Impact of the Payne School Model on Student Achievement

Ridgeroad Middle Charter School
North Little Rock, Arkansas

Interim Report: 2004-05 Data

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Abstract

Analyses of Covariance (ANCOVA)—using the Arkansas Department of Education Statewide standardized tests for Mathematics and Literacy in 2004–05 as dependent variables and using standardized test data for the same students in prior years (i.e., 2003–04 and 2002–03) as covariates—were conducted for two sets of students. For Grade 7, the two groups were students in classes with teachers who were assessed as High Fidelity implementers and students in classes with teachers who were assessed as low implementers or not observed; this analysis focused only on Mathematics. For Grade 8, the two groups of students were students in one school (Ridgeroad) that had implemented the model for two years and students in another school in the district that had implemented the model for one year. For Grade 7, the students in the High Fidelity group outperformed the students in the other group, and the ANCOVA-adjusted means were statistically significantly different at the $p < .029$ *level. For Grade 8, the students at the Comparison School outperformed the students at Ridgeroad, based on ANCOVA-adjusted means for Mathematics; however, these results were not statistically significant. For Literacy, the students at Ridgeroad outperformed the students at the Comparison School, and the results were statistically significant. These results support the expectation that the Payne School Model, when implemented in a High Fidelity manner, can positively impact student achievement in middle school grades.*

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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 reading/English/language arts and mathematics. 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 and Raising Test Scores* materials and training—on student achievement in the areas of mathematics and literature.

Context for Ridgeroad Middle Charter School

Ridgeroad Middle Charter School, located in North Little Rock, Arkansas, serves 554 seventh- and eighth-grade students; 79% of the students receive free or reduced-price lunch. The current student population is 71% African American, 19% Caucasian, 9% Hispanic, and less than 1% American Indian/Alaskan Native. Ridgeroad has been involved with aha! Process, Inc. since the 2003–04 school year. Staff members have received *A Framework for Understanding Poverty, Learning Structures,* and *Meeting Standards and Raising Test Scores* training from aha! Process consultants or local district trainers. During the course of the 2004–05 school year, content-specific technical assistance was provided monthly by aha! Process consultants.

English/Literacy

An aha! Process consultant provided eight technical-assistance sessions to English/language arts teachers, with each teacher receiving on average 5.5 days of technical assistance. During the first semester, technical assistance focused on:

- Making adjustments to time and content grids
- Using data to identify student performance patterns
- Analyzing resources of students who were failing current classes
- Developing consistent models for sorting story/narrative, expository, and descriptive writings

The English teachers also met with the social studies teachers during the first semester and developed a plan to support the curriculum in both areas, specifically with the social studies teachers using open-response questions and grading with similar rubrics.

During the second semester, the aha! Process consultant demonstrated lessons for the teachers and conducted classroom observations, in addition to the meetings. These technical-assistance sessions focused on:

- Identifying target students based on test data
- Ranking standards from weakest to strongest
- Developing material to reinforce the weak standards
- Helping students understand the possible test formats
- Developing relationships with students and their parents
- Revising time and content grids for the following school year

Math

An aha! Process consultant provided seven technical-assistance sessions to math teachers, with each teacher receiving on average five days of technical assistance. During the first semester, technical assistance focused on:

- Completing student data grids based on data from the previous year's state assessment
- Identifying target students based on the student data grids
- Adopting a common problem-solving, open-ended response strategy
- Constructing 10-question tests
- Administering and gridding data from 10-question tests

The math teachers also met with the science teachers during the first semester to discuss items that correlate between subject areas and develop a plan to teach these concepts consistently across subject areas.

During the second semester, in addition to the meetings, the aha! Process consultant demonstrated lessons for the teachers and conducted classroom observations. The second semester's technical-assistance sessions focused on:

- Analyzing mock benchmark grids
- Determining strengths and weaknesses of students based on the benchmark data
- Identifying skills to target before testing
- Developing a checklist for testing
- Developing time and content grids to align with the new Arkansas Frameworks and aligning strategies by framework strands in cross-grade-level groups
- Standardizing bell work
- Identifying mental models, step sheets, strategies, and processes being used in the classroom

Science

An aha! Process consultant provided eight technical-assistance sessions to science teachers, with each teacher receiving on average five days of technical assistance. During the first semester, technical assistance focused on:

- Reviewing time and content grids
- Developing 10-question tests and analyzing them for content and format validity

- Developing shared lesson plans using the Payne Lesson Design
- Identifying science standards that involve mathematics

The science teachers also met with the math teachers during the first semester to identify the application of math skills to the science curriculum.

