoring networks about research evidence

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Overview

Purpose of the study:
- Identify research conducted on the impacts of including STEM experts in K-12 education
- Provide descriptions of key aspects of studies identified:
  - Programs addressed
  - Research conducted
  - Results reported
- Offer recommendations for developing a cohesive research agenda

Approach to Finding Papers
- Searched internet and bibliometric databases using keywords
- Screened abstracts of search results, and retained those with:
  1. A focus on a program (rather than general discussion of a practice)
  2. Descriptions of specific programs, practices, and activities
  3. Reports on empirical research about student outcomes

Approach to Summarizing Results

Summary of Results

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