Fluency Formula

Second-Grade Study

Long Island, New York
2003–2004

Scholastic
Research &
Results

Executive Summary

A Summary of the Effectiveness Research for Fluency Formula

Full Report available at
www.scholastic.com/fluency

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ABSTRACT

An independent third party evaluation of Scholastic's Fluency Formula® was conducted during the 2003–2004 academic year in two suburban districts within close proximity to a major city in the northeastern United States. The primary purpose of this research was to investigate whether the addition of the Fluency Formula program to the regular second-grade language arts curriculum results in significantly greater student outcomes in fluency and comprehension.

This quasi-experimental scientific study employed random assignment at the classroom level to identify a total of 12 participating classrooms with six classes randomly assigned to the Fluency Formula condition and six to the control condition.

Results revealed that in comparing treatments, low ability students receiving *Fluency Formula* achieved a statistically significant, educationally exemplary learning advantage. low ability Fluency Formula students demonstrated growth that successfully moved them into the 50th percentile band, while the fluency skills of students in the low ability control group remained stagnant throughout the year.

Independent samples t-tests reveal that the low Ability Fluency Formula group scored significantly higher at posttest than the low Ability control group, $p < .001$ with an effect size of $d = .84$. Furthermore, paired samples t-tests confirmed the low ability Fluency Formula group's significant increase from pretest to posttest at $p < .001$, with an effect size of $d = .71$.

Comprehension results revealed a significant growth for both the low and high ability Fluency Formula students throughout the year. Although the differences between the Fluency Formula group and the control group were not statistically significant, changes in fluency were positively correlated with changes in comprehension.

Fluency Formula was universally well received by participating teachers and students. Fidelity of implementation was extremely high, as was students' engagement and motivation with the program.

This research reveals a fluency gap between lower and higher performing students, and provides evidence that Fluency Formula can help lower performing students begin to catch up in a single school year. Like many educational achievement gaps, the fluency gap is anticipated to widen over time if left untreated, and to impact more significantly on the complex matrix of skills comprising reading comprehension in the older grades. Further research should continue to explore the correlation between fluency and comprehension by tracking the performance of students with and without the benefits of Fluency Formula into third grade and beyond.

The Executive Summary provides an abbreviated review of this study. The full study and all outcomes variables are available at www.scholastic.com/fluency.

Introduction

Fluency Formula's Research Basis

Fluency is one of the five key components of reading instruction identified in the *Reading First* legislation. Currently, there is an increased national attention on fluency. The National Assessment of Educational Progress revealed that 44% of fourth-grade students lacked the fluency necessary for comprehending grade-level text, thus determining a "close relationship" between fluency and reading comprehension (National Institute of Child Health and Human Development, 2000a, pp. 1–3, citing Pinnell et al., 1995). In its explanation of this relationship, the NRP argued that "fluency helps enable reading comprehension by freeing cognitive resources for interpretation, but it is also implicated in the process of comprehension as it necessarily includes preliminary interpretive steps" (NICHHD, 2000a, pp. 3–6).

Scholastic Inc. developed Fluency Formula in response to a strong understanding of the critical role fluency plays in attaching meaning to text. The product is based upon research and recommendations outlined in the Report of the National Reading Panel (NICHHD, 2000) that fluency instruction, practice, and assessment are essential for bridging the gap between word recognition and comprehension. Fluent reading requires speedy recognition of words, decoding accuracy, and oral expressiveness (prosody)—the three pillars of the Fluency Formula program.

Based on its review of the research, the NRP recommended that teachers should assess fluency regularly, using both formal and informal methods (NICHHD, 2000a, pp. 3–4). There are two fundamental reasons why the regular assessment of oral reading fluency is essential for all students in the elementary grades. First, reading fluency has repeatedly been proven to be one of the best overall indicators of reading comprehension. Secondly, regularly assessing fluency assists teachers in quickly identifying students who may have a fluency weakness that requires additional instructional focus.

The product is based upon research and recommendations outlined in the Report of the National Reading Panel (NICHHD, 2000) that fluency instruction, practice, and assessment are essential for bridging the gap between word recognition and comprehension.

Overview of Fluency Formula

Scholastic's Fluency Formula was influenced by the work of Maryanne Wolf and her colleagues who incorporate a developmental approach to teaching fluency, whereby there is repeated oral reading coupled with phonics speed drills, phrase-cued text passages, one-minute fluency readers, intensive vocabulary work, and the inclusion of fluency norms for continuous assessment. Scholastic's Fluency Formula Kits include:

Direct Fluency Instruction Materials—Each kit provides all the components and detailed teacher guidance necessary to integrate fluency instruction into daily lesson plans, including strategic instruction for all students plus intervention plans for struggling readers.

