



**Impact of the
Payne School Model
on Student Achievement**

**North Little Rock School District
North Little Rock, Arkansas**

**Interim Report:
2005-06 Data**

**William W. Swan, Ed.D.,
The University of Georgia
Athens, GA.**

Center for Study of
**ECONOMIC
DIVERSITY**

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Abstract

Analyses of covariance (ANCOVA)—using the 2005–06 Arkansas standardized tests in Mathematics and Literacy as dependent variables for Grades 6–8 and prior standardized test scores in the same domains as the covariates—were used with two groups (students served by teachers demonstrating high model fidelity and students served by other teachers) to determine the impact of the Payne School Model on student achievement. The two statistically significant results (one each in Mathematics and Literacy) favored the High Model Fidelity group. For the two non-statistically significant results, one favored the High Model Fidelity group (Literacy), and one favored the Other group (Mathematics). Both of the results for the seventh and eighth grades in Literacy favored the High Model Fidelity Group. These results, combined with the results from 2003–04 and 2004–05, demonstrate that the implementation of the Payne School Model in a high-fidelity manner before and during the middle school years tend to significantly positively increase student achievement in both Mathematics and Literacy compared with traditional approaches.

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Introduction and Purpose

The federal No Child Left Behind Act (2001) and corresponding state legislation throughout the United States require that schools use “research based” programs to increase student achievement in all academic areas, with particular emphasis on Mathematics and Reading/English/Language Arts. Consistent with these mandated foci on student achievement, Dr. Ruby K. Payne initiated research to determine the impact of the implementation of the Payne School Model—*A Framework for Understanding Poverty, Learning Structures, and Meeting Standards & Raising Test Scores* materials and training—on student achievement in the areas of Mathematics and Reading/English/Language Arts.

Context for North Little Rock School District

North Little Rock School District, located in North Little Rock, Arkansas, serves approximately 9,000 students, kindergarten through 12th grade. There are 22 schools in the district. Five of the schools in the district were involved with aha! Process, Inc. throughout the 2005–06 school year. Of the five schools, two are elementary schools serving kindergarten through fifth-grade students, one is a middle school serving sixth-grade students, and two are middle schools serving seventh- and eighth-grade students. These five schools serve 2,102 students. During the course of the 2005–06 school year, technical assistance was provided by aha! Process consultants.

Lynch Drive Elementary School

Lynch Drive Elementary School is a K–5 campus with an enrollment of 329 students. The current student population is 84% African American, 15% Caucasian, and 2% Hispanic. Eighty-nine percent of the students are eligible for free or reduced-price school meals. During the course of the 2005–06 school year, technical assistance was provided by aha! Process consultants.

An aha! Process consultant provided eight technical-assistance sessions to selected elementary teachers. During the 2005–06 year, technical assistance sessions focused on:

- Introducing math-specific mental models and working with a common problem-solving strategy
- Analyzing 10-question test items and scoring open-ended response items
- Developing time and content grids
- Demonstrating mental models and step sheets
- Grading open-ended response items
- Reviewing *Framework* and *Learning Structures* concepts
- Identifying testing strategies for the state assessment
- Revising time and content grids based on pacing guides and new textbooks

Poplar Street Middle School

Poplar Street Middle School is a sixth-grade campus with an enrollment of 668 students. The current student population is 62% African American, 36% Caucasian, 2% Hispanic, and <1% Asian or Pacific Islander. Eighty-nine percent of the students are eligible for free or

reduced-price school meals. During the course of the 2005–06 school year, technical assistance was provided by aha! Process consultants in the areas of Mathematics and English/Language Arts.

Mathematics

An aha! Process consultant provided eight technical-assistance sessions to math teachers, with each teacher receiving the equivalent of 3½ days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Completing time and content grids
- Creating 10-question tests and analyzing results
- Developing interventions to meet needs
- Discussing a common problem-solving strategy, as well as math-specific mental models
- Demonstrating mental models and step sheets
- Grading open-ended responses from a mock benchmark exam and discussing testing strategies
- Planning for 2006–07 school year

English/Language Arts

Because of the greater number of English/Language Arts teachers, an aha! Process consultant provided a total of 14 technical-assistance sessions with each teacher receiving the equivalent of 2½ days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Analyzing benchmark data
- Identifying target students and standards
- Revising time and content grids and 10-question tests
- Reviewing concepts from *Framework* and *Learning Structures*
- Introducing walk-through rubrics and model-fidelity scales
- Grading benchmark tests
- Demonstrating mental models for the classroom
- Discussing resources and how they are used as interventions

