

Effectiveness of Reading and Math Software Products

Findings From the National Evaluation

Mark Dynarski

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Study Synopsis

- **Design**
 - Nine reading and six math software products (four grade levels)
 - 132 volunteer schools
 - Random assignment of volunteer teachers within schools to use products or not: each school is an experiment
- **Implementation**
 - Companies train teachers, provide support
 - Study purchased upgrades and some hardware components
- **Key Findings**
 - Test scores not statistically different
 - Most individual products not effective
 - Few relationships between effects and contextual factors
 - Experience has mixed effects on effectiveness

Study Size

	Districts	Schools	Teachers	Students
Grade 1	14	46	169	2,619
Grade 4	11	43	118	2,265
Grade 6	10	28	81	3,136
Algebra	10	23	71	1,404
Total	45	140	439	9,424
Unduplicated	33	132	439	9,424

Implementation Framework

Did teachers learn to use products, use them, and did using them change what teachers did in classrooms?

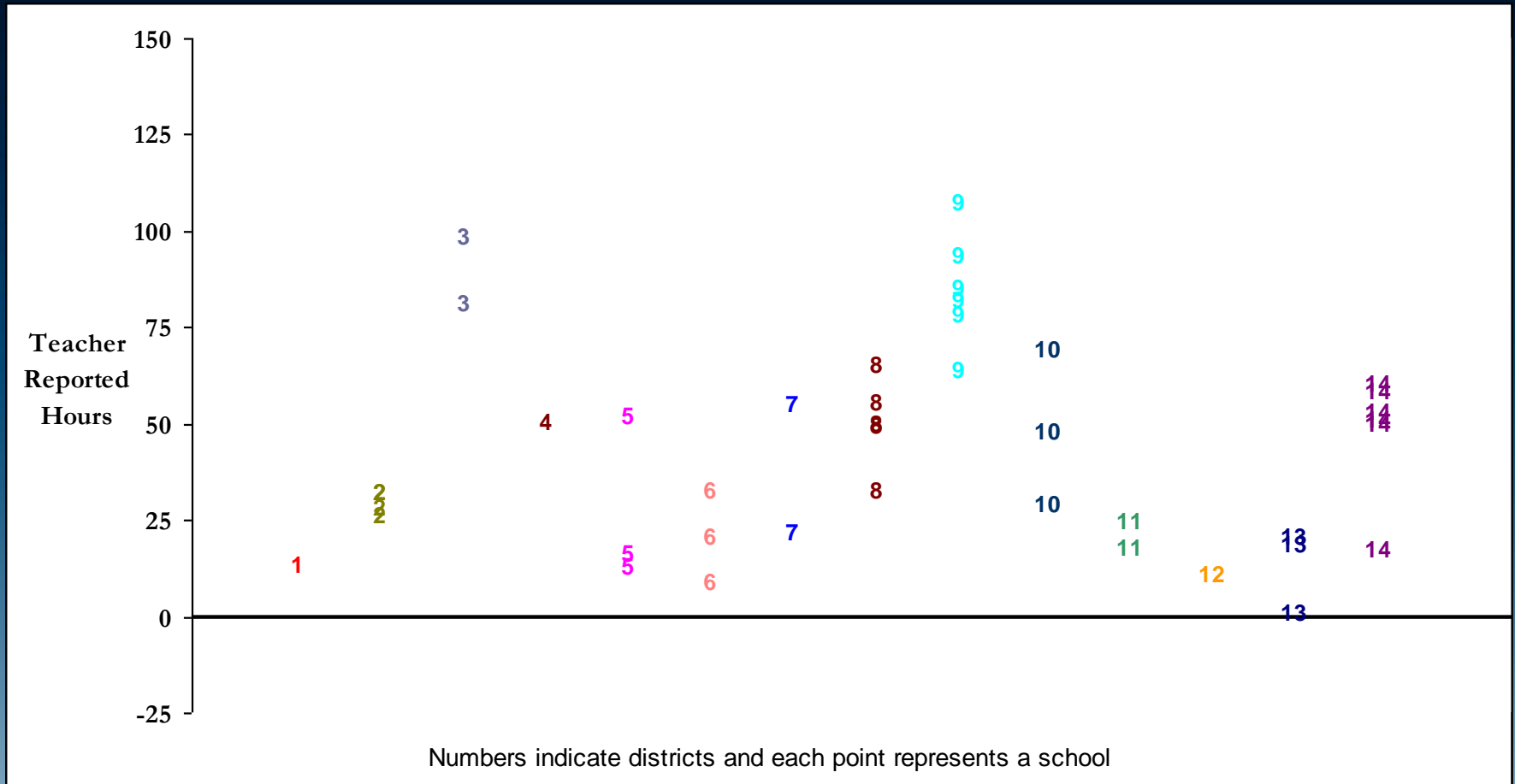
- **Teacher training [O, R]**
- **Amount of use [I, R]**
- **Technical difficulties and teacher support [I]**
- **Student and teacher roles [O]**
- **Student on-task behavior [O]**
- **Use of performance reports [I]**

