Abstract Title Page

Title: The Effects of a Parsimonious Comprehension and Vocabulary Intervention on Student Learning

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Abstract Body
Limit 5 pages single-spaced.

Background/context:

The national investment in the science of reading is producing converging evidence in how reading is taught. Implicit in this reform is a substantive need to translate this evolving knowledge base into the practices of teachers. This study evaluated the potential efficacy of content- and case-situated professional development that is built on the Fourth Grade Texas Reading Academies (Texas Center for Reading and Language Arts, 2003), situated in classroom applications, and supported by face-to-face institutes, technology-based online mentoring, and in-school learning communities. Our model was designed to increase implementation of proven content-area instructional strategies and to build a research base to inform the design of effective professional development.

Teachers face a particular challenge in helping students access and make sense of content and concepts in content-area text. As a curriculum area driven by content coverage unlike any other, social studies teachers must mediate for students the inconsiderateness of informational text (Ambruster & Anderson, 1984). It is unreasonable to expect that teachers have the sole responsibility for addressing the challenges of social studies textbooks. Yet, teachers who know which instructional strategies facilitate comprehension of informational text will be better prepared to modify and enhance such materials. Professional development is a primary avenue to support teachers' learning and practice in discerning important concepts, and in designing instruction to communicate the network of ideas in content-area texts. Large numbers of practicing professionals, however, have not received adequate or current preparation in evidence-based instructional strategies that promote reading comprehension in the content areas (Rand Reading Study Group, 2002). A core issue is how to provide professional development that is usable and effectively connected to teachers' work (National Science Education Standards, 2004).

Recent action documents and reviews of educational research have identified the need for additional high quality studies in vocabulary and comprehension strategy instruction (RAND, 2002) and content area literacy instruction (Heller & Greenleaf, 2007; Baxter & Reddy, 2007). Current research on effective vocabulary instruction has contributed to our growing knowledge base (e.g., Baumann et al., 2003), yet we still know considerably less about effective vocabulary instruction than we do comprehension strategy instruction, particularly within the context of content-area instruction. And although the body of literature on comprehension instruction is more robust and effective practices have been identified (NRP, 2000; RAND, 2002), the applicability of such practices to older readers and within the content areas is less established.

To help address these gaps in the research, the Institute of Education Sciences has funded large-scale studies on the efficacy of comprehension and vocabulary instruction in middle and upper elementary classrooms, with a particular focus on approaches intended to enhance comprehension of expository text. The study presented here contributes to this research by examining the relative effects of comprehension and vocabulary instruction both alone and in combination when integrated into social studies instruction.

In our intervention model, 4th grade teachers integrated comprehension strategies *or* vocabulary instruction into the existing social studies curriculum. In our original study, students in the intervention classrooms scored significantly higher on a general measure of comprehension achievement than students in the "business as usual" condition (Simmons et al., in review). When the two intervention conditions (comprehension and vocabulary) were compared, students who received direct vocabulary instruction outperformed their peers on a curriculum-based measure of vocabulary (Simmons et al., in review). Interestingly, there were no significant differences on a general measure of comprehension between the two intervention conditions, indicating that comprehension is not compromised when vocabulary is emphasized during social studies instruction.

As a follow-up to last year's presentation (*Examining the Effects of a Content- and Case-based Professional Development Model on Teachers' Practices and Students' Comprehension and Content Acquisition),* we present a revised intervention model. To improve the intervention's scalability, we incorporated both comprehension and vocabulary strategies into one model. Although results from the initial study indicated that participation in strategy-focused content-area instruction was effective, combining all the comprehension and vocabulary practices from both conditions for subsequent study would have doubled the time needed for professional development and increased the instructional requirements during the already limited time available for social studies. Therefore, we created a parsimonious hybrid model, combining select elements from both conditions based on teacher feedback and the literature on effective instruction. The new model, *STrategies for Reading Information and Vocabulary Effectively* (STRIVE), incorporated explicit vocabulary instruction, word-learning strategies, and three core comprehension strategies (i.e., previewing, questioning and get the gist).

Purpose/objective/research question/focus of study:

The purpose of this study was to examine the relative effects of the single-focus interventions (vocabulary and comprehension) and the streamlined multi-component model. The program of research included a development and pilot phase, an initial experimental study and a follow-up study to further refine and test the model. Results presented here are from the follow-up experimental study. Specific research questions were:

1. What are the effects of a comprehension-focused intervention and a vocabulary-focused intervention when compared to typical practice on measures of comprehension, social studies vocabulary and social studies content knowledge?
2. What are the effects of the streamlined, parsimonious STRIVE model when compared to typical practice on student outcomes?
3. What are the effects of the streamlined, parsimonious STRIVE model when compared to the single-focus (comprehension or vocabulary) intervention models?
4. What are teachers' perceptions of the STRIVE model's feasibility and practicality?

Also of interest was the effect of multiple years of professional development on teachers' instructional quality and student outcomes. Specifically, are there differential student effects when teachers participate in two years of professional development in vocabulary and comprehension strategies?

Setting:

This research was conducted in 15 schools in two urban districts over two years. All teachers who taught fourth-grade social studies, including those who provided special education support, were eligible to participate. Instructional organization within each school included departmentalized, self-contained, and team-teaching formats.

