

Virginia Advanced Study Strategies

Rural Math Excel Partnership (RMEP)

DID RMEP HAVE AN IMPACT ON STUDENTS' MATH ACHIEVEMENT AND ATTITUDES TOWARD MATH AND STEM CAREERS?

Project Overview

THE PROBLEM: What Challenge Did the Program Try to Address?

Since 2007, Virginia Advanced Study Strategies, Inc. (VASS) has provided professional development to teachers, counselors, and school administrators and standardized test support sessions for students across rural Virginia. In doing so, VASS noticed that schools' foundational math courses did not prepare students for AP or college credit dual enrollment courses. As a result, students were unlikely to be prepared for postsecondary education, for careers as skilled technicians, or for higher level professional positions in STEM-focused careers. To help address this issue, VASS applied for and received an i3 development grant¹ (2013-2015) to implement and evaluate Rural Math Excel Partnership (RMEP).²

THE PROJECT: What Strategies Did the Program Employ?

RMEP was created to develop a rural workforce qualified for STEM jobs in local communities. Its goal was to implement a model of shared responsibility among families, teachers, and rural communities so as to have students prepare for and succeed in advanced high school and postsecondary STEM studies. Ultimately, RMEP wanted to have students leave school ready, at a minimum, to pursue postsecondary preparation for a technician-level career in STEM-related fields. The project served 14 schools in six rural Virginia Local Education Agencies (LEAs) in five counties. The program was evaluated using a quasi-experimental design, with the researchers selecting six rural southern Virginia LEAs as a treatment group and an additional six rural LEAs from the same area as a matched comparison group. Districts were matched on geography, demographics, and prior academic achievement. Each group contained a total of seven middle schools and seven high schools, with the student sample size for different outcomes ranging from 727 to 1,742.

¹ Development grants provide funding to support the development or testing of novel or substantially more effective practices that address widely shared education challenges. All i3 grantees are required to conduct rigorous evaluations of their projects. The quality of evidence required to demonstrate a project's effectiveness depends on a project's level of scale or grant type.

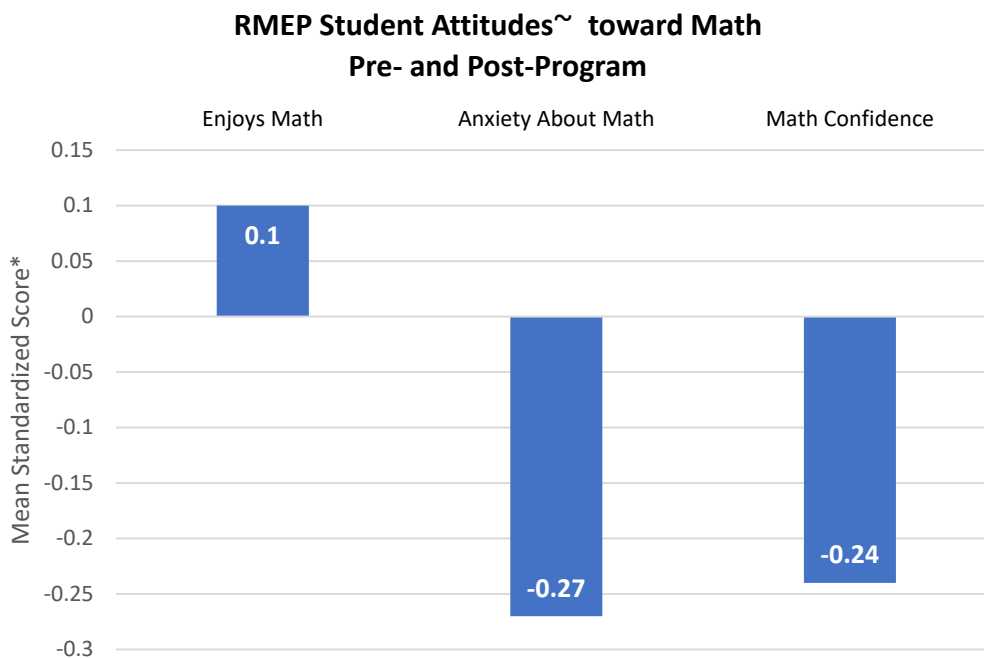
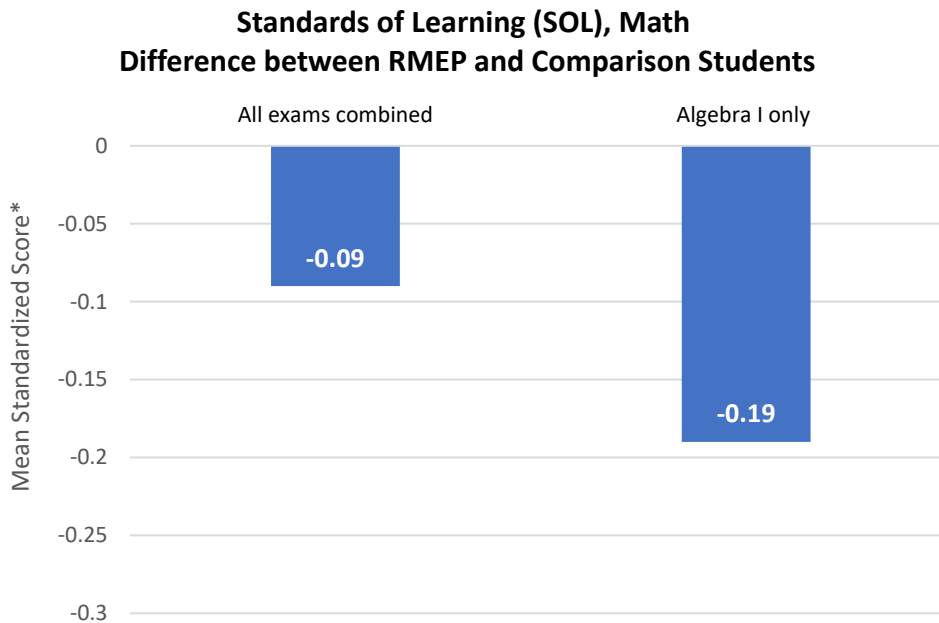
² Virginia Advanced Study Strategies received an i3 development grant supported by the U.S. Department of Education's Investing in Innovation program through Grant Number U411C120091.