• **The Fluency Assessment System**—The National Reading Panel recommends that fluency be assessed formally on a regular basis. Many states and districts now require Oral Fluency Assessments (OFAs) as a measure of adequate yearly progress. Scholastic's Fluency Formula Assessment System is a nationally normed and validated assessment from EdFormation that enables teachers to assess, diagnose, and tailor instruction to individual needs.

• **The Fluency Formula Library**—The Fluency Formula library of leveled books provides students with targeted independent fluency-building practice, as well as audio CDs to support students in reading aloud.

Purpose of Research

The primary purpose of this research project is to investigate whether the addition of the Fluency Formula program to regular second-grade language arts curriculum results in significantly greater student outcomes in fluency and comprehension, as well as improved reading attitudes. A secondary purpose is to collect and analyze data on teacher implementation of Fluency Formula, which can aid in the interpretation of learning outcomes findings and can inform future product development decisions.

Research Methodology

This study followed a pre-posttest, treatment-comparison, quasi-experimental design. One key element of the design was that pairs of intact classes of students, matched for ability and teacher experience, were randomly assigned to the experimental Fluency Formula treatment group and the control group. While random assignment occurred at the class level, data analysis was completed at the student level. Thus, this study should be categorized as a quasi-experimental design rather than an experimental design.

The experimental treatment group was comprised of six classes of second grade students that used Fluency Formula with their teachers (three classes from each of two districts). The control group included six classes of second grade students that did not use Fluency Formula (three classes from each of the same two districts), but rather remained with their school's standard reading/language arts program. By design, students received different intensities of Fluency Formula instruction based on pretreatment assessment of their oral fluency skills (as measured by the EdFormation Oral Fluency Assessment):

- Students scoring below the 50th percentile on the OFA pretest received four days of Fluency Formula instruction, including two days of small-group instruction.

- Students scoring at or above the 50th percentile on the OFA pretest received two days of Fluency Formula instruction, excluding the two days of small-group instruction.

One key element of the design was that pairs of intact classes of students, matched for ability and teacher experience, were randomly assigned to the experimental Fluency Formula *treatment group and the control group.*

Fluency Formula: Weekly Implementation Plan

Fluency Formula GROUPS	Whole-Class Instruction	Fluency Practice & Reinforcement	Intervention Small Group	Fluency Assessment
High Ability (OFA>50th percentile)	Day 1	Day 2	Not Applicable	Not Applicable
Low Ability (OFA<50th percentile)	Day 1	Day 2	Days 3 and 4	Day 5

Results

Fluency—NCE Analysis

Changes in oral fluency performance as measured by the Edformation Oral Fluency Assessment (OFA) Normal Curve Equivalent (NCE) scores at pretest compared to fluency NCEs at posttest were evaluated using a 2 (Time: Pretest vs. Posttest) x 2 (Fluency Condition: Fluency Formula Treatment vs. Control) x 2 (Initial Fluency Ability Group: Low vs. High) mixed-model design, with time serving as a within-persons variable, and fluency condition and ability as between-persons variables. (The pretest Woodcock-Johnson III Basic Reading score—a cluster score based on scores on the WJII Letter-Word Identification and Word Attack sub tests—was not used as a covariant in this analysis because the Fluency Formula experimental treatment and control groups did not differ significantly on this variable.[1]) In addition, district, gender, ethnicity (white vs. all others), and free/reduced lunch were not included in the final analysis reported below, as none of these variables interacted with the primary interaction of interest (fluency condition x time).

Results revealed a significant main effect of time.[2] On average, NCE scores increased from pretest to posttest.[3] More importantly, results also revealed a significant interaction between time, fluency condition, and initial ability level.[4] Means and standard deviations for the three-way interaction are presented in Table 1, and means for the interaction are plotted in Figure 1.

| Table 1. Oral Fluency NCE Scores at Pretest and Posttest as a Function of Initial Fluency Ability Group and Fluency Treatment Condition								
	Low Initial Ability				High Initial Ability			
	Control		Fluency Formula Treatment		Control		Fluency Formula Treatment	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
M	33.59	33.70	35.98	42.59	53.80	55.74	54.24	54.07
SD	10.79	11.10	8.71	10.02	3.70	7.57	3.38	8.03
N	35	35	37	37	27	27	29	29

