

## Project SEED works because:

- It is still on the cutting edge of instructional theory after four decades of operation.
- It offers advanced academic topics that have intrinsic interest to students.
- It encourages vigorous student discussion and high levels of participation from students at all ability levels.
- It teaches entire classes, not specially selected students.
- It enhances literacy while teaching numeracy.
- It has a strong ongoing training program for its instructors and classroom teachers.
- It employs instructors with expertise in mathematics to teach mathematics.

*We must prepare our children  
for academic survival in the  
future.*

## Want to learn more?

For more information about  
how to make a systemic change  
in your school or district or to  
implement a SEED class  
contact us at:

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Or you may check us out on the  
web: [www.projectseed.org](http://www.projectseed.org).

*Socially useful mathematics,  
sowing seeds of hope.*

**project  
SEED®**

(A Tax Exempt, Non-Profit Corporation)

## Discovering Mathematics



**Improving the quality of life  
for urban youth since 1963.**

*"The true intellectuals in  
our society are the  
children. Adult genius is  
just the part of childhood  
that is retained."*

William Johntz, founder of  
Project SEED



## Vision

- Project SEED improves the quality of life of its students by instilling in them a love of the pursuit of knowledge and confidence in their own capabilities and intelligence.
- Project SEED mathematics specialists inspire academic confidence and high achievement by teaching high school and college mathematics in urban school districts at the elementary level.
- Early in their academic careers students are intellectually open and curious. It is in these formative grades where crucial attitudes toward school and learning form. We raise expectations of teachers, students, and families.

*Algebra is the gateway to higher mathematics and, as it is taught in Project SEED, serves as a pump rather than a filter, leading more students to higher mathematics rather than discouraging them from the start.*

## Mission

The mission of Project SEED is to significantly increase the number of urban youth who graduate high school, obtain higher education, and in the long run pursue careers in mathematics, technology, or related fields.

## Benefits

### Student Benefits:

- Raise student academic confidence.
- Improve critical thinking and problem solving skills.
- Raise mathematics achievement scores.

### Teacher Benefits:

- Raise teacher expectations.
- Learn Project SEED methodology.
- Learn Project SEED techniques.

### District Benefits:

- Train teachers from elementary through secondary and university level in extremely effective pedagogy.
- Raise achievement levels for students.
- Improve teacher performance.
- Increase family involvement.

*Project SEED will bring systemic reform to your school, district, and community.*

## Components

1. Classroom Instruction
2. Professional Development
3. Curriculum Support and Development
4. Family Involvement

## Features

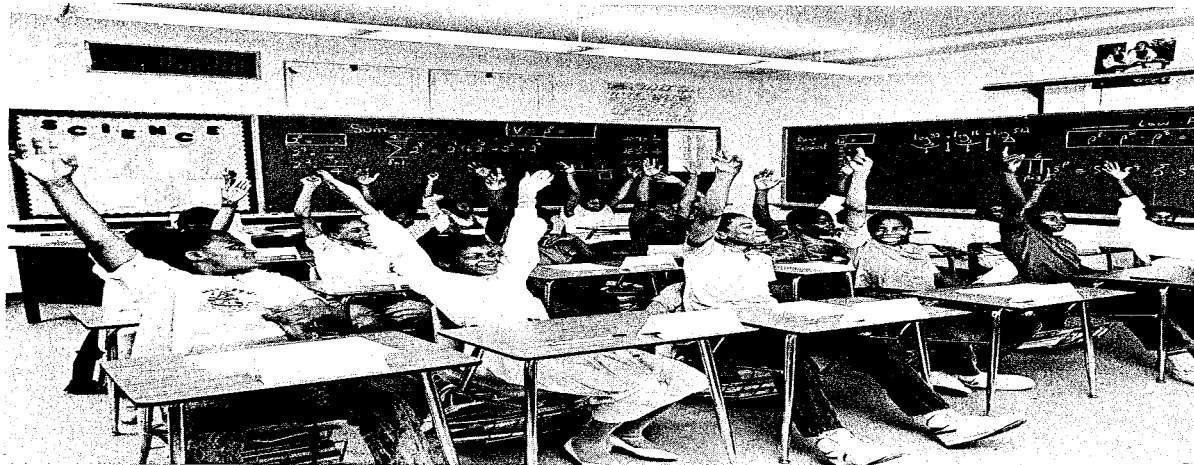
Project SEED is unique because:

- We hire people who love mathematics and understand it in depth.
- SEED specialists are highly trained in a unique, inquiry based Socratic methodology.
- SEED has an ongoing internal staff development program with several facets designed to maintain a high level of success in the classroom.
- Project SEED is a self-evaluating program: specialists at all levels of experience are required to observe and critique each other on a weekly basis.



