

Write a Researcher: a Pen Pal Outreach Program for Middle and High School Students

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INTRODUCTION

Science, technology, engineering, and math (STEM) fields have historically lacked proportionate representation of racial and ethnic minoritized groups and gender diversity (1). Further, students from underrepresented identities leave STEM majors at higher rates (2–4). While bias and marginalization play a role in these disparities (5), another factor may be lack of guidance on navigating the path to higher education. Indeed, students whose parents have earned higher degrees are more likely to seek higher degrees themselves (6).

Here we present Write a Researcher, a pen pal outreach program that pairs middle and high school students (here, “students”) with STEM mentors (including Cornell University graduate and professional students, postdocs, and faculty; here, “mentors”). This program aims to empower students by providing mentoring and knowledge of STEM career options. Additionally, we sought to address a systemic socioeconomic barrier by providing undergraduate application fee waivers to participating students interested in applying to Cornell University.

Similar programs either affiliated or unaffiliated with universities (see Supplemental File 1) have been successful in reaching school students of various ages and locations through volunteer STEM professional pen pals. These programs have similarly excelled at increasing interest in STEM, and it is our hope that this article will serve as a guide for others to implement such programs at their own institutions (Supplemental File 2, Appendix 2).

Audience

To recruit participants, we e-mailed middle and high school teachers, principals, and administrators. Individual students could

also enroll. Teachers could act as “letter liaisons,” distributing letters on behalf of their students, and some teachers opted to write letters as a class. Ideally, recruitment efforts should attempt to maximize the STEM fields represented by the mentors to match a broad range of student interests and should target schools with substantial populations of underrepresented groups in STEM or that have limited resources to learn about STEM careers.

Over 2 years, our program included 274 students from 46 schools across 18 U.S. states and students in Canada, France, Mexico, and Taiwan. The program was also advertised to Cornell graduate and professional students, postdocs, and faculty. In total, there were 182 mentors representing 50 STEM fields.

Materials

Surveys (Supplemental File 2, Appendix 3) were created with Qualtrics and a program website was hosted through CampusGroups. Students and mentors were sent welcome packets containing a letter-writing guide and prompts (Supplemental File 2, Appendix 5 and 6). To prevent letters from being incorrectly addressed, address labels were affixed to prestamped envelopes and sent to each pen pal in the welcome packet. Packages containing welcome packets for the class were shipped to letter liaisons. Welcome packets cost approximately \$3.50 per participant (Supplemental File 2, Appendix 2).

PROCEDURE

Write a Researcher involved students exchanging letters with mentors during an academic year. Refer to Fig. 1 and Supplemental File 2, Appendix 2 for a detailed timeline. In our pilot year, each person sent two letters for a total of four letters per pair. We received feedback that more letters would be beneficial, so in our second year we increased the number of letters to seven (three letters from each person and an optional seventh letter from the students). Students and mentors were recruited a few months before the first letter deadline to allow time to complete permission slips, background checks, and training. As students and teachers completed the initial survey,