Key: O indicates observations, R records, I interviews

Implementation Findings

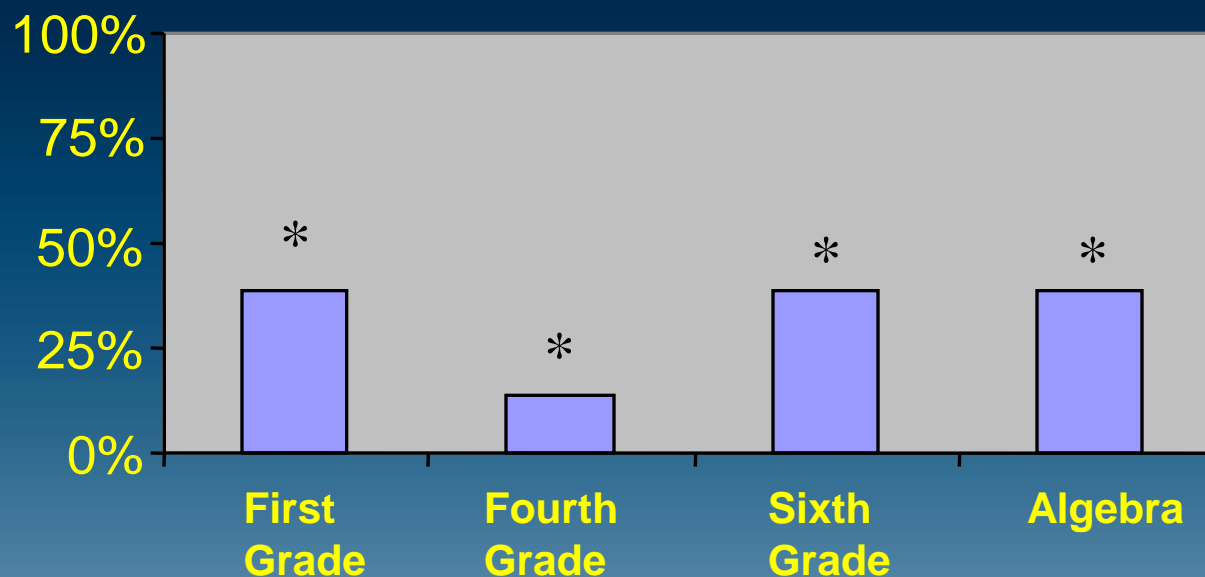
- **Nearly all trained, believed it prepared them**
- **Minor difficulties using hardware**
- **Total use of software products was higher in treatment classrooms**
- **Other**
 - **Teachers more likely to be “facilitators”**
 - **Students more likely to work on their own**
 - **More on-task behavior**

Difference in Technology Use in Treatment and Control Classrooms: First Grade



Effects on Classroom Practices

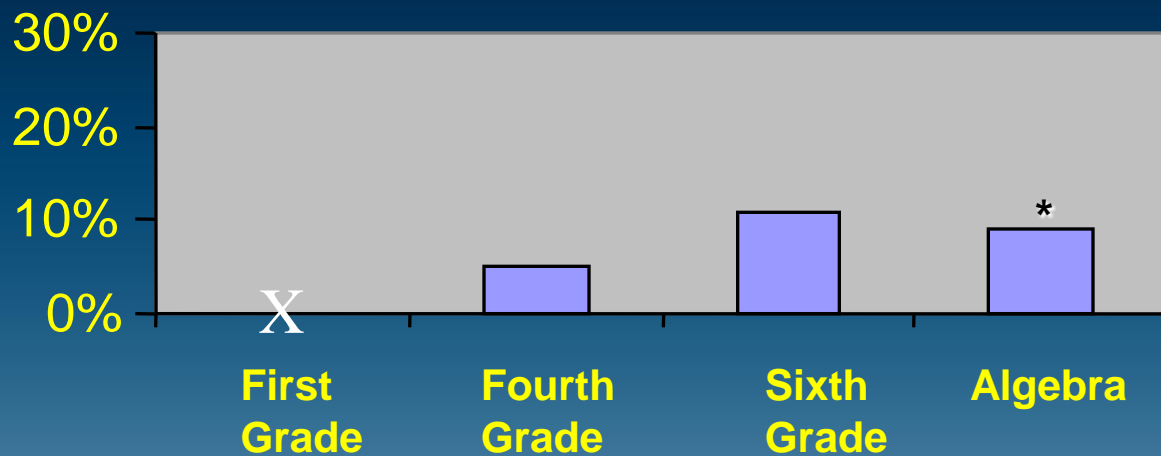
Percent Difference: Teacher as Facilitator



Note: * Significantly different from zero at the 0.05 level

Effects on Classrooms

Percent Difference: Students On Task



Note: * Significantly different from zero at the 0.05 level

Estimating Effects

- **Outcome: spring test score**
- **Main effects**
 - 3-level model of students, classrooms, schools
 - Fall test score as covariate (other covariates)
 - Power: able to detect effect size of 0.15
 - ◆ Increase of about 6 percentile points at the mean