Do you speak this language?

$$\sum_{\alpha=1}^{\square} \text{Log}_{\beta}(\beta^{\alpha}) = 6^2$$



These sixth graders speak it fluently.

**project**  
**SEED**®

### **Project SEED Workforce Development through Early Math Success**

Many of today's fastest growing jobs require a solid mathematics background. Yet, few of our children, nationwide, have the essential skills required for these opportunities.

In the 2002-2003 school year 6,112, 66% of the 9,277 Milwaukee Public School District freshman, **failed** to pass the ninth grade algebra requirement. This is an outrageous number of failures! No one needs to fail algebra!

Unfortunately, the bulk of the failures have been among low-income African American and Hispanic students. Many people conclude, therefore, that these children should not be required to study advanced mathematics.

**What insanity!** What very poor guidance at the very least, not to require poor children to learn subject matter that can help lift them up and out of poverty.

Yes, poor nutrition and difficult life experiences that come with *some* poor circumstances can sap a child's will to pay attention. So the teaching methods must grab their attention and make important, advanced topics easy-to-grasp. And that's where Project SEED comes in.

Project SEED's math specialists use engaging, highly interactive, questioning strategies that make algebra, geometry and even calculus easy-to-grasp for educationally "at risk" elementary and middle school students in schools nationwide. They reach students, early, before failure may set in.

Early competency and understanding mathematics is the backbone for student success in higher education. Success in algebra and geometry is an indicator of college success.<sup>1</sup> Success in high school mathematics is an indicator of greater earning power later in life.<sup>2</sup> Poverty is often associated with higher rates of crime and in Milwaukee (2002) there are 22% of people living below poverty level up from 19.2% in 2001.

The mission of Project SEED is to increase the chances for students from poverty backgrounds to graduate from high school with the skills required to participate in the productive workforce and to avoid the vulnerability of unsuccessful students to crime.

Sadly, the cost to taxpayers for incarceration of one lost youth is between \$21,000 and \$84,000<sup>3</sup>. However, it only costs \$400 per student for one semester of Project SEED instruction.

Project SEED can help with workforce development but, if we want long lasting positive change in our community, we must tackle the problem at the root. Let us work for the long term with the elementary school students and teachers in the poorest performing schools in the district.

Do you know that there are so few American students interested in math and science that graduate schools cannot find enough American students for these graduate programs? Our medical science and all mathematical, scientific and engineering programs suffer. **Such jobs can provide a pathway out of poverty.**

Mathematics is the key to opportunity in a world where it opens doors to college and careers. Please help us open these doors for every one of our children.

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<sup>1</sup> Pelavin, Sol H. and Michael Kane, *Changing the Odds: Factors Increasing Access to College*, College Entrance Examination Board, New York, 1990.

<sup>2</sup> "Number of Math Courses Taken Said Linked to Future Earnings," Education Week, Vol. 8, No. 16., January, 1989.

<sup>3</sup> E.M. Garry, Truancy: First Step to a Lifetime of Problems, Bulletin, Washington, DC: U.S. Department of Justice. Office of Justice Programs, Office of Juvenile and Delinquency Prevention, 1997, p.1.

## **Project SEED Challenges Low-income Children with High-status Mathematics**

### **Creating a Viable Workforce Where One is Least Expected**

Project SEED's mathematics specialists inspire high academic confidence and increase the achievement of urban elementary school students by teaching them high school and college mathematics. The math specialists break down complex ideas from algebra, analytic geometry and pre-calculus into small, logical, understandable pieces, so that they are easy to grasp by all students in regular classes of elementary school students. These instructors use techniques that permit and monitor responses from virtually every student to every question. This creates an active and enthusiastic atmosphere among these students, many of whom live in deep poverty in Alameda, Berkeley, Oakland and West Contra Costa, California, and in Camden, Dallas, Detroit, Indianapolis, Milwaukee and Philadelphia.

We must reach them with significant educational experiences before they become frustrated and drop out.

Junior high school students' career objectives were studied by Northeastern University researchers, who found that 66% of African American males, 48% of Latino males, and 33% of Caucasian males chose basketball as their career objective. Yet only one in 10,000 athletes attain this goal.

*(As It Happens* radio interview, Center for the Study of Sports and Society, Northeastern University, Boston, April 2, 1997.)