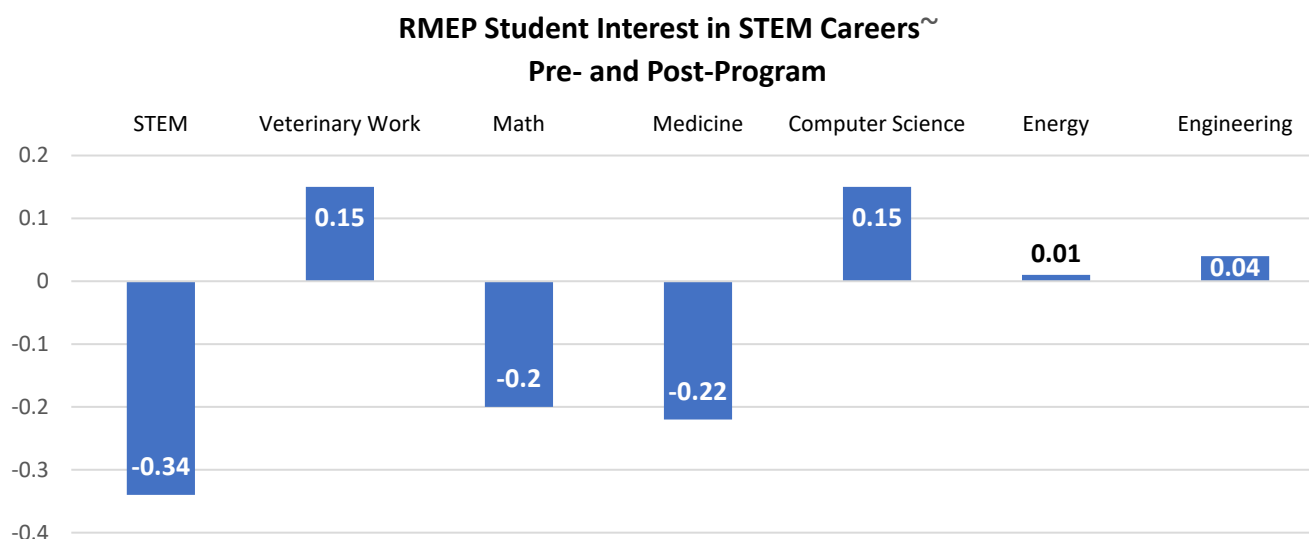
THE RMEP MODEL

- **Gap Analysis & Math Advanced Study (MAS) Guide.** RMEP conducted a gap analysis to determine the gap between essential math workforce competencies and the Virginia math annual state assessments (SOLs). The project used the results of the analysis to create the MAS guide in order to address the gaps. The guide included math competencies, their related SOLs, and real-life math problems for teachers to use. For the competencies that were determined not to be taught effectively, the project also identified Khan Academy videos that could help improve instruction and learning of the competencies.
- **Professional Development.** RMEP began providing professional development in year two of the project to all participating teachers from each LEA. The PD provided teachers with the information they needed to engage in RMEP and conveyed the available supports the RMEP team could provide. Part of the PD requirement was that teachers incorporate the selected Khan Academy videos into their homework assignments through an online platform, MARi. RMEP provided ongoing support to teachers during the school year, especially for issues around tablets, online access, registering students on Khan Academy and MARi, and improper internet usage.
- **Community-Based STEM Events.** The goal of this component was to have members of the five communities in the RMEP project form a team to plan and hold a STEM event each year. Three community-led events were held during the second year of the project and two were held in the third year.
- **Family Math Night (FMN).** With the support of RMEP staff, participating math teachers in each LEA/school organized these events to introduce families to the RMEP project and model of shared responsibility, explain the family's role and responsibilities in the model, and help parents understand how to use the technology. To achieve implementation fidelity for this component, teachers had to hold at least one (and preferably two) FMN(s) each year in each school, specifically early in the first and/or second semesters of the academic year.
- **Project Website & Social Media Presence.** By the second year of the program, the RMEP team had created a standalone website to serve as a resource for teachers, students, and families.
- **Access to Technology for Students.** The RMEP team worked with school principals and district technology staff to ensure that all students and families could access the necessary technology for the program. In particular, this meant providing tablets and internet to families that didn't have web access, thereby allowing students to view online videos through the MARi platform.

Summary of Results

DID RMEP HAVE AN IMPACT ON STUDENTS' MATH ACHIEVEMENT AND ATTITUDES TOWARD MATH AND STEM CAREERS?





~ As measured by a researcher-developed student survey

*The scores shown are standardized scores. The mean of all students in the sample is zero. A negative score indicates that the group scored below the average for the sample and a positive score indicates that the group scored above average for the sample.

RMEP did not have a statistically significant impact on either students' math achievement or their attitudes toward math and STEM careers.

- **MATH ACHIEVEMENT.** RMEP had no statistically significant impact on students' math achievement, as measured by scores on end-of-course SOL exams in both all math courses overall and Algebra I specifically.