Estimation Model: Main Effects

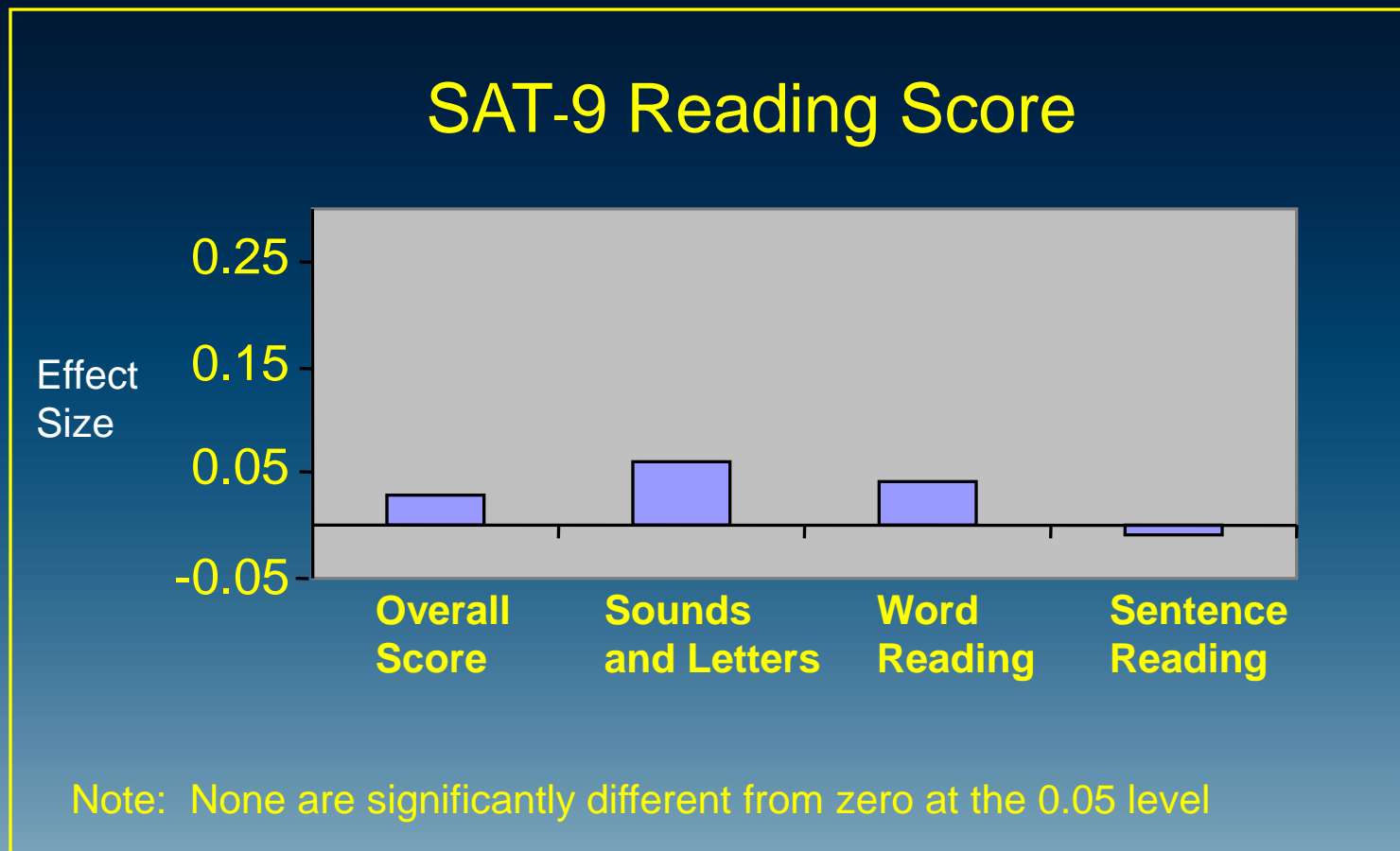
$$\textit{Student} : Y_{ijk} = \alpha_{0jk} + \pi X_{ijk} + \varepsilon_{ijk}$$

$$\textit{Classroom} : \alpha_{0jk} = \beta_{0k} + \beta_1 T_j + \varphi W_j + \mu_{jk}$$

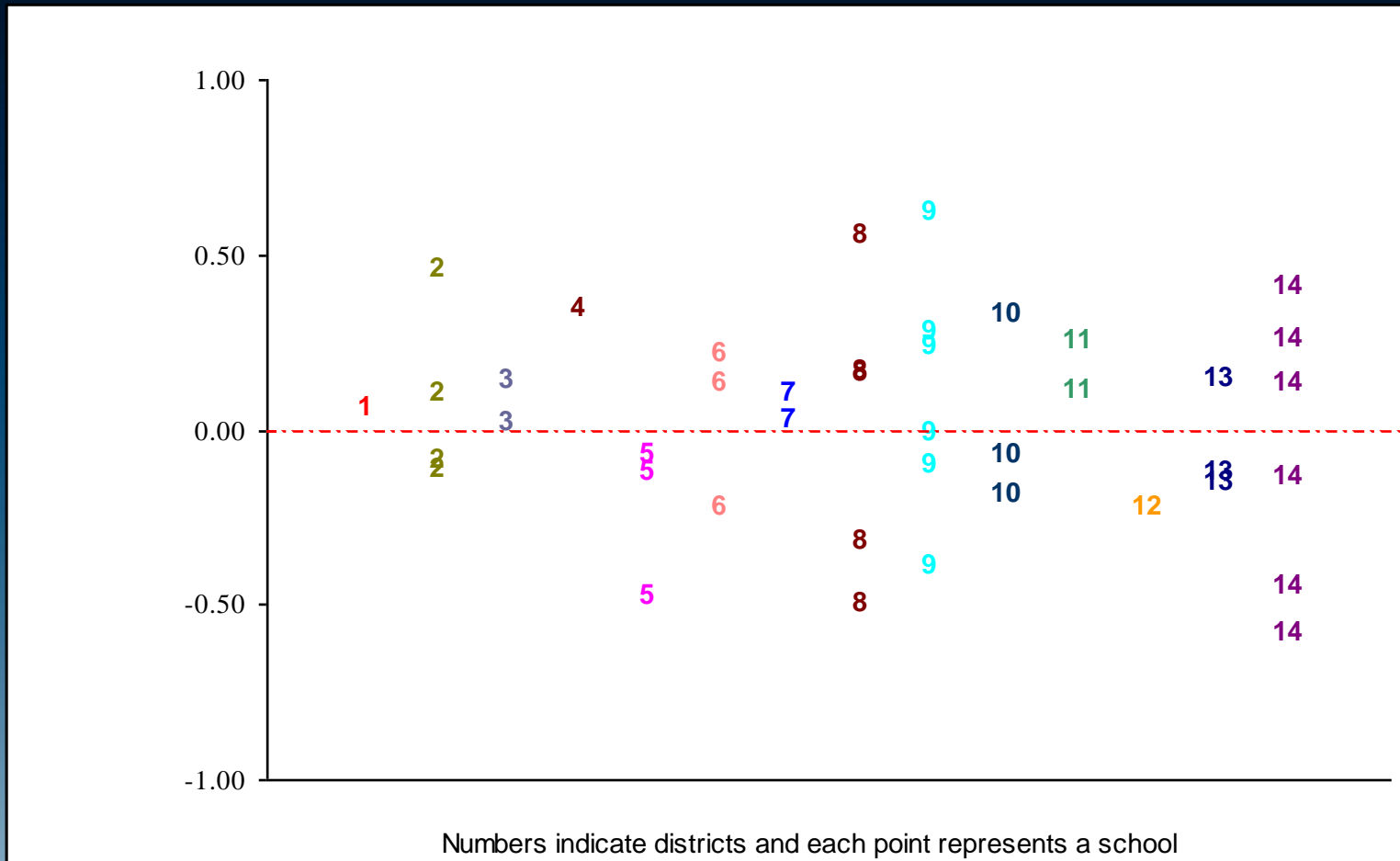
$$\textit{School} : \beta_{0k} = \delta_0 + \delta_1 Z_k + \mathbf{v}_k$$

