

## REVIEW OF *THE HIDDEN VALUE OF CURRICULUM REFORM*

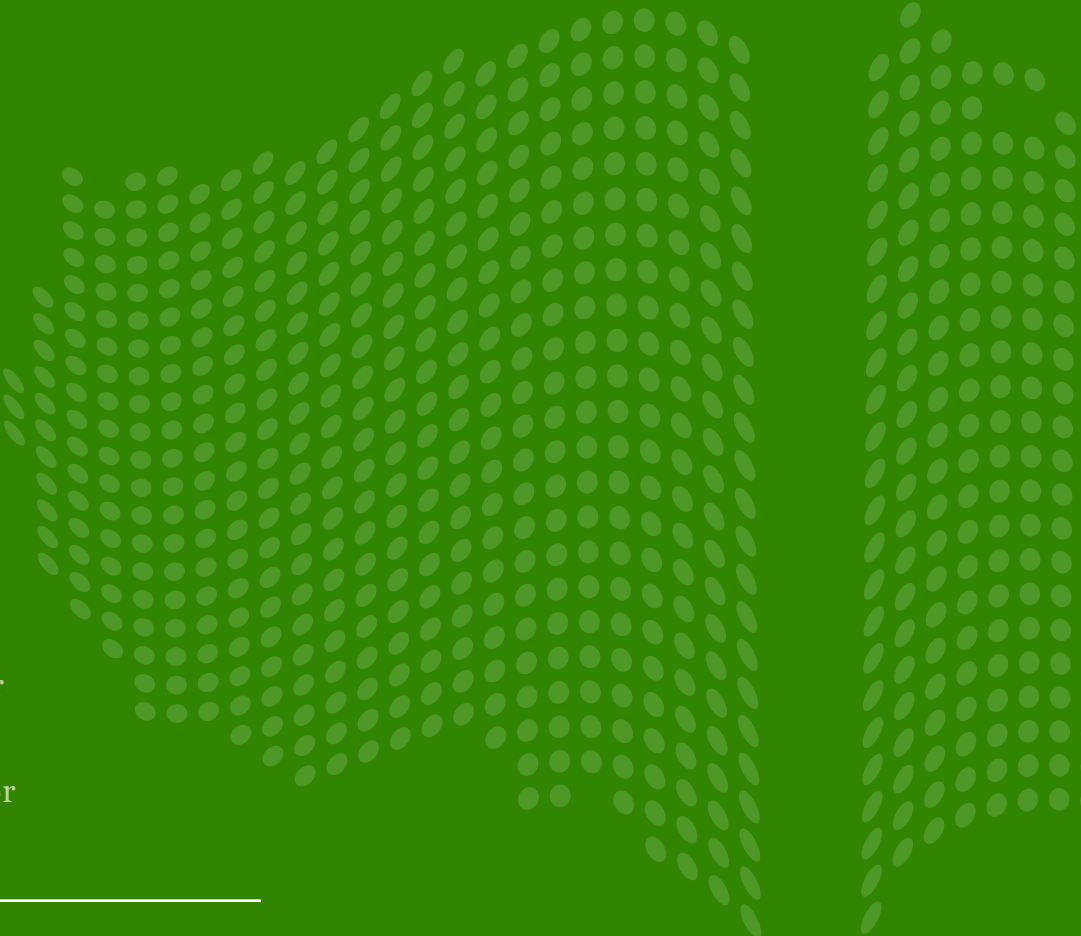
*Reviewed By*

Sarah Lubienksi  
*University of Illinois at Urbana-Champaign*

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### Summary of Review

A recent Center for American Progress report, *The Hidden Value of Curriculum Reform*, draws bold conclusions about the high payoff of better textbooks. It finds that textbooks are rarely chosen based on evidence of effectiveness and true alignment with standards. It also finds that elementary mathematics textbook prices vary little, regardless of quality or whether or not a state recommends particular texts for adoption. While these elements of the report have merit, it then overreaches. Based on a single prior study of first and second grade math curricula in some high-poverty schools, it draws general conclusions about the Return on Investment (ROI) for good versus weak textbooks, ignoring key findings within the original study and also ignoring other research showing that curricular effects vary, depending on context and implementation — that is, a good book is no guarantee of benefits. The report then compares its estimated ROI for textbooks with another study's reported ROI for other interventions, while ignoring nuances of that second study's calculations. Overall, *Hidden Value* is timely and provides important insights about the need for evidence-based curriculum selection. However, its highly optimistic claims about curricular ROI could reduce support for other worthy interventions and spur simplistic comparisons of textbooks that lead to naïve conclusions about which curriculum is “best.”



