

UTAH STATE OFFICE OF EDUCATION

REVIEW OF H.B. 181

Section 53A-17a-152

GRADES FOUR THROUGH SIX MATHEMATICS INITIATIVE

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Overview

In 2006 HB 181 created a multi-faceted, state-funded program intended to improve the performance of Utah students in mathematics at grades 4 – 6. The Utah State Office of Education issued requests for proposals that were independently reviewed. This resulted in funding projects in twelve individual districts and one multi-district consortium (involving four districts). The projects were to assist in determining the most effective methods for improving student mathematics performance while raising the mathematical achievement level of students in the targeted schools in grades four – six.

The selected projects were allowed to choose to implement a professional development model, an incentives model, or a combination of the two. Eleven districts chose a combination of professional development and incentives, (including the four district consortium), one chose professional development only and the other chose an incentive model. To provide an analysis of how professional development and incentive bonus plans impact mathematics achievement, a quasi-experimental method was instituted. Forty-four experimental schools were matched with forty-four control schools. Approximately 650 teachers were involved in schools where the average enrollment was 500. An external evaluation of the project was done by IBRIC (The Institute for Behavioral Research in Creativity).

Funding

The table below shows the amount of funding allocated to the participants.

Table 1

2006-2009 Funding			
District Name	Professional Development	Incentives	Total Funding
5 District Consortium (Davis, Weber, Ogden, Box Elder, USDB)	\$300,450	\$450,000	\$750,450
Alpine	\$400,000	\$0	\$400,000
Carbon	\$420,000	\$460,000	\$880,000
Duchesne	\$58,430	\$59,700	\$118,130
Emery	\$200,000	\$84,000	\$284,000
Granite	\$400,000	\$169,977	\$569,977
Jordan	\$500,000	\$600,000	\$1,100,000
Juab	\$69,850	\$120,000	\$189,850
Nebo	\$225,000	\$200,000	\$425,000
Ogden (grades 4-5)	\$300,000	\$400,000	\$700,000
Salt Lake	\$499,822	\$480,000	\$979,822
San Juan	\$0	\$250,000	\$250,000
Washington	\$300,000	\$295,668	\$595,668

Models

Tables 2, 3 and 4 show the models used by the participants.

Table 2

Professional Development and Incentives		
District Name	Type of Training	Incentives
5 District Consortium (Davis, Weber, Ogden, Box Elder, USDB)	WSU Math Endorsement Special Program	Achievement Classes Participation
Carbon	District Training and SUU Endorsement Program	Achievement
Duchesne	F.U.S.I.O.N Training for Saxon Math	Participation
Emery	SUU Math Endorsement Program	Achievement Classes
Granite	District Training; Coaching and Mentoring	Implement
Jordan	Bi-Monthly District Training; Observations; Collaborative Groups	Achievement Classes
Juab	District Training; Core Alignment	Achievement Implement
Nebo	District Training; Weekly Collaborative Groups	Achievement Classes Implement
Ogden (grades 4-5)	District Training; Implementation Observations	Achievement Classes Implement
Salt Lake	District Training; Math Coaches; Peer Collaboration	Achievement Classes
San Juan	No Professional Development	Achievement
Washington	District Training; Kagan Structures (yr. 2)	Achievement Classes Implement

Table 3

Professional Development Only

District Name	Type of Training
Alpine	BYU Math Endorsement Program

Table 4

Incentives Only

District Name	Incentives
San Juan	Based on Student Achievement

Additional Treatments

In addition to the use of professional development and incentives, the participants used a variety of treatments.

Table 5

District	School or Teacher Based	District Specialist or School Coach	Treatments						
			Endorsement	Training	Collaboration	Tutoring	Parent Involvement	Special Materials	Additional Testing
Consortium	Teacher		X					X	
Alpine	School		X	X					
Carbon	School	Specialist		X	X		X		X
Duchesne	School						X	X	X
Emery	School	Specialist	X	X					
Granite	School	Specialist & Two Coaches shared by 6 schools		X					
Jordan	Teacher	Specialist		X					
Juab	School		X	X					X
Nebo	School			X					X
Ogden	School	Specialist		X	X			X	
Salt Lake	Teacher	Coach		X			X		
San Juan	School								
Washington	School	Coach		X	X				

Results Summary

Baseline information was taken from the 2005 school year, the year prior to the start of the initiative. In the 2006-2007 school year; the end of the first year of the initiative, the experimental school students outperformed matched controls by highly significant margins at both grades four and five. By the 2007-2008 school years, results for every standard were higher for the experimental school students than for the control school students. A balanced approach model with professional development and incentives and the incentives only model showed significantly higher student scores. Experimental schools significantly outperformed control schools on total scores from the Utah criterion-referenced tests in mathematics and on every sub-score or math standard. The Iowa Tests of Basic Skills also showed highly significant differences favoring the total group of experimental schools.