$$Y_{ijk} = \delta_0 + \beta_1 T_j + \delta_1 Z_k + \pi X_{ijk} + \varphi W_j + \xi_{ijk}$$

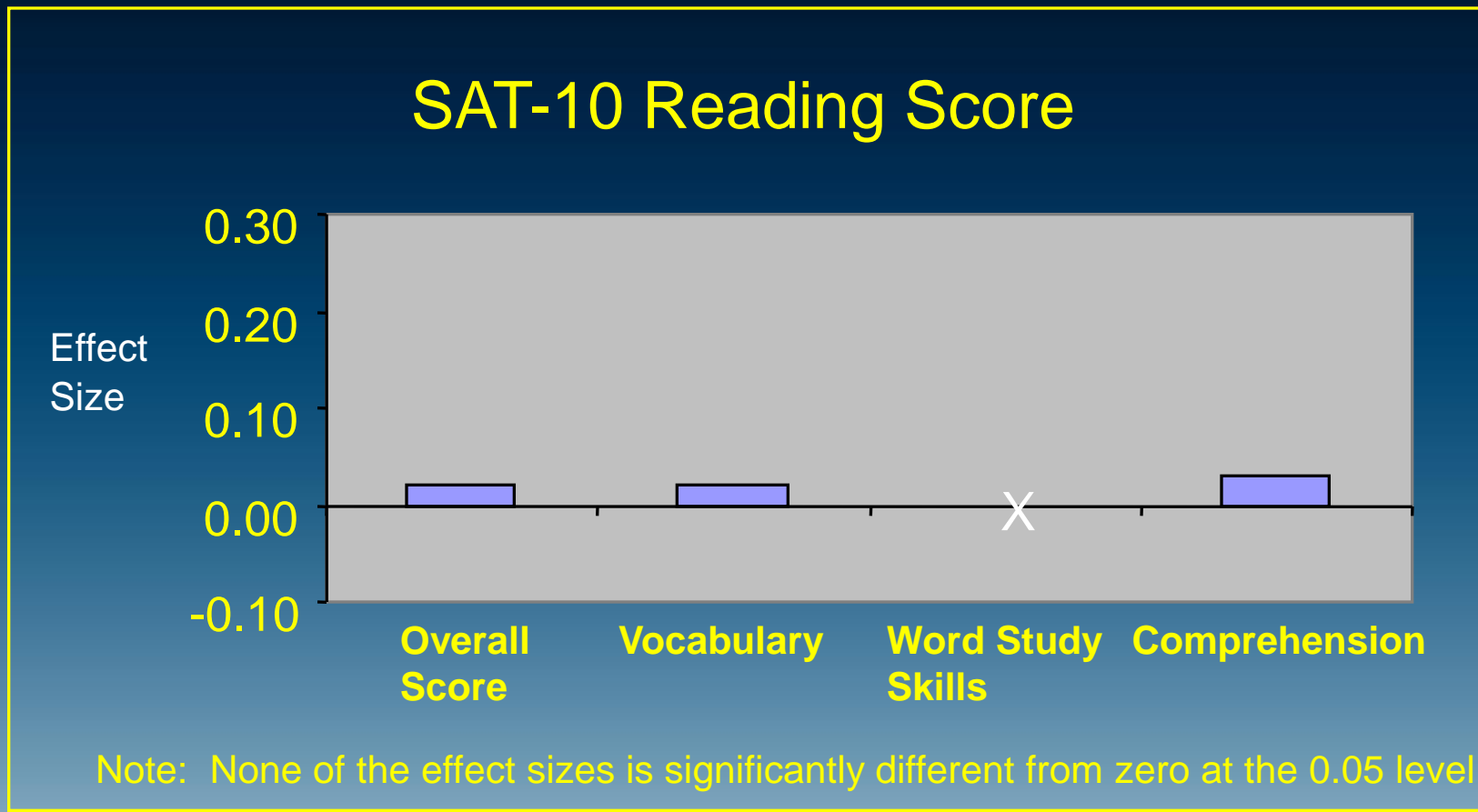
Test Scores: First Grade



Effect Sizes By School: First Grade

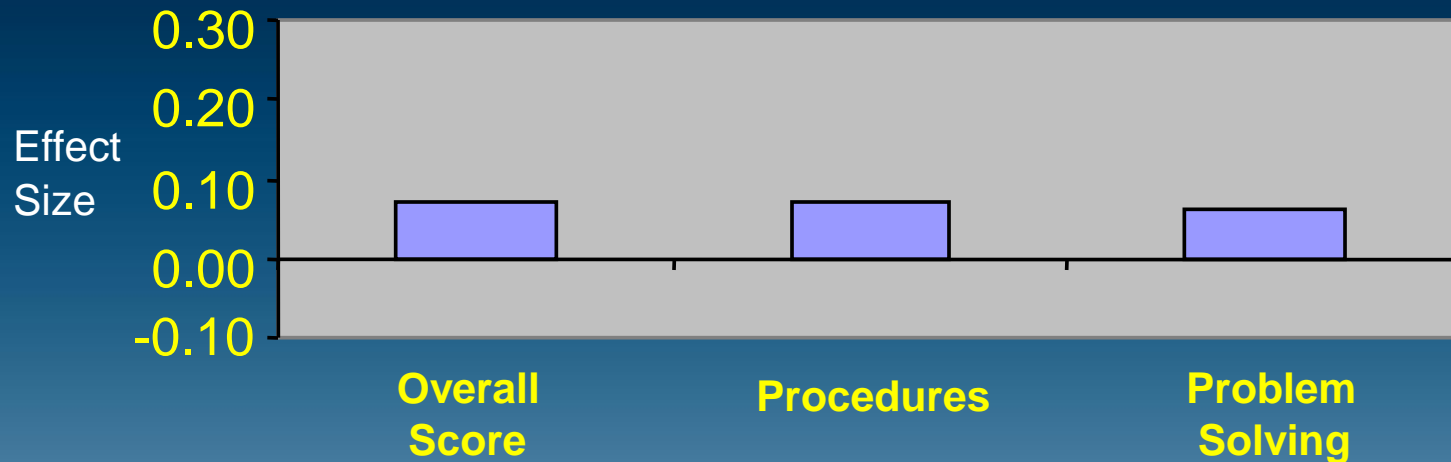


Test Scores: Fourth Grade



Test Scores: Sixth Grade