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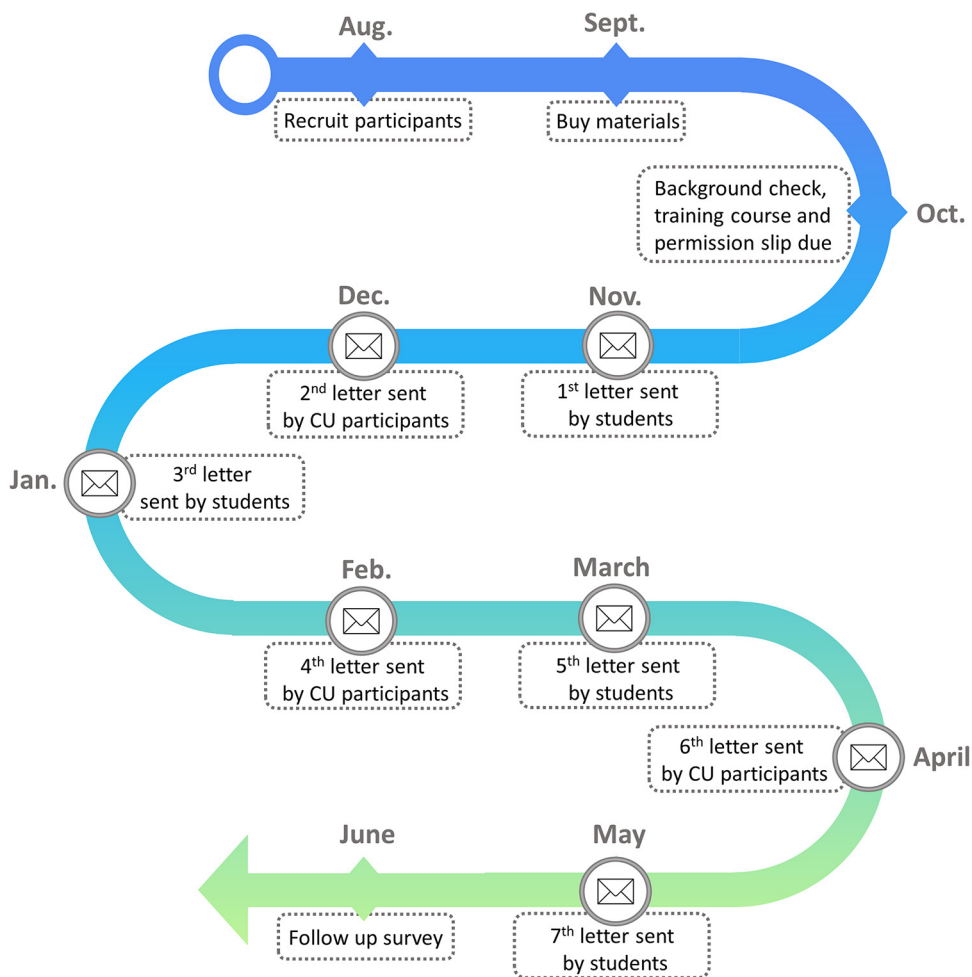


FIG 1. Write a Researcher program timeline.

emails were sent to the parent, guardian, or teacher, requesting a signed permission slip (Supplemental File 2, Appendix 4) and mailing address. As mentors submitted the initial survey, they underwent a background check and enrolled in a minor safety training course provided by Cornell.

Once permission slips, background checks, and training courses were completed, we matched students and mentors. We primarily matched based on academic interests and secondarily by hobbies. Students who did not provide interests were randomly matched.

After the students sent the first letter, consecutive letters were sent monthly. All participants were required to submit electronic copies of their letters for screening and to serve as a backup copy if a letter was lost in the mail. Letters from international students were printed and mailed by the program organizers. Mentors paired with international students sent letters through the mail as usual.

Safety issues

Students were required to return a permission slip generated by the Cornell Office of Risk Management and Insurance

signed by their parent or guardian (Supplemental File 2, Appendix 4). All mentors underwent a background check and participated in a training course covering ways to recognize and report sexual misconduct toward minors.

All emails and letters were addressed to students and parents or guardians. In cases where a teacher served as letter liaison, the teacher received all correspondence. Virtual copies of letters were screened by program organizers before sending. Mentors were instructed not to share personal contact information.

This study was evaluated by the Cornell Institutional Review Board (protocol IRB0147100) and determined to be exempt from review.

Evaluation

After program completion, we sent a survey to participants to evaluate the program and its impact on students' decisions to pursue further education or a STEM career (Supplemental File 2, Appendix 3). Almost 60% of respondents said they were more interested in pursuing graduate or professional school, and 56% said they were more interested in STEM