During the second semester, these sessions continued, with the aha! Process consultant also demonstrating lessons for the teachers and conducting classroom observations. The sessions focused on:

- Identifying target standards to focus on before testing
- Identifying target students based on math benchmarks
- Modifying time and content grids for the coming school year
- Completing 10-question tests
- Collecting activities for bell work that correspond to the standards being taught
- Developing and sharing mental models and step sheets for experimental design, data analysis, open-ended questions, and written reports

Social Studies

An aha! Process consultant provided eight technical-assistance sessions to social studies teachers, with each teacher receiving on average 4.5 days of technical assistance. During the first semester, technical assistance focused on:

- Developing 10-question tests
- Reviewing and revising time and content grids
- Working with the Payne Lesson Design

The social studies teachers also met with the language arts teachers during the first semester and participated in language arts data analysis. Students were identified who may benefit from social studies support for language arts. The social studies teachers participated in grading language arts essays and developing 10-question tests that would target standards for language arts.

During the second semester, the aha! Process consultant demonstrated lessons for the teachers and conducted classroom observations, in addition to the technical-assistance sessions. These sessions focused on:

- Reviewing benchmark scores and developing plans to address low scores
- Completing 10-question tests
- Revising time and content grids for the following school year

Non-Core

An aha! Process consultant provided four technical-assistance sessions to non-core teachers, with each teacher receiving on average 2.5 days of technical assistance. The technical assistance focused on:

- Reviewing the concepts from *A Framework for Understanding Poverty*, specifically discipline
- Using the Payne Lesson Design as a planning tool
- Developing a substitute teacher folder
- Planning for the following year

Methodology

The research design to determine impact on student achievement had two dimensions. The first dimension was establishing Model Fidelity at each school. Each experimental school must be implementing the model effectively for it to improve student achievement. The second dimension 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: (a) Grade 8: Two groups using the analysis of covariance to adjust for initial differences at an experimental school, using the model for two years, and a comparison school, using the model for only one year; (b) Grade 7: Two groups—a High Model Fidelity group and a Low Model Fidelity group—using the analysis of covariance to adjust for individual differences. Two approaches were necessary because of the data that were available for analysis.

Model Fidelity

The *Instructional Framework Scale—Observation* (2003) was used to assess the fidelity of the implementation of the Payne School Model. This instrument consisted of 47 indicators criterion-referenced to key model components/activities and was used by aha! Process consultants to determine the fidelity of the implementation of the model. The median inter-rater reliability for the instrument is .83, with a range from .72 to .95.

Analysis of Student Achievement Data

A post-test-only comparison design for two groups (experimental group—a school implementing the Payne School Model for two years; comparison group—a school implementing the Payne School Model for one year), using the analysis of covariance to adjust for initial differences between two groups, was used to determine the statistical impact of the implementation of the model on student achievement. The independent variable was the implementation or non-implementation of the model. The dependent variables were standardized test scores in both reading/English/language arts and mathematics. The covariates were prior test scores in reading/English/language arts and mathematics. Consistent with requirements of No Child Left Behind and corresponding state legislation, analyses were conducted for the total groups, as well as the five disaggregations (gender, race/ethnicity, LEP, socioeconomic status, and disability) when demographic descriptors were available. The level of statistical significance was set at $p < .05$.

The dependent variable for Grade 7 was the Mathematics standardized test scores—the standardized tests used by the Arkansas Department of Education for assessing student performance in Mathematics in 2004–05. The covariates were the related standardized tests in the same areas when these students were in Grade 6 in 2003–04. Additional information about these and other standardized tests are available through the Arkansas Department of Education (www.arkedu.k12.ar.us). Specific statewide data by system 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. [NOTE: No Literacy data were available for the seventh grade.] Analyses of disaggregation variables also were completed on available information.

The examination of the impact of the Payne School Model on Grade 8 in 2004–05 was completed through a comparison of the eighth-grade students at Ridgeroad Middle Charter School (where the model was in its second year of implementation), with the eighth-grade students at a comparison school in the same school district (which was in its first year of implementation of the model). The dependent variables were Literacy and Mathematics scores on Arkansas standardized tests in 2004–05. The covariate was the students' standardized test scores on the Mathematics and Literacy tests when the students were sixth-graders in 2002–03). [NOTE: 2004–05 was the first school year that a seventh-grade test had been administered in Arkansas.]