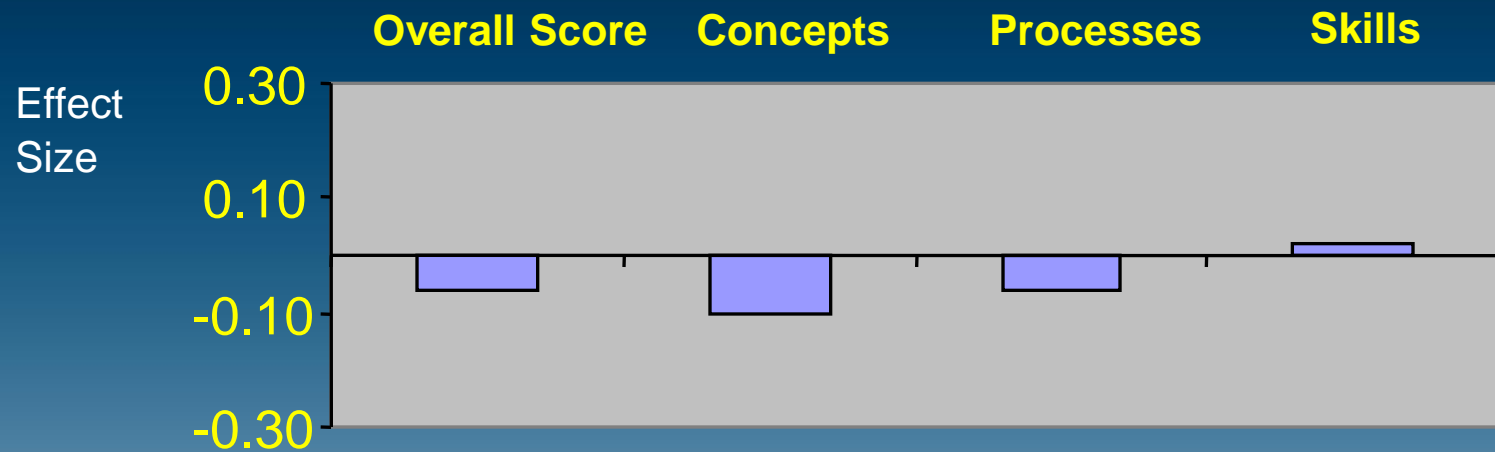
SAT-10 Math Score



Note: None of the effect sizes is significantly different from zero at the 0.05 level

Test Scores: Algebra

ETS Algebra Exam



Note: None of the effect sizes is significantly different from zero at the 0.05 level