**Kevin Welner**  
Project Director

**William Mathis**  
Managing Director

**Alex Molnar**  
Publishing Director

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## National Education Policy Center

School of Education, University of Colorado  
Boulder, CO 80309-0249  
Telephone: (802) 383-0058

Email: [NEPC@colorado.edu](mailto:NEPC@colorado.edu)  
<http://nepc.colorado.edu>

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# REVIEW OF THE HIDDEN VALUE OF CURRICULUM REFORM: DO STATES AND DISTRICTS RECEIVE THE MOST BANG FOR THEIR CURRICULUM BUCK?

*Sarah Lubienski, University of Illinois at Urbana-Champaign*

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## I. Introduction

A new report published by the Center for American Progress makes strong claims about the payoff of schools' investment in high-quality curriculum materials. In *The Hidden Value of Curriculum Reform: Do States and Districts receive the Most Bang for Their Curriculum Buck?*, authors Ulrich Boser, Matthew Chingos, and Chelsea Straus argue that, compared to other reforms, a switch to better textbooks is a far more cost-effective way to improve student achievement.<sup>1</sup>

Amid shrinking school budgets and unprecedented national agreement about curriculum via the Common Core State Standards,<sup>2</sup> this timely report promotes the development and evaluation of high-quality curricula. *Hidden Value* also advocates wide dissemination of evaluation findings and the creation of textbook adoption processes that make good use of those findings.

This review raises questions about key claims made in the report, particularly its calculation of the return-on-investment (ROI) of mathematics texts versus other reforms. Still, *Hidden Value* will be of interest to those involved in textbook adoption processes and will hopefully bring greater attention to the importance of curricula and ways to improve its quality and selection in U.S. schools.

## II. Findings and Conclusions of the Report

*Hidden Value* sets out to examine four issues: (1) How states and districts decide which curriculum to adopt, (2) How much curriculum materials cost and whether that cost is consistent across states, (3) The relationship between cost and quality of curricula, and (4) The Return on Investment (ROI) of curriculum compared with other interventions.

### Adoption Processes

The report presents brief case studies of textbook adoption processes in five states — Alabama, California, Florida, South Carolina, and Texas — and selected districts within

five other states (Alaska, Arizona, Illinois, Iowa, and Nebraska). The report finds that curricula are often selected based on shallow comparisons instead of evidence of effectiveness or deep analyses of alignment with curricular standards. One notable exception is highlighted – the case of Lincoln (NE) Public Schools, which pilots materials and considers achievement data and teacher feedback before full implementation of a new curriculum.

## Cost

According to the report, the average price for early elementary mathematics curriculum materials is \$34 per text, with remarkably little variation in price between texts or across states. The gap between the minimum and maximum price for any particular text averaged \$1.47, and costs did not depend on whether a state recommended particular texts for adoption or not.

## Relationship Between Cost and Quality

In comparing curriculum cost with quality, the report draws upon a prior study that was funded by the Institute of Education Sciences and conducted by researchers from Mathematica Policy Research and SRI International.<sup>3</sup> That 2010 study examined the relative effectiveness of four mathematics curricula, examining one-year gains that first and second graders made on the assessment created for the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99 (ECLS-K).<sup>4</sup> Although the effects of the various curricula differed for first and second graders, students using either *Math Expressions* or *Saxon* tended to outperform those using *Scott Foresman-Addison Wesley (SFAW)* by .12 to .13 grade levels per year. Students using the fourth curriculum, *Investigations in Number, Data, and Space*, scored no differently than the *SFAW* students at Grade 1, but scored .09 grade levels ahead of *SFAW* students at Grade 2.<sup>5</sup> The report finds that the more effective curricula cost no more than the least effective curriculum.

## ROI of Curriculum Versus Other Reforms

The report compares the ROI for curriculum with estimates for several non-curricular interventions taken from a 2009 analysis conducted by economist Doug Harris.<sup>6</sup> *Hidden Value* concludes that switching to a more effective curriculum is a far better investment than the other interventions Harris examined. For example, it claims that switching from *SFAW* to *Math Expressions* or *Saxon* would provide a cost-effectiveness ratio over 60 times larger than that of reducing class size and over 44 times larger than Success for All, a school-wide improvement intervention. The report concludes that schools should immediately abandon less effective curricula:

These data make a compelling case that if schools have access to objective

and reliable information on curriculum quality, they should throw out a lower quality product and buy a higher quality product without hesitation. Similarly, investments into research on curriculum effectiveness also can produce a very high ROI by enabling schools to make such ROI-enhancing decisions. (p. 18)

The report ends by urging the U.S. government (via IES) to invest in rigorous studies of curricular effectiveness, arguing that although randomized controlled trials (RCTs) may cost millions of dollars to conduct, they are a good investment “since the results can immediately inform selection and purchasing decisions around effective instructional materials that benefit millions of students...” (p. 21). Philanthropies are also urged to fund grant competitions to support the development of openly licensed materials aligned with the Common Core, as well as randomized studies of their impact.