- **ATTITUDES: MATH.** The study indicated that RMEP did not have a statistically significant impact on students' attitudes toward math. Attitudes measured included enjoyment of math, anxiety about math, and confidence in math.
- **ATTITUDES: STEM CAREERS.** The study demonstrated that RMEP had no statistically significant impact on students' interest in STEM careers. The evaluators asked specifically about interest in careers in STEM, veterinary medicine, math, medicine, computer science, energy, and engineering.

Please see Appendices B and C for information about the evaluation's design and the quality of the evidence, respectively.

OTHER CONSIDERATIONS

The study reported results regarding fidelity of implementation, challenges experienced, lessons learned, and possible explanations for the lack of significant outcomes in the impact study.

- **IMPLEMENTATION.** All of the key components of the intervention met the standard of performance set by the evaluation team, except for access to technology. However, implementation also varied across schools, teachers, and classrooms.
- **TECHNOLOGY ACCESS.** Several issues posed a challenge for providing access to technology for students and families. Project staff had to experiment with several different tablet technologies to stream online videos before they found one that worked reliably in each area. It was also difficult to locate the students and families in need of tablets and internet access and provide them with the needed services at home. Teachers' comfort level with technology also created major delays for the program in the first two years.
- **TEACHERS.** Individual teachers varied in terms of their willingness to perform their role in the shared responsibility model. This was particularly the case regarding the number of videos they assigned to students and the organization of Family Math Nights. In particular, at most sites either one teacher or a small group of teachers assigned a disproportionate number of the total number of videos assigned. Consequently, in the fall of 2015, RMEP staff began to focus their resources on what they termed high-implementing teachers. These teachers were identified based on their prior online video assignments and perceived willingness to continue in RMEP.
- **LOGISTICAL RESOURCES.** Families and students reported that RMEP events were useful, but attendance at the events was lower than expected. One issue was that organizing these events required a large time commitment. Teachers and community members also indicated that they needed more help identifying ways to boost attendance at the events. Generally speaking, the RMEP team also concluded that teachers (as well as community leaders) needed a high level of direct support to perform their roles in the model.
- **IMPACT FINDINGS.** Regarding the lack of significant outcomes in the impact study, the researchers offered several possible explanations. Since the SOL exams were not well-aligned with the intervention, they may not have provided a good measure of its effectiveness. The study occurred over a short time period, potentially limiting the observed impacts.
- **LESSONS FOR OTHER PROJECTS.** The RMEP team suggested that similar projects should be especially mindful of participant buy-in, have the ability to anticipate and resolve technology access issues, and provide sufficient time and staff support for implementation.