[1] p = .30
[2] F(1, 124) = 8.51, p < .01
[3] The increase was from M = 43.22, SD = 12.26 at pretest to M = 45.53, SD = 12.94 at posttest.
[4] F(1, 124) = 8.76, p < .01

**Figure 1. Oral Fluency NCE Scores at Pretest and Posttest as a
Function of Fluency Treatment Condition and Initial Fluency Ability Level**
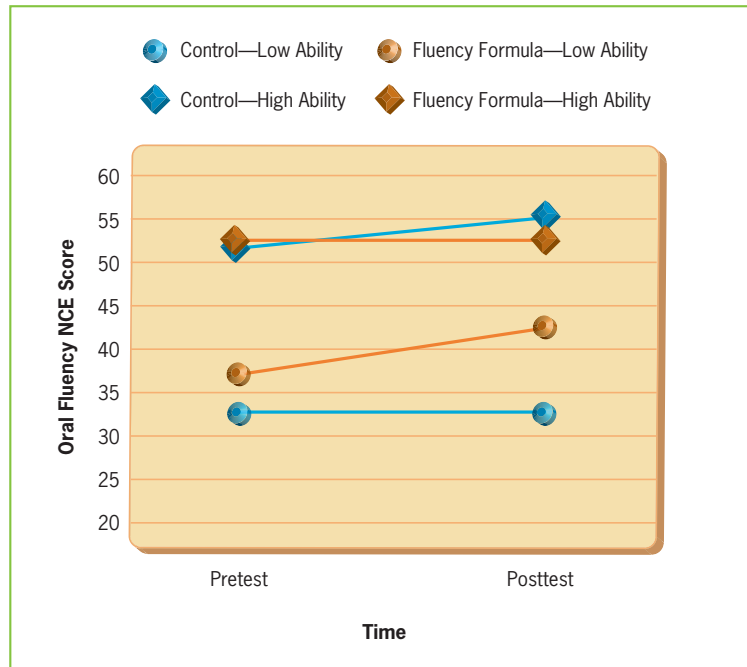
As can be seen in Figure 1, the group that demonstrated the largest increase in oral fluency over time was the low initial fluency ability/Fluency Formula treatment group. Follow-up tests were used to evaluate the significance of the increase from pretest to posttest in each of the four groups, and differences between the control and Fluency Formula treatment groups (within each ability group) at pretest and posttest. Paired samples t-tests revealed a significant increase from pretest to posttest in the low ability Fluency Formula treatment group,[5] with an effect size (d = .71) qualifying as an educationally meaningful difference. Comparisons within the remaining three groups were not significant.[6] Independent samples t-tests were used to compare the control and Fluency Formula treatment groups within each ability group. At pretest, the control and treatment groups did not differ significantly within either the low ability or the high ability groups.[7] At posttest, within the low ability group, the Fluency Formula treatment group scored significantly higher than the control group.[8] The effect size for this difference was d = .84, considered a large, educationally significant effect by most educational researchers. Within the high ability group, the treatment and control groups did not differ significantly.[9]

[5] mean change = 6.60, t(36) = 4.24, p < .001
[6] All ps > .13
[7] p = .30 for the low ability group and p = .64 for the high ability group
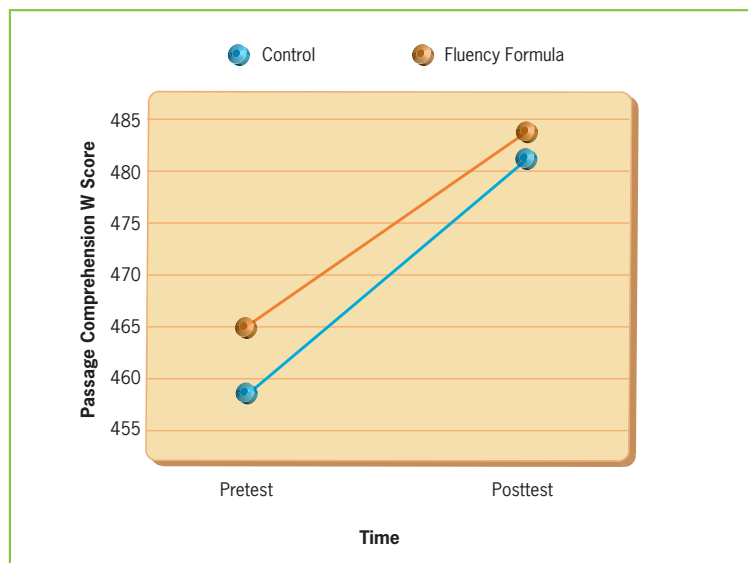[8] t(70) = 3.57, p < .001
[9] p = .43