Finally, the report calls for improvements to existing curriculum adoption processes, arguing that “states should ditch their largely haphazard approaches to measuring alignment and instead commission professional alignment studies of proposed curricula” (p. 23). Such alignment studies could lead to both recommended texts within each state, as well as improved rubrics for guiding local evaluations of curricular options. Districts are also encouraged to run their own pilots to examine the impact of new curricula on their students and to share that information with other districts.

### III. The Report’s Rationale for Its Findings and Conclusions

*Hidden Value* presents brief case studies of textbook adoption processes in five states and eight districts, and considers data from 19 states on prices paid for various elementary mathematics products. The report’s claims about the relative ROI of curricula compared with other interventions are based largely on two prior studies.<sup>7</sup>

### IV. The Report’s Use of Research Literature

*Hidden Value* draws from a variety of sources on textbook adoption processes, including studies of alignment and interviews with state and district leaders. The report relies most heavily on two studies. Estimates of the ROI of several popular interventions are pulled from Harris’s study. *Hidden Value* compares those estimates with the estimated ROI of four elementary mathematics curricula, based on the effects found in a Mathematica/SRI study, explaining that this study was the only RCT available and that other less rigorous studies were not considered. However, the report later cites a quasi-experimental study of curricula to help support its conclusions,<sup>8</sup> raising questions about why other similar studies of curriculum effects were ignored. Additionally, the report overlooks a highly

relevant follow-up to the Mathematica/SRI study, which found patterns that differed somewhat from the original study,<sup>9</sup> as well as two syntheses of mathematics intervention studies (including some RCTs), all of which highlight the difficulties of detecting a clear signal amid the noise in studies of curricular effects.<sup>10</sup>

Unfortunately, amid its calls for funding of curriculum development and evaluation, the report reveals no awareness of previous, similar efforts from the National Science Foundation, most notably the many millions of dollars invested in the development of mathematics textbooks in the 1990s and subsequent studies of their impact.<sup>11</sup> Inclusion of a broader range of studies would have added helpful nuance to the report's conclusions about curricular implementation and payoff.

## V. Review of the Report's Methods

One contribution of *Hidden Value* is its case study data regarding the curriculum adoption process. For example, the discussions with state and district leaders revealed that, given the ways checklists are used to determine alignment with standards, publishers benefit from flooding their textbooks with every possible topic, as opposed to streamlining content to closely match standards. The report also presents a careful curricular price comparison, adjusting for inflation and considering 114 materials used in at least 2 of the 19 states examined.

The report is weaker in its reliance on only two prior studies to draw major conclusions about the impact and ROI of specific curricula.

### Determining Curricular Impact

Hiebert notes that determinations of “effective” instructional methods cannot solely be determined by research, as they are based on which outcomes we value.<sup>12</sup> Outcomes not only vary by the assessment used, they are also shaped by instructional context. Hence, IES calls for studies to consider “what works, for whom, and under what conditions.”<sup>13</sup> *Hidden Value* seems out of step with current thinking in its reliance on a single study to determine “what works,” without considering the rich nuances of that study, or a follow-up report revealing different longitudinal patterns in curricular effectiveness than those reported in the original study.

More specifically, the 2010 Mathematica/SRI comparison of the four math curricula was done carefully, with multi-level models controlling for student demographics, teacher demographics, prior use of the curriculum, teacher knowledge, class size, as well as the distribution of students' initial test scores within each classroom. Despite this care and despite the millions of dollars invested in the Mathematica/SRI study, the study does not necessarily generalize to all students. The study focused on one-year gains of first

and second graders in high-poverty schools in the 12 districts willing to participate from among the 473 invited. Moreover, the 2013 update to the Mathematica/SRI report, which examines student growth after two years, contradicted some patterns found in the original study (with the *SFAW* curriculum no longer at the bottom of the heap).<sup>14</sup> These issues of generalizability across place and time suggest just how difficult it is for a study to make definitive claims about the effectiveness of one curriculum over another. Although *Hidden Value* notes the lack of a representative sample in the Mathematica/SRI study, the report does not temper its sweeping conclusions about the effectiveness and payoff of the four curricula.

## Calculating ROI

Readers may initially be confused by *Hidden Value's* analysis of the relationship between curricular cost and quality, which is presented in graphs showing every possible combination of curricula (pp. 15 and 16), as opposed to a more straightforward graph of effect sizes versus costs. Ultimately the report concludes that, at the cost of less than \$40 per student, purchasing new, more effective curricula is a far better use of funds than other interventions.