For More Information

Evaluation Reports

[Final Evaluation Report \(Full Report\)](#) (SRI Education, July 2016)³

[Final Evaluation Report \(ERIC\)](#)

³ The information and data for this result summary was collected from the most recent report as of 01/22/2020: SRI Education. (2016, July). *Evaluation of the Rural Mathematics Excel Partnership: Final Report*. Retrieved from http://docs.wixstatic.com/ugd/19fc5e_ae45938742a548f18bdcf6917452f230.pdf

Appendix A: Students Served by the Project⁴

GRADE(S)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12

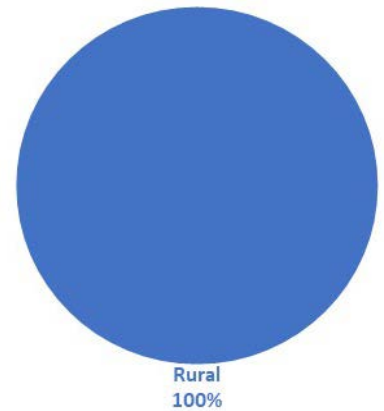
GENDER

RACE/ETHNICITY

COMMUNITY

Not Reported

Not Reported



HIGH-NEED STUDENTSⁱ

Free/Reduced-Price Lunch	English Learner	Students with Disabilities
N/A	N/A	N/A

⁴These data reflect the entire student population served by the intervention, not just the evaluation sample used in the impact study.

Appendix B: Impact Evaluation Methodology⁵

RESEARCH DESIGN:

Design:	Quasi-Experimental Design (QED)
Approach:	<ul style="list-style-type: none"> To examine math achievement, the study used a pre/post comparison group QED at the student level, comparing the change in exam scores in treatment districts to the change in comparison districts. To examine attitudes toward math and STEM careers, the study used a pre-post QED with no comparison group, looking at changes in the treatment group from prior to the intervention to the end of its third year. In addition, the examination of student attitudes included only those students who were in high-implementing teachers' classrooms.
Study Length:	Three years

DATA COLLECTION AND ANALYSIS

Study Setting:	Rural school districts in southern Virginia
Final Sample Sizes:	<ul style="list-style-type: none"> <i>Intervention Group</i>: six rural LEAs (14 participating schools) <i>Comparison Group</i>: six rural LEAs (14 non-participating schools)
Intervention Group Characteristics (district-level averages):	<ul style="list-style-type: none"> Enrollment Size: 3,637.8 Black: 42.9% White: 49.3% Low-income: 25.3% 2011 Algebra I EOC Scale Score: 469.0 2012 Algebra I EOC Scale Score: 414.4
Comparison Group Characteristics (district-level averages):	<ul style="list-style-type: none"> Enrollment Size: 2,601.7 Black: 52.1% White: 41.1% Low-income: 24.1% 2011 Algebra I EOC Scale Score: 461.9 2012 Algebra I EOC Scale Score: 408.6
Data Sources:	<ul style="list-style-type: none"> Student Assessments Surveys
Key Measures:	<ul style="list-style-type: none"> Math Achievement (statewide SOL assessments in 8th-grade math, Algebra I, Geometry, Algebra II) Student Attitudes: Math (researcher survey) Student Attitudes: STEM Careers (researcher survey)

⁵ These data reflect only the evaluation sample in the impact study, not the entire population served.

Appendix C: Quality of the Evidence

WHAT WORKS CLEARINGHOUSE REVIEW⁶

STUDY	RATING
Not reviewed as of 01/22/2020	N/A

EVIDENCE FOR ESSA REVIEW⁷

STUDY	RATING
Not reviewed as of 01/22/2020	N/A

NATIONAL CENTER ON INTENSIVE INTERVENTIONS REVIEW⁸

STUDY	RATING
Not reviewed as of 01/22/2020	N/A

⁶ <https://ies.ed.gov/ncee/wwc/FWW>

⁷ <https://www.evidenceforessa.org/>

⁸ <https://intensiveintervention.org/>

The [*Investing in Innovation Fund \(i3\)*](#), established under section 14007 of the American Recovery and Reinvestment Act of 2009, is a Federal discretionary grant program at the U.S. Department of Education within the Office of Elementary and Secondary Education (OESE). i3 grants help schools and local education agencies work in partnership with the private sector and the philanthropic community to develop and expand innovative practices that improve student achievement or student growth, close achievement gaps, decrease dropout rates, increase high school graduation rates, and/or increase college enrollment and completion rates for high-need students.

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ⁱ “High-need student” refers to a student at risk of academic failure or otherwise in need of special assistance and support, such as students who are living in poverty, attend high-minority schools, are far below grade level, who have left school before receiving a regular high school diploma, at risk of not graduating with a diploma on time, who are homeless, in foster care, have been incarcerated, have disabilities, or who are English learners. For more information see: [*Applications for New Awards; Investing in Innovation Fund-Development Grants, 81 FR 24070 \(April 25, 2016\)*](#).