Estimation Model: Interaction Effects

$$\textit{Student} : Y_{ijk} = \alpha_{0jk} + \pi X_{ijk} + \varepsilon_{ijk}$$

$$\alpha_{0jk} = \beta_{0k} + \beta_{1k} T_{jk} + \beta_{2k} T_{jk} W_{jk} + \varphi_k W_{jk} + \mu_{jk}$$

$$\beta_{0k} = \gamma_0 + \gamma_1 Z_k + \tau_k$$

$$\beta_{1k} = \omega_0 + \omega_1 Z_k + \nu_k$$

X: student characteristics T: treatment W: teacher characteristics
Z: school characteristics

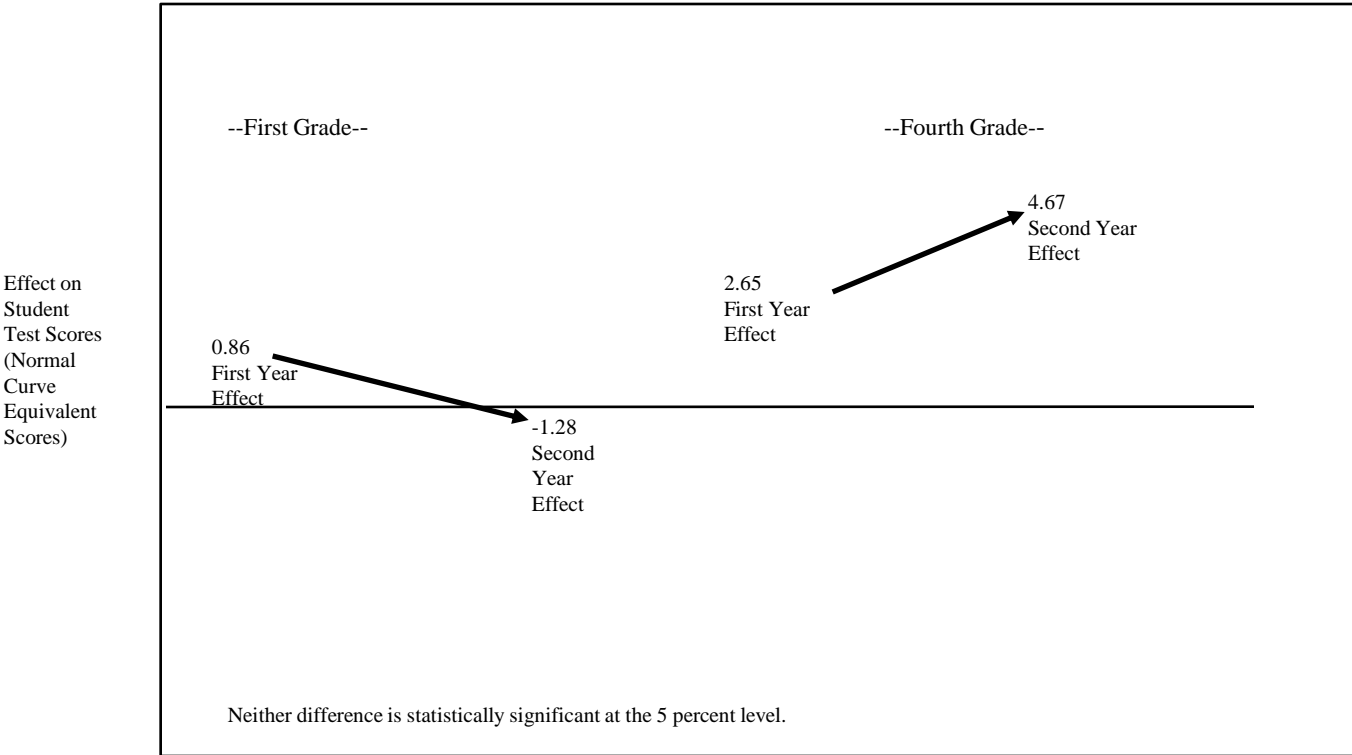
Interactions

- **First grade**
 - ◆ More experienced teachers (+)
 - ◆ Smaller student-teacher ratio (+)
- **Fourth grade**
 - ◆ Product Usage (+)
- **Sixth Grade**
 - ◆ None
- **Algebra**
 - ◆ Difficulties using product (-)