Ridgeroad Middle Charter School

Ridgeroad Middle Charter School is a Grades 7–8 campus with an enrollment of 554 students. The current student population is 71% African American, 19% Caucasian, 9% Hispanic, and <1% American Indian/Alaskan Native. Seventy-nine percent of the students are eligible for free or reduced-price school meals. During the course of the 2005–06 school year, technical assistance was provided by aha! Process consultants in the core content areas, as well as in the related arts program.

English/Language Arts

An aha! Process consultant provided eight technical-assistance sessions to English/Language Arts teachers, with each teacher receiving the equivalent of four days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Identifying target students and determining resources and interventions
- Identifying weakest and strongest standards and developing a plan to address weak standards
- Reviewing mental models for formal register and fictional stories, plan and label for non-fiction, and a planning strategy for open-ended responses
- Analyzing benchmark tests data
- Discussing and compiling bell work
- Grading open-ended responses from benchmark tests
- Reviewing rubrics, resources, and discipline
- Developing a plan to enhance reading instruction for the next year

Social Studies

An aha! Process consultant provided eight technical assistance sessions to social studies teachers, with each teacher receiving the equivalent of five days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Completing time and content grids
- Developing 10-Question tests
- Analyzing data
- Reviewing the Payne Lesson Design, question writing, and vocabulary sketching
- Reviewing plan and label for expository text
- Sorting
- Developing bell work
- Mental mapping

Science

An aha! Process consultant provided eight technical-assistance sessions to science teachers, with each teacher receiving the equivalent of 3½ days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Identifying targeted students and completing a resource analysis of these students
- Identifying most difficult standards and identifying skills and strategies that could be used to help students understand these concepts
- Creating open-response questions
- Creating a mock benchmark test
- Editing 10-question tests
- Analyzing scores of benchmark tests
- Discussing vocabulary strategies
- Adjusting time and content grids

Mathematics

An aha! Process consultant provided eight technical-assistance sessions to math teachers, with each teacher receiving the equivalent of four days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Standardizing mental models, step sheets, and daily bell work
- Completing time and content grids
- Demonstrating the Payne Lesson Design
- Identifying processes to improve open response item scores
- Analyzing 10-question test data
- Identifying targeted students and developing interventions

Rose City Middle School

Rose City Middle School serves seventh- and eighth-grade students, as well as houses an alternative program serving sixth- to ninth-grade students from the district. Enrollment totals 219 students. The current student population is 92% African American, 6% Caucasian, <1% Asian or Pacific Islander, and <1% American Indian/Alaskan Native. Eighty-seven percent of the students are eligible for free or reduced-price school meals. During the course of the 2005–06 school year, technical assistance was provided by aha! Process consultants in the area of Mathematics and English/Language Arts.

Mathematics

An aha! Process consultant provided eight technical-assistance sessions to math teachers, with each teacher receiving the equivalent of 4½ days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Completing time and content grids
- Standardizing mental models, step sheets, and daily bell work
- Identifying processes to improve open-ended, response-item scores
- Analyzing 2005 benchmark data and 10-question test data, as well as developing interventions based on the data
- Developing 10-question tests, mental models, step sheets, an advisory plan, and monitoring tools
- Demonstrating mental models

English/Language Arts

An aha! Process consultant provided eight technical-assistance sessions to English/Language Arts teachers, with each teacher receiving the equivalent of four days of technical assistance. During the small group meetings with the teachers, the technical assistance focused upon:

- Analyzing student data
- Identifying “target” students
- Reviewing time and content grids
- Developing 10-question tests
- Scoring the tests and open-response items
- Reviewing strategies from *Learning Structures*
- Discussing writing strategies

- Demonstrating sheets and “fact catchers” to review vocabulary and question making
- Reviewing hidden rules

Seventh Street Elementary

Seventh Street Elementary School serves 332 K-5 students. The current student population is 96% African American, 3% Caucasian, and <1% Hispanic. Ninety-two percent of the students are eligible for free or reduced-price school meals. During the course of the 2005–06 school year, technical assistance was provided by an aha! Process consultant.