Results

The results are presented in two sections—Model Fidelity and Student Achievement.

Model Fidelity

aha! Process consultants used the *Instructional Framework Scale—Observation* (2003) to observe teachers at Ridgeroad Middle Charter School. This resulted in a total of 16 teachers being observed in Ridgeroad Middle Charter School in Grades 7 and 8. The Model Fidelity Scores ranged from 11% to 100%, with a median of 72%. No Model Fidelity data were obtained from the comparison school in its first year of implementation.

Student Achievement

Table 1 contains an overview summary of the results of the ANCOVA for the Mathematics scores in Grade 7. There was a statistically significant difference in the ANCOVA-adjusted means for Mathematics ($p < .029$) in favor of the High Model Fidelity group. Regarding analyses on disaggregation variables, there were no statistically significant differences between the two groups for Gender, Race (although the scores for Caucasian and Hispanic students were higher than for African American students), or poverty (as measured by participation/non-participation in Free/Reduced-Price School Lunch).

Tables 2 and 3 (see final page) contain the results of the ANCOVAs for the Mathematics and Literacy scores in Grade 8 for the comparison between the two schools. While the direction of the difference for the ANCOVA-adjusted means for Mathematics was in favor of the comparison school, the results were not statistically significantly different. The direction of

the difference for the ANCOVA-adjusted means for Literacy was both in favor of Ridgeroad Middle Charter School and was statistically significantly different at the $p < .04$ level.

Discussion

Discussion of these results is constrained by several factors. First, there was significant staff turnover at Ridgeroad Middle Charter School over the two years of project efforts. Second, complete data were not available for Grades 7 and 8, along with demographic descriptors for the disaggregation variables.

Regarding Grade 7, the statistically significant result for Mathematics in favor of the High Model Fidelity group reflects an improvement in the fidelity of implementation of the model and student performance in 2003–04. This is probably due to continued training and technical assistance, combined with a commitment from staff in implementing the model in an increasing high-quality manner.

Regarding Grade 8, the level of significance for student performance in Literacy has increased from 2003–04 for the comparison of these two schools—from $p < .058$ in 2003–04 to $p < .040$ in 2004–05. These results suggest that the training and technical assistance, along with staff commitment, have continued to improve the quality of implementation and its impact on student achievement. Concerning the results in Mathematics, the direction of the difference is in favor of the Comparison school. One explanation may be that the Comparison school is more highly focused on Mathematics than was Ridgeroad in 2004–05.

Recommendations

Based on these results, there are several recommendations that should be considered relative to examining the impact of the Payne School Model on student academic achievement.

1. Since this is the first multiple-year comparison concerning the impact of the Payne School Model, this set of results might be explored in more depth by examining the disaggregate variables if additional data can be obtained for 2004–05 and for continued study in 2005–06.

2. The Model Fidelity at the Comparison school could be examined to determine if differential levels of Model Fidelity are observed in the same school system based on continued implementation of the model at two different schools and whether such changes are linked to student achievement over time.

3. Following up the students from the first year of implementation at Ridgeroad might yield significant dividends in determining the impact of the Payne School Model over time, particularly as it relates to dropout prevention and academic achievement.

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Table 1

Summary of Results for ANCOVA for **Mathematics** in Grade 7—2004–05
North Little Rock Schools District (Arkansas): High Model Fidelity (HMF) vs. Other

Group	Sample Size	Covariate	ANCOVA – Adjusted Means	Direction of Difference	F	Probability
HMF	44	6th Grade	25.296	HMF > Other	4.862	p < .029*
Other			22.351			

* Statistically significant at p < .05

Table 2

Summary of Results for ANCOVA for **Mathematics** in Grade 8—2004–05
North Little Rock Schools District (Arkansas): Ridgeroad vs. Comparison School (Comp 1)

Group	Sample Size	Covariate	ANCOVA – Adjusted Means	Direction of Difference	F	Probability
Ridgeroad	150	6th Grade	142.607	Ridgeroad < Comp 1	1.725	P < .190
Comp 1	82		146.439			

Table 3

Summary of Results for ANCOVA for **Literacy** in Grade 8—2004–05
North Little Rock Schools District (Arkansas): Ridgeroad vs. Comparison School (Comp 1)

Group	Sample Size	Covariate	ANCOVA – Adjusted Means	Direction of Difference	F	Probability
Ridgeroad	151	6th Grade	184.855	Ridgeroad > Comp 1	4.250	P < .040*
Comp 1	82		179.718			