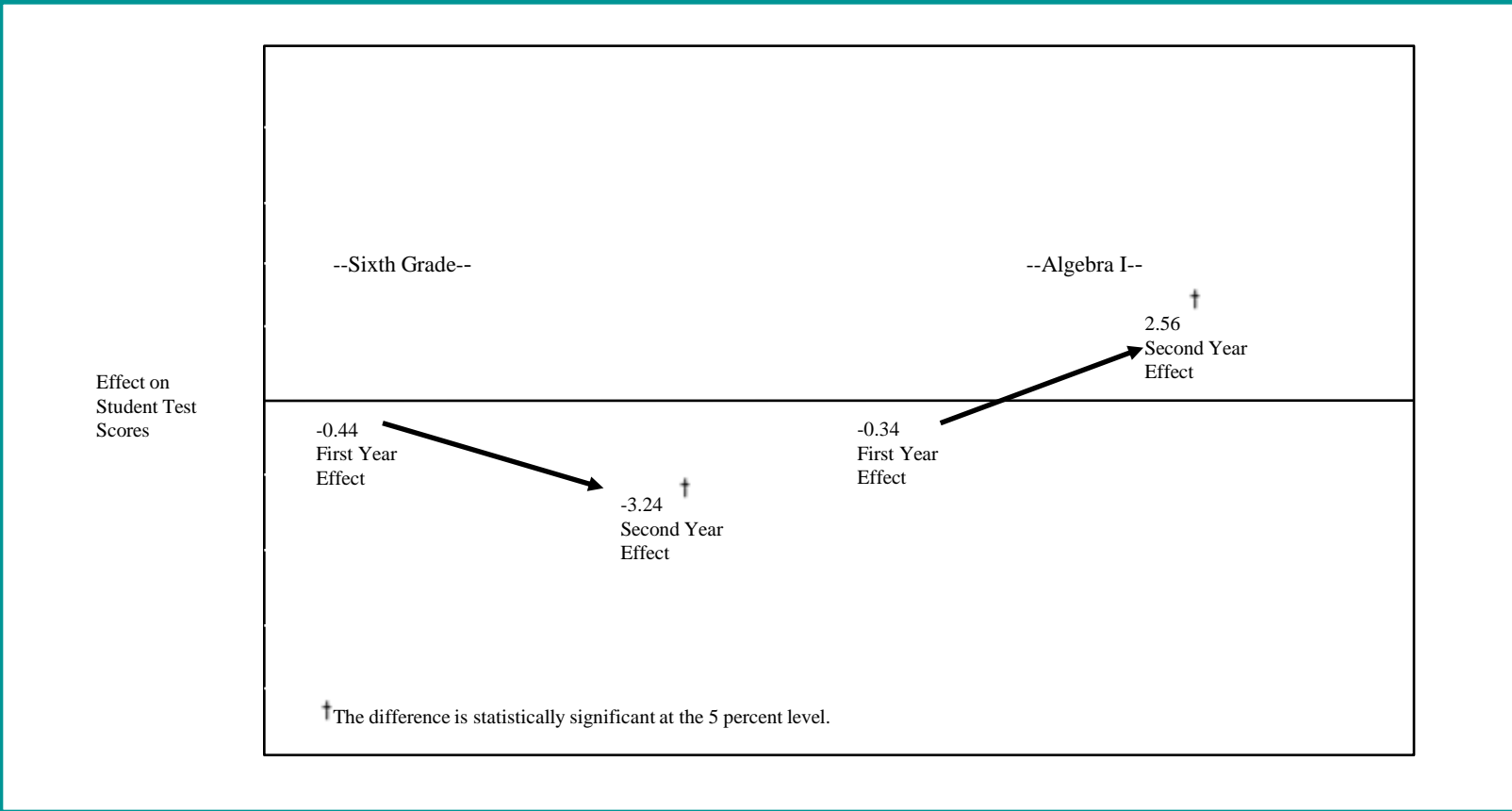
Design of Second Year of the Study

- **Products that had been implemented in a few schools during year 1 were not included in year 2**
- **One treatment teacher and one control teacher randomly sampled within schools that had more than one in either group**
- **Districts that administered nationally-normed tests provided those scores as outcome data**
- **No classroom observations or teacher interviews**

Effects of one year of teacher experience: reading products



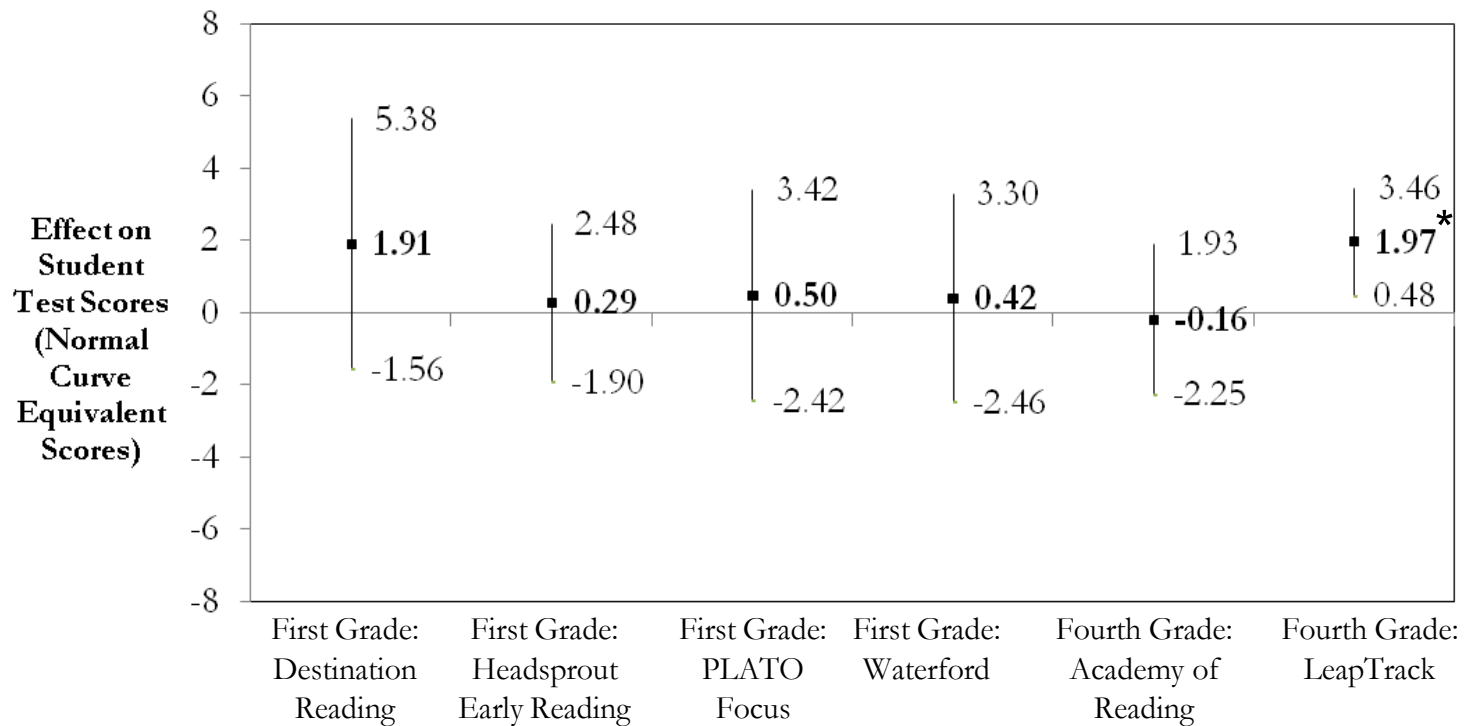
Effects of one year of teacher experience: math products