Elementary (K–5)

An aha! Process consultant provided eight technical-assistance sessions to selected elementary teachers. During the 2005–06 year, technical-assistance sessions focused on:

- Reviewing concepts from foundational workshops
- Demonstrating math-specific mental models, vocabulary strategies, and step sheets
- Discussing time and content grid process
- Analyzing 10-question test data and developing interventions
- Discussing mental models for current lessons
- Identifying strategies to monitor during testing
- Creating open-ended-response questions for fifth grade and a walk-through rubric for math instruction
- Revising time and content grids

Methodology

The research design to determine impact had two dimensions. The first was establishing model fidelity at each school working with the Payne School Model. If teachers were not implementing the Payne School Model effectively, differences in student achievement could not be attributed to its use. The second was determining the statistical significance of the impact of the Payne School Model on student achievement in Mathematics and Literacy. The design for this analysis was a post-test-only comparison design for two groups—students of those teachers using the model at a High Model Fidelity (HMF) level and students of teachers who were not using the model at a high-fidelity level (Other)—using the analysis of covariance to statistically adjust student achievement based on prior performance.

Model Fidelity

The *Instructional Framework Scale—Observation* (2003) consists of 47 indicators that were criterion-referenced to key model components/activities. Consultants from aha! Process used this instrument to determine a teacher’s level of model fidelity in implementing the Payne School Model. The median inter-rater reliability for this instrument is .83 (83%), with a range of .72 (72%) to .95 (95%).

Analysis of Student Achievement Data

A post-test-only comparison design for two groups, coupled with the analysis of covariance to adjust for differences between the groups based on prior test performance in the same or a related domain, was used to determine the impact of the Payne School Model on student achievement. The independent variable was the level of implementation of the model. The two groups of students served were the students served by teachers with a High Model Fidelity (HMF), e.g., 50% or higher on the *Instructional Framework Scale—Observation* vs. the students served by teachers with a rating of 49% or lower on the scale. The dependent variables were standardized test scores on the statewide Arkansas standardized tests (i.e., Mathematics and Literacy) in 2005–06 for Grades 4 through 8. The covariates for each analysis were the 2004–05 standardized raw test scores in the same or related domains, e.g., Mathematics for Mathematics. [Additional information about these standardized tests is available through the Arkansas Department of Education (www.ArkansasEd.org). Specific statewide data by district are provided at <http://adedata.k12.ar.us:8080/index1.ade>. An overview of testing used in Arkansas is provided at www.idhi.uky.edu/sparc/states/ar.pdf.] Analyses of disaggregate variables (gender, race, limited English proficiency, poverty status defined by participation in free/reduced school lunch, and IDEA disability) were conducted when sample sizes were adequate for such analyses. (IDEA stands for Individuals with Disabilities Education Act of 2004.)

Results

The results are presented in two sections—model fidelity and student achievement.

Model Fidelity

Consultants from aha! Process used the *Instructional Framework Scale—Observation* to observe teachers who were identified by either the building principal at the schools or the aha! consultants as potentially implementing the Payne School Model effectively. Since the focus for this study was student achievement in the areas of Mathematics and Literacy, only teachers in these areas were considered for analysis. A total of 53 teachers in Grades 4–8 were observed and rated in the five schools—two middle schools, one sixth-grade school, and two elementary schools. Based on a review of the model-fidelity results, no analyses could be conducted for the following groups.

- No teachers in Grade 4 met the 50% criterion in either Mathematics English/Language Arts.
- Only one teacher in Grade 5 Mathematics met the criterion. However, the sample size of students with complete data served by this teacher was less than 10.
- For Grade 6, all English/Language Arts teachers and for Grade 8 all Mathematics teachers met or exceeded the criterion. There was no comparison group from another school for the Other group. While these results are most positive from the training perspective, the inability to analyze the data for these two groups is a limitation.

Thus, the students taught by 15 teachers in Grades 6–8 (five in English/Language Arts and 10 in Mathematics who met criterion) were included in this study.

Student Achievement

This was the second year (2005–06) that standardized testing was required for Grades 3–8 in Arkansas for both Mathematics and Literacy. The sample sizes for each analysis varied based on complete data for students, including demographic descriptors.

Tables 1 and 2 [see Appendix] contain summaries of the statistical analyses conducted for Mathematics and Literacy.