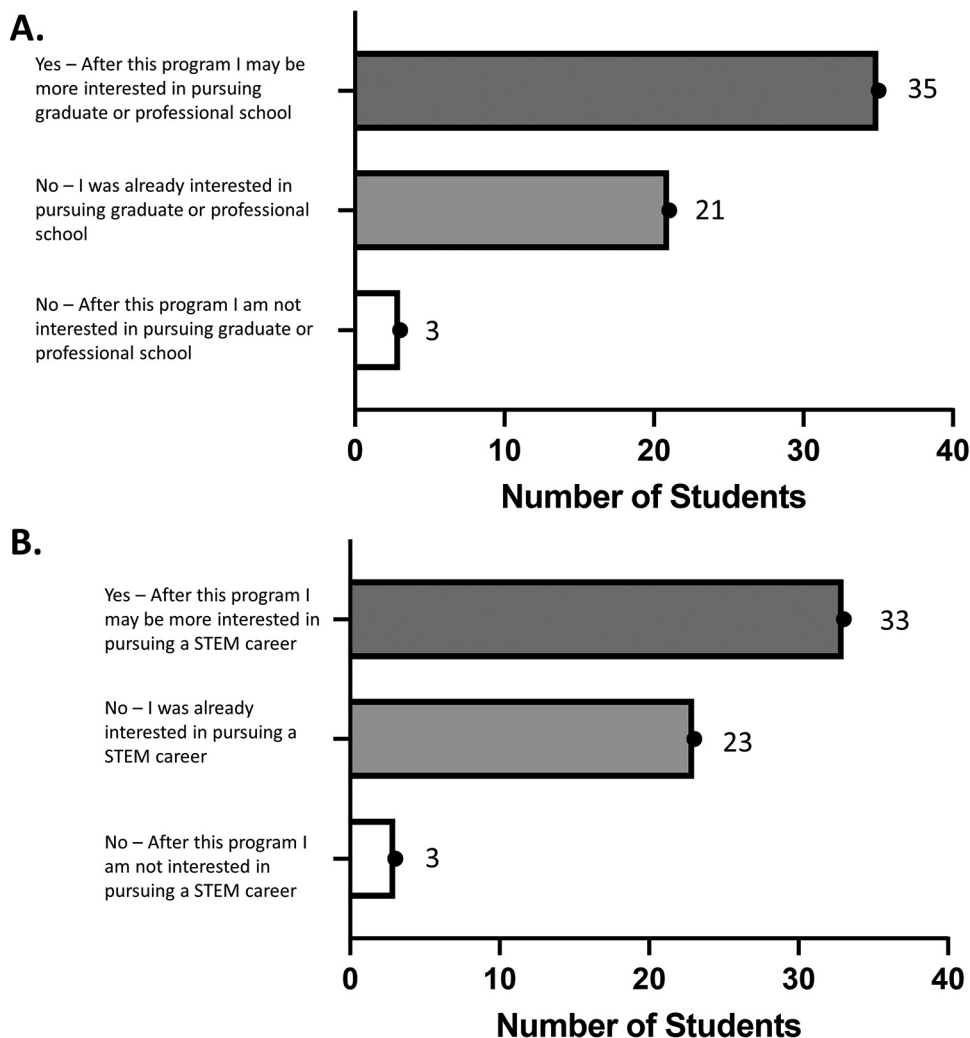


FIG 2. Preliminary program impact. Responses from 59 students (of 84 total student participants in the 2021–2022 program year). (A) Responses to the question: Has Write a Researcher positively influenced your decision to pursue graduate or professional school (for a master's degree, Ph.D., law school, medical school, etc.)? (B) Responses to the question: Has Write a Researcher positively influenced your decision to pursue a STEM career?

careers after participating in Write a Researcher (Fig. 2A and B). Additionally, 16 of 59 respondents said they were more interested in pursuing college after the program. Only 5% of participants indicated that they were not interested in pursuing graduate or professional school or a STEM career after the program. Further data collection involving paired pre-program and post-program surveys is needed to examine how students' attitudes about their educational and career goals shifted in response to the program.

Students also provided comments. One student wrote, "The best part of sharing my aspirations with someone older than me and with similar past aspirations is that I was able to realize that my future can play [out] in any way that I would like." Another comment we received stated, "Not only did I get to learn so much from my [pen pal], I also got a chance to strengthen my communications skills and get to know someone who is working in a field that is closely

[associated] to the one I want to [pursue]." These preliminary results suggested that this program may be beneficial in increasing student interest in STEM, but further evaluation is required.

CONCLUSION

Write a Researcher is a low-cost program and is simple to organize. Mentorship through personal letters may impact participants' interest in STEM and help them to pursue STEM careers. The format of our program provides an opportunity to engage with student participants around the world with minimal extra effort on the part of the program organizers. Write a Researcher is limited by the number of available mentors, and we therefore encourage other institutions to start similar programs, as students may benefit from

programs with local schools or schools the students are interested in applying to.

SUPPLEMENTAL MATERIAL

Supplemental material is available online only.

SUPPLEMENTAL FILE 1, XLSX file, 0.01 MB.

SUPPLEMENTAL FILE 2, PDF file, 0.9 MB.

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