Variation in Logged Student Product Usage

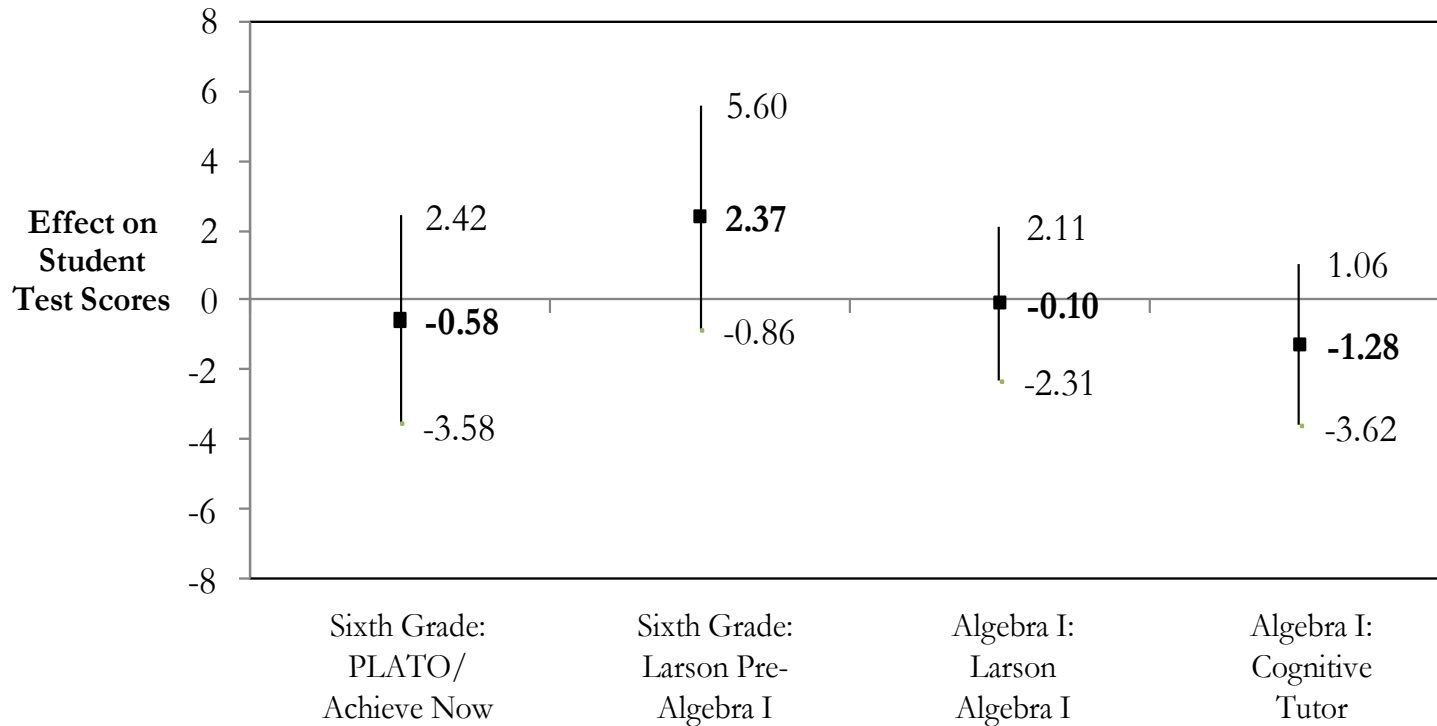
- **First grade**
 - First year 2,556 minutes, second year 1,182 minutes ↓
- **Fourth grade**
 - First year 720 minutes, second year 936 minutes ↑
- **Sixth grade**
 - First year 852 minutes, second year 678 minutes ↓
- **Algebra I**
 - First year 1,308 minutes, second year 936 minutes ↑

Reading Product Effects



Bands indicate 95 percent confidence intervals

Math Product Effects



Bands indicate 95 percent confidence intervals

Study Tradeoffs

- **Included 15 reading and math products**
 - Many products and types of technology not in the study
 - Results do not mean “technology is ineffective”
- **Used experimental design**
 - Teachers had not used these products in current classrooms

Concluding Thoughts

- **Products may be cost-effective**
- **Comparative effectiveness not known**
- **School districts and decisionmakers express appreciation for the information**