Mathematics. The ANCOVA results for Mathematics for the High Model Fidelity (HMF) Group vs. the Other Group are (see Table 1):

- Grade 6: The result was highly statistically significant ($p < .000$) and favored the HMF Group. The model-fidelity scores for the HMF group were very high, which contributed to the level of statistical significance.
- Grade 7: The result was not statistically significant and favored the Other Group.

Literacy. The ANCOVA results for Literacy for the High Model Fidelity (HMF) Group vs. the Other Group are (see Table 2):

- Grade 7: The result was not statistically significant but favored the HMF Group.
- Grade 8: The result was statistically significant ($p < .046$) and favored the HMF Group.

Three of the four analyses found that the adjusted mean of the High Model Fidelity Group exceeded the adjusted mean of the Other group (sixth-grade Mathematics, seventh-grade Literacy, and eighth-grade Literacy). There were two statistically significant results; both favored the High Model Fidelity Group (sixth-grade Mathematics and eighth-grade Literacy). There was one non-statistically significant result that favored the Other Group (seventh-grade Mathematics). Regarding the analyses by disaggregate variables, there was only one statistically significant result (concerning gender) for all the analyses.

These results suggest that the Payne School Model had consistent impact across gender, race, and poverty. The sample sizes were too small to conduct analyses for the disaggregates of limited English proficiency and students with IDEA disabilities.

Discussion/Recommendations

These results were compared with the results from the 2003–04 and 2004–05 school years. For Mathematics, there were five analyses for Grades 6, 7, and 8 across the three years, comparing student achievement (adjusted for prior performance) between students educated by teachers implementing the Payne School Model in a high-fidelity manner compared with students served by teachers using a traditional model or by teachers using

the model in a low-fidelity manner. In two of the five analyses, the Payne School Model was very statistically significantly ($p < .03$) more effective in improving student achievement than in the other approach. In three of the five analyses, the Payne School Model was equally effective in improving student achievement compared with the other approach. For Literacy, there were four analyses for Grades 7 and 8 across the three years. In three of the four analyses, the Payne School Model was statistically significantly ($p < .05$) more effective in improving student achievement than the other approach.

In one of the four analyses, the Payne School Model was equally effective in improving student achievement compared with the other approach. These results suggest that the implementation of the Payne School Model in a high-fidelity manner before and during the middle-school years for at least a two-year period produces statistically significant results in student achievement in both Mathematics and Literacy in a majority of the analyses.

Recommendations for the 2006–07 school year include increasing the number of teachers meeting/exceeding the criterion of 50% model fidelity, continuing to analyze data for Grades 4–8 using the now required Arkansas assessment process, and identifying one or more comparison schools not using the Payne School Model—in order to allow analysis of student performance with the schools in this study that are using the Payne School Model in such an exemplary manner in the middle grades.

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Table 1

Summary of Results for ANCOVA for **Mathematics: 2005–06**
 North Little Rock School District (Arkansas): **High Model Fidelity (HMF) in Payne School** vs. Other in Payne School
 (Dependent Variables: Mathematics Scaled Score in 2006 ... Covariate: Mathematics Raw Score in 2005)

Grade	Group	Sample Size	ANCOVA – Adjusted Means	Direction of Difference	F	Probability	Disaggregates				
							G	Race	LEP	Pov	Dis
6 th	HMF	157	45.533	HMF > Other	63.072	.000**	ns	ns	NA	ns	NA
	Other	136	36.472								
7 th	HMF	261	26.030	HMF < Other	1.044	.308	.067	ns	NA	ns	NA
	Other	12	27.771								

Table 2

Summary of Results for ANCOVA for **Literacy: 2005–06**
 North Little Rock School District (Arkansas): **High Model Fidelity (HMF) in Payne School** vs. Other in Payne School
 (Dependent Variables: Literacy Scaled Score in 2006 ... Covariate: Literature Raw Score 2005)

Grade	Group	Sample Size	ANCOVA – Adjusted Means	Direction of Difference	F	Probability	Disaggregates				
							G	Race	LEP	Pov	Dis
7 th	HMF	53	54.441	HMF > Other	1.072	.303	ns	ns	NA	ns	NA
	Other	57	52.741								
8 th	HMF	75	26.339	HMF > Other	4.041	.046*	ns	ns	NA	ns	NA
	Other	88	24.325								

* p<.05; ** p<.001