Founded over thirty-nine years ago, this national, nonprofit program has been continuously evaluated. Project SEED students outperform comparison students by up to a full year on standardized tests, and take more advanced mathematics courses in high school.

Project SEED classes meet four times a week for fourteen to sixteen weeks a year, as a supplement to the regular math program. The classroom teacher remains in the room during Project SEED lessons, as a participant and observer, as part of the professional development program for teachers. Additional professional development is available in one-on-one coaching, mathematics content, team teaching, lesson planning, observations and feedback, full-faculty workshops and after-school seminars.

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# Allowing one youth to leave high school for a life of crime and drug abuse costs society \$1.7–\$2.3 million

A 1998 study by Mark Cohen estimated the external marginal costs imposed on society by the average career criminal, heavy drug abuser, and high school dropout. Though necessarily somewhat speculative, cost estimates of this kind help to convey a sense of the actual "waste" involved in a wasted life—as well as the substantial potential benefits to be expected from even modestly successful prevention efforts aimed at high-risk youth.

The portion of the study that focused on crime costs was based on estimates of the number and range of crimes committed by the average career criminal (68–80 crimes of various levels of seriousness, over an active career of about 10 years, including 4 as a juvenile); the tangible and intangible costs that such crimes impose on their victims; the expenses borne by the criminal justice system in connection with investigation, processing, and punishment; and productivity losses caused by incarceration. Discounted to a present-value dollar amount, the total crime costs imposed by a single lifetime of crime were estimated at \$1.3–\$1.5 million.

Note that these are *external* costs borne by those other than the perpetrator—victims, fellow citizens, and taxpayers. About half are intangible costs—pain, suffering, and diminished quality of life—imposed on victims alone and monetized according to widely accepted techniques developed by economists for

## Invoice

To: American public	
For: One lost youth	
Description	Cost
<b>Crime:</b>	
Juvenile career (4 years @ 1–4 crimes/year)	
Victim costs	\$62,000–\$250,000
Criminal justice costs	\$21,000–\$84,000
Adult career (6 years @ 10.6 crimes/year)	
Victim costs	\$1,000,000
Criminal justice costs	\$335,000
Offender productivity loss	\$64,000
<b>Total crime cost</b>	<b>\$1.5–\$1.8 million</b>
<b>Present value*</b>	<b>\$1.3–\$1.5 million</b>
<b>Drug abuse:</b>	
Resources devoted to drug market	\$84,000
Reduced productivity loss	\$168,000
Drug treatment costs	\$27,600
Medical treatment of drug-related illnesses	\$10,200
Premature death	\$11,000
Criminal justice costs associated with drug crimes	\$31,800
<b>Total drug abuse cost</b>	<b>\$223,000</b>
<b>Present value*</b>	<b>\$40,500</b>
<b>Costs imposed by high school dropout:</b>	
Lost wage productivity	\$200,000–\$480,000
Fringe benefits	\$150,000–\$360,000
Nonmarket losses	\$300,000
<b>Total dropout cost</b>	<b>\$75,000</b>
<b>Present value*</b>	<b>\$95,000–\$375,000</b>
<b>Total loss</b>	<b>\$470,000–\$750,000</b>
<b>Present value*</b>	<b>\$243,000–\$368,000</b>
<b>Total loss</b>	<b>\$2.2–\$3 million</b>
<b>Present value*</b>	<b>\$1.7–\$2.3 million</b>

\* Present value is the amount of money that would need to be invested today to cover the future costs of the youth's behavior.

Source: Authors' adaptation of Cohen's The monetary value of saving a high-risk youth, *Journal of Quantitative Criminology*, 14(1).

## **Comments from the Students of Milwaukee**

*The following are comments from fourth grade Project SEED students:*

*"I love Project SEED because there's plenty of things that you can do with algebra. I learned how to take care of my problems in algebra, also, my parents are very proud of me."*

*"I think that everyone should have Project SEED because it brings math to your mind and when you have Project SEED you get better at math and you get better grades."*

*"When we go to college it will be easier."*

*"I think Project SEED will help me in the future because most kids don't get algebra until high school, so we're pretty lucky."*

*"I like Project SEED because it helps solve problems."*

*"It's very fun. It's things that really help you, and when you study it in high school, you will be successful."*

*"Project SEED is a fantastic special for the children. Some children think Project SEED is food for the brain."*

*"We learned about exponentiation and logarithms."*

*"I learned a lot in Project SEED like critical thinking problems and lots of math skills."*

*"I've learned  $2^4$  and negative numbers like -2, -3, and -4."*

*"What I like about Project SEED is we're learning math at a high school level."*