Comprehension—W Scores Analysis

Changes in passage comprehension as measured by the Woodcock-Johnson III Passage Comprehension test (W scores at pretest to W scores at posttest) were evaluated using the same 2 (Time: Pretest vs. Posttest) x 2 (Fluency Condition: Fluency Formula Treatment vs. Control) x 2 (Initial Fluency Ability Group: Low vs. High) mixed-model design described previously. This analysis yielded a significant main effect for time,[10] with scores for both groups significantly higher at posttest than at pretest.[11] The analysis also yielded two noteworthy interactions. The interaction between time and fluency condition approached but did not reach the p = .05 level of significance,[12] with students in the control condition demonstrating a somewhat larger increase from pretest to posttest than did students in the Fluency Formula treatment condition.[13] However, the effect size for this difference (d = .29) did not reach the level of educational significance. These results are presented in Figure 2 below.

The significant interaction between time and ability group,[14] revealed that the low ability groups achieved a larger increase from pretest to posttest than did students in the high ability groups.[15] The effect size for this difference (d = .47) met the criterion for educational significance. However, the three-way interaction between time, fluency condition, and initial ability group was far from significant.[16]

Figure 2. Woodcock–Johnson III Passage Comprehension W Scores as a Function of Condition and Time

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Fidelity to the Fluency Formula Model

Teachers participated as fully as the district schedule would permit. On each day, overall adherence to the Fluency Formula instructional model across the classrooms was high. Adherence to the instructional plan for Days 1, 3, and 4 was excellent. Adherence to the instructional plan for Day 2 was good (with most teachers emphasizing all but one of the specified instructional areas, and the others emphasizing all the specified instructional areas). In most classes, the majority of the Fluency Formula materials were observed somewhere in the classroom. By the Units 5 and 6 observations, there was an obvious dedicated fluency corner in most classrooms.

In all of the classrooms, students were observed to be motivated, engaged, and enjoying the Fluency Formula program. During fidelity of implementation observations, several teachers expressed satisfaction with or enthusiasm about Fluency Formula.

Fluency Formula was universally well received by participating teachers and students. Fidelity of implementation was extremely high, as was students' engagement and motivation with the program

Teacher Reaction to Fluency Formula

Teachers praised the major Fluency Formula techniques: Partner Reading, Choral Reading, Expressive Reading, Reader's Theater, Repeated Reading, and Expert Reading. Across all six units, the highest rated Fluency Formula instructional strategy was Teacher Modeling, followed by Audio-assisted Reading with Practice and Expert Reading Speeds, Building Phonics Fluency, Introducing and Practicing Sight Words, and Flipchart Word Lists. In addition, teachers provided extensive positive feedback on the Read Aloud Anthology readings and the books from the Fluency Formula library.

Throughout the year, teachers specifically commented that they observed fluency skills transferring to other reading situations and content areas. In addition, students were observed by teachers to pay more attention to punctuation and to read with greater expression as a result of participating in the Fluency Formula program.

Conclusion

Fluency Formula has been proven to be a successful instructional program for low fluency ability students that can be implemented into regular classroom settings with a mix of ability levels.

Fluency Formula significantly increased oral reading fluency among students who initially scored low in fluency ability. Students in the control condition who also scored low in initial fluency ability demonstrated no such increase. In comparing the two treatments, there was a statistically significant, educationally meaningful learning advantage for low fluency ability students receiving Fluency Formula instruction. In addition, changes in fluency were positively and strongly correlated with changes in passage comprehension. In other words, students' improvements in fluency tended to correspond with improvements in reading comprehension.

This research reveals a fluency gap between lower and higher performing students, and provides evidence that Fluency Formula can help lower performing students begin to catch up in a single school year. Like many educational achievement gaps, the fluency gap is anticipated to widen over time if left untreated, and to impact more significantly on the complex matrix of skills comprising reading comprehension in the older grades. Further research should continue to explore the correlation between fluency and comprehension by tracking the performance of students with and without the benefits of Fluency Formula into third grade and beyond.

Fluency Formula was proven successful at closing the gap for lower performing students who received its targeted fluency instruction and reinforcement.

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About Interactive Educational Systems Design (IESD), Inc.
Interactive Educational Systems Design (IESD), Inc. provides a variety of services related
to the marketing, evaluation, and development of educational software, multimedia products,
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President and Vice President. IESD's clients include software publishers, technology
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