In the 2008-09 school year the mathematics criterion referenced tests were changed to reflect the 2007 revision of the mathematics core. This CRT was a completely new test. New standards were set for the test that reflected the increased rigor of the 2007 core. The new standards make comparison between the new test and the test given in and before 2008 not feasible. The IBRIC report, with its experimental design and use of results of the Iowa Test of Basic Skills (ITBS), will be able to determine the effect of the project on student achievement for the third year. That report, however, will not be ready until early in 2010.

In addition to achievement gains, individual LEAs in the study were able to note improvements in mathematics instruction. These improvements include teachers reporting being more confident in their mathematics teaching abilities, more teachers with elementary mathematics

endorsements, and students reporting increased positive attitudes toward mathematics. In addition, LEAs used data such as NWEA scores to award incentives to teachers and to show growth.

Recommendations:

The evidence obtained in the study shows a clear advantage for using both professional development and financial incentives to improve student achievement in mathematics. Significant improvements both in math instruction and student achievement were recorded as a result of these activities. We recommend that a new round of pilot projects be initiated with criteria supporting the findings of this study and the findings of the National Mathematics Panel. Narrowing the focus of future funding to pilot proven and national research-based practices will support Utah teachers in improving mathematics instruction and student achievement.

If funds are available, Legislation could be proposed that appropriates **\$870,000** annually for three years (**total cost: \$2,250,000**) to provide for the design and implementation six K-4th pilot school programs designed to:

1. Facilitate the successful acquisition of mathematics concepts and skills for students, as well as establish a benchmark system for student learning.
2. Determine the most instructionally and financially effective delivery system for student achievement in mathematics.

Three of the schools would use Singapore Mathematics materials, methods, and related technology. The other three would select and use other mathematics research-based materials, methods, and related technology.

Each pilot school would receive \$115,000 annually for three years to:

1. Hire a mathematics coach who will provide on-going classroom coaching for teachers and facilitate on-going tutoring for students who fail to reach grade-level benchmarks.
2. Use pre/post grade level assessments, as well as at least quarterly benchmark assessments to determine ongoing learning and the need for supplemental and intervention instruction and tutoring support.
3. Using Utah's Three-Tiered Mathematics Instruction Model, provide tiered instruction for those students not mastering critical benchmarks and ongoing tutoring for students who fail to reach grade-level benchmarks.
4. Provide parent communication and parent tutoring support to maximize student mathematics achievement.
5. Address critical minority achievement gaps through instructional practices.
6. Provide professional development and endorsement course work aligned to student assessment, indicated achievement gaps and use of research-based practices (e.g., differentiated instruction, systematic instruction, teaching to a daily objective).
7. Provide an annual data report to the Utah State Office of Education demonstrating evidence of student learning, mastery of critical benchmarks, and aligned use of funding.

The pilot would be evaluated by an outside evaluator to determine the effectiveness of each solution. For comparison purposes, districts with pilot schools or, in the case of charters, the state charter school office, would designate a control school with nearly similar demographics.

Proposed Budget per pilot school based on average school size enrollment	
Category	Funding
Core Math Materials	\$10,000
Math Coach	\$70,000
Professional Development	\$25,000
Assessments	\$5,000
Tutoring Support	\$5,000
Total per school	\$115,000 per year
Six schools @ \$115,000	\$690,000
Independent Evaluation	\$60,000
Project Technical Assistance	\$120,000
Total Project Cost per year	\$870,000
Total Project Coast for three years	\$2,250,000

In 2013 if finds are available, legislation could be proposed that appropriates \$25,000,000 annually on an on-going basis to provide for the implementation of a statewide K-6 Math Initiative. Districts and charter schools would apply for funds to replicate the successful implementation of the most effective pilot model from the 2010-2012 study. They would be required to at least match the allocation with local funds.

Each school would use the state and local match to:

1. Use the materials, methods and technology associated with the effective pilot model(s).
2. Hire a mathematics coach who will facilitate on-going classroom coaching for teachers and facilitate ongoing tutoring for student who fail to reach grade-level benchmarks.
3. Use pre/post grade level assessments, as well as at least quarterly benchmark assessments to determine ongoing learning and the need for supplemental and intervention instruction and tutoring support.
4. Using Utah’s Three-Tiered Mathematics Instruction Model, provide tiered instruction for those students not mastering critical benchmarks and on-going tutoring for students who fail to reach grade-level benchmarks.
5. Provide parent communication and parent tutoring support to maximize student mathematics achievement.
6. Address critical minority achievement gaps through instructional practices.
7. Provide professional development and endorsement course work aligned to student assessment, indicated achievement gaps and use of research-based practices (e.g., differentiated instruction, systematic instruction, teaching to a daily objective).
8. Provide an annual data report to the Utah State Office of Education demonstrating evidence of student learning, mastery of critical benchmarks, and aligned use of funding.