*"I love Project SEED because of the Greek letters. I wish that Project SEED will go on next year."*

*"I love Project SEED. It helps me a lot with my math."*

*"We learn about solving problems by using strategies."*

*"We learn about mathematics and additive inverses. Additive inverses are a negative and positive number that add up to zero."*

*"I learn about shapes such as the rhombus, triangle, square, decagon, hexagon, pentagon."*

*"In Project SEED I am learning how to use additive inverses and negative numbers."*

*"We are learning how to solve really long problems. We use all kinds of different strategies."*

## President's Message

# The Time Has Come for Pre-K-5 Mathematics Specialists

Johnny W. Lott



The No Child Left Behind Act calls for "highly qualified mathematics teachers" in all classrooms by 2005. To meet this requirement, teachers for the early grades would need both a bachelor's degree and state certification. In reality, the call for student proficiency in mathematics and science demands more than this. I suggest that although there has been a traditional unwillingness to consider the need for mathematics specialists in elementary schools, it is an idea whose time has come.

### Why Are Specialists Needed?

Consider the arguments in favor of specialists in other fields:

- Art—"Teacher education programs demand minimal preparation in the arts. ... How can one course teach all that is needed to successfully conduct an arts program? ... With an arts preparation that is bound to be incomplete (Boardman 1996), it is no wonder that elementary teachers have feelings of inadequacy when they address the arts curriculum. Under these conditions, as we have seen with other subject areas, teachers tend to rely on traditional activities that they experienced as students" (Passe 1999, pp. 168-69).
- Physical education—"Nonspecialists' activities have been identified as less effective in developing skills and promoting higher levels of activity..." (Dewey [1904] 1970).

Now, consider the needs of students in mathematics. Similar arguments to those above have been made in favor of mathematics specialists, including the following:

- "Teacher decisions about curriculum and instruction are more likely to be based on teachers' personal classroom experiences as students than on teacher education courses and in-service training (Lortie 1975)" (quoted in Passe 1999, p. 156).
- "Because they are not trained as specialists, elementary school teachers tend to have limited knowledge of mathematics" (Hyde 1989).
- "Teachers whose mathematics program consists of endless drill may be disguising their lack of mathematical prowess. They could be hesitant to teach for conceptual understanding because they do not possess it themselves. Under such stress, the traditional approach is appealing because it emphasizes correct answers instead of mathematical reasoning and communication" (Passe 1999, p. 57).

### References

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- Dewey, John. "The Relation of Theory to Practice in Education." 1904. In *Readings in Social Studies*, edited by Peter H. Martorella. New York: Macmillan, 1970.
- Hyde, Arthur A. "Staff Development: Directions and Realities." In *New Directions for Elementary School Mathematics*. 1989 Yearbook of the National Council of Teachers of Mathematics,

It's unfortunate that so many teachers of mathematics are teaching the subject without the requisite knowledge to teach it. Isn't it time for that to change? Mathematics specialists would do just that and could help improve mathematics learning by students in elementary school.

### What Makes a Teacher a Mathematics Specialist?

The type of coursework and training that specialists should have was addressed in *The Mathematical Education of Teachers Part I* (Mathematical Association of America 2001, pp. 7-8):

- *Recommendation 1.* Prospective teachers need mathematics courses that develop a deep understanding of the mathematics they will teach.
- *Recommendation 2.* Although the quality of mathematical preparation is more important than the quantity, the following amount of mathematics coursework for prospective teachers is recommended.

(i) Prospective elementary grade teachers should be required to take at least 9 semester-hours on fundamental ideas of elementary school mathematics.

"Fundamental ideas of elementary school mathematics" must reach beyond what is taught to students at that level. The fundamental mathematics must be taught with understanding. Why algorithms work, why classifications are necessary for young children as they learn mathematics, and why it is necessary to learn the rudiments of mathematical language in such a way that they do not have to be relearned later are all ideas that may enter the fundamentals of mathematics for teachers. Understanding, not just mechanics, is a key here. A mathematics specialist at the elementary school level must have a basic understanding of mathematical concepts in each of the five content areas: algebra, geometry, measurement, number and operations, and data analysis and probability.

The mandate for higher-performing students is nationwide. We are being pushed to consider different and better models for teaching. Evidence shows us that students of more knowledgeable teachers do score higher on tests. Therefore, I believe the time has come for a mathematics specialist for the elementary grades.

Watch the NCTM Web site ([www.nctm.org](http://www.nctm.org)) for an online chat with Johnny Lott on this subject.

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