This conclusion is based on Harris' ROI estimates for prior interventions, which *Hidden Value* carefully adjusts for inflation to enable comparisons with the four curricula analyzed in the Mathematica/SRI study. Harris calculates ROI as the expected effect size per \$1,000 spent on each student. While on one hand, this is a straightforward calculation, on the other hand, estimates of curricular ROI can be skewed if the curricular effect size is inflated or the cost is minimized, or both, as the case may be.

*Curriculum selection is too often based on political issues instead of evidence of effectiveness or alignment with standards*

For example, *Hidden Value's* ROI for curriculum focuses solely on mathematics achievement, while Harris' estimated ROIs for other interventions, such as class size, are based on an average of achievement gains across subjects, thereby providing a greater return on investment

than subject-specific interventions with the same ROI. One might also argue that non-academic (e.g., socio-emotional) benefits accrue from some interventions, such as class size reduction, and those benefits are not included in the ROI calculation. Moreover, the Mathematica/SRI study noted that Saxon teachers spent an additional hour per week on math instruction. While one can argue that this is a positive effect of the curriculum, one must also consider that time was taken from other curricular areas to create that additional math time.

In calculating the cost of curricula, *Hidden Value* included only the cost of the student materials, as opposed to teacher development and time spent on learning a new curriculum. This stands in stark contrast to Harris' extensive calculations of teacher time required for other interventions.<sup>15</sup> Furthermore, the estimated ROIs for curriculum were

based on Grades 1 and 2, whereas the costs of texts become substantially more expensive in upper grades.<sup>16</sup>

Hence, given the myriad factors influencing curricular effects and the way in which curricular cost may have been minimized, there are reasons to be cautious in drawing conclusions from *Hidden Value*'s estimated 3.1 ROI for curriculum.<sup>17</sup>

## VI. Review of the Validity of the Findings and Conclusions

Despite such cautions, *Hidden Value*'s general point still stands. That is, given that costs vary remarkably little across curricula, and given that curriculum is so central to students' day-to-day learning experiences, more attention should be given to the development and selection of high-quality curricula.

However, the report's conclusions would be stronger if tied to an awareness of recent mathematics curricular reform efforts and the challenges of drawing definitive conclusions about curricular effects. The report calls for new curricula to be developed and for millions of dollars to be invested in new randomized controlled trials. Given the National Science Foundation's relatively recent curriculum development efforts, and the similarities between the NCTM Standards upon which those were based and the current Common Core State Standards,<sup>18</sup> a more cost-effective alternative to creating new curricula would be to update the most promising NSF-funded curricula (e.g., *Math Expressions*) to enhance alignment with the Common Core. Additionally, the report rightly notes the need for states to collect data on curricula used by its districts, but a useful next step would be to include textbook information in all relevant NCES datasets so that ongoing, nationally representative, quasi-experimental comparisons of curricula can be conducted at minimal cost.

## VII. Usefulness of the Report for Guidance of Policy and Practice

*Hidden Value* raises the important point that curriculum selection is too often based on political issues instead of evidence of effectiveness or alignment with standards. Education leaders involved in textbook adoption processes will find much of interest in the report, and it could spur efforts to improve curriculum adoption processes and provide better curriculum selection tools to help schools "separate the wheat from the chaff." (p. 2)

Despite its strengths, there is some danger that the report's highly optimistic claims about curricular ROI could be taken too far, reducing support for other interventions with broader impact. Additionally, the admonition for school districts to run (and widely share results of) their own curriculum pilots could be problematic if district analysts are not equipped to deal with the myriad factors that can muddy curricular comparisons.

Still, *Hidden Value* rightly notes that, given substantial agreement around the Common Core, the time is right for national investment in curriculum. The report will hopefully increase attention to the potential of curriculum as a lever of instructional improvement and prompt careful consideration of ways to improve the development, research, and selection of curricula that the nation's students use each day.

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- 15 For example, in his calculations of the cost of Success for All, Harris writes, “One additional hour for each of 31 teachers for 40 weeks per year, at \$36.71 per hour yields \$45,520 per school.” (p. 17).
- 16 As a point of comparison, the publisher’s list price for one set of Saxon Grade 1 materials is approximately \$45, while the price for the hard-back 4<sup>th</sup> grade text is \$78, and the price for a high school calculus text is \$93. (<http://www.hmhco.com/shop/education-curriculum/math/saxon-math/buy-now>)
- 17 Moreover, although ROI is useful for comparing “bang for the buck” across interventions, one cannot assume linearity of ROI. That is, even if we can agree that a particular \$33 textbook can produce an average gain of .1 standard deviations, this does not mean that a \$1,000 curricular investment would yield a gain of 3 standard deviations.
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AUTHORS:

Ulrich Boser, Matthew Chingos, & Chelsea Straus

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REVIEWER:

Sarah Lubienski, University of Illinois at Urbana-Champaign

E-MAIL ADDRESS:

Stl@illinois.edu

PHONE NUMBER:

(217) 333-1564

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