Population/Participants/Subjects:

In the 2006-2007 school year, a total of 49 fourth-grade social studies teachers and 883 students participated. Teachers were part of the comprehension (n = 17), vocabulary (n = 18) or comparison (n = 14) group.

In the 2007-2008 school year, 45 fourth-grade social studies teachers and 527 students participated. Of the 35 teachers who participated in the STRIVE model, 17 were Experienced (receiving two years of professional development) and 18 were Novice (receiving one year of professional development). A historical control group of ten teachers and 192 students was used from the 2006-2007 school year.

Among District A schools, 37.8% of the students are Hispanic, 34.9% White, and 26.5% African American. Overall, 60.2% are considered economically disadvantaged, with 10.8% of the students English language learners. The school population of District B is largely minority: 67% Hispanic, with ethnic and cultural ties to Mexico, 15% African American, and 17% White. More than 70% of the students receive federal lunch subsidies.

Intervention/Program/Practice:

Participating teachers in both years were provided similar professional development experiences. Comparison teachers did not participate in professional development. Teachers were asked to implement the individual strategy intervention models or the STRIVE model over an 18-week intervention time frame for approximately 90 minutes per week.

In Year 1, professional development was delivered separately for teachers in each treatment condition and was distributed through a case-model over a 20-week period (before intervention and during intervention). The case-based design was intended to scaffold both teacher and student learning by introducing practices over time, with new content in each case building upon previously learned teaching and learning strategies. In addition to face-to-face sessions, teachers participated in school-based collaborative teacher-study teams for a total of 6 professional development sessions. Total professional development time was approximately 16 hours. Teacher study teams consisted of teachers from the same condition and offered opportunities for participants to discuss implementation, receive feedback from colleagues and intervention developers, and problem-solve challenges encountered during each 6-week case.

In Year 2, professional development for the STRIVE model also used the same scaffolded, case-model as in Year 1. Teachers participated in one initial professional development session, followed by three booster sessions held midway through the case, for a total of approximately 15

hours of professional development. In addition to the face-to-face sessions, teachers received on-line support.

In Year 1, the social studies intervention featured core practices for each domain (vocabulary and comprehension) and featured weekly routines to increase feasibility of use. In Year 2, the STRIVE model integrated vocabulary and comprehension practices into one parsimonious routine. Core practices for each condition are outlined in Table 1. All student and teacher materials, including lesson plans, student learning logs and vocabulary maps and sample scripts to support implementation were provided. Lessons followed the districts' social studies scope and sequence and were closely linked to the already-established curriculum and standards. Fidelity was established through audio-tapes of teacher instruction.

Research Design:

The initial study (2006-2007) was a randomized control trial with schools matched on demographics and randomly assigned. In the second year (2007-2008), all teachers received professional development, resulting in Experienced and Novice groups. The control group from 2006-2007 was retained as the historical control. The primary focus was on teachers, with student data serving as indicators of professional development impact. All students in participating teachers' classrooms received standard amounts of social studies instruction as recommended by district and state standards.

Data Collection and Analysis:

- ***Gates-MacGinitie Reading Test (Riverside Publishing): Comprehension subtest.*** The Gates-MacGinitie is a standardized, group administered survey of reading. Its purpose is to measure student achievement in reading.
- ***Curriculum-based Measurement in the Content Areas – Vocabulary Matching (Espin, Busch, Shin, & Kruschwizt, 2001.)*** The vocabulary CBM was used as an indicator of vocabulary and comprehension of expository text. The CBM vocabulary-matching measure was a timed, fluency-based measure in which students matched vocabulary from the social studies text with short definitions or phrases associated with the word.
- ***District developed unit tests.*** The multiple-choice unit test aligned with the content of the adopted social studies text was administered after each unit of study as a measure of content knowledge.

Findings/Results:

Both the single-focus vocabulary intervention and the STRIVE model resulted in significant and large effects on the curriculum-based measure of social studies vocabulary. These results indicate that comparable effects can be achieved with a more parsimonious intervention, one in which vocabulary is a central but not singular focus. Whether students received the comprehension, vocabulary, or multi-component intervention, their comprehension did not significantly differ from the comparison students. However, the comprehension measure used was a distal measure of general comprehension achievement that may not have been sensitive enough to detect changes from the 18-week interventions.

There were several significant differences on the vocabulary and content measure. When comparing STRIVE to typical practice on measures of vocabulary acquisition, effects were large (5.343, $p < .01$). However, there were no significant differences in content learning, indicating that STRIVE increased vocabulary learning without sacrificing content learning. When comparing STRIVE to vocabulary only and comprehension only, analyses indicate that the STRIVE model significantly outperformed single-component interventions on the content measure (See Table 2). Regarding vocabulary acquisition, STRIVE resulted in significant differences when compare to comprehension only (3.473, $p < .05$); however, when compared to vocabulary only, results favored the vocabulary only condition (2.902, $p < .05$). The revised model was favorably viewed and remedied the problem of emphasizing comprehension strategy instruction during social studies without consideration for meaningful vocabulary instruction and vice versa. STRIVE also resulted in significantly greater content acquisition.

Unlike previous studies of comprehension interventions (Simmons, et al., in review), we did not find significant results on our comprehension outcome. There are two plausible explanations. First, as mentioned previously, the intervention dosage of 90-minutes a week for 18 weeks may not have been sufficient to affect change in students' comprehension skills as measured by a general, standardized comprehension assessment. Secondly, unlike many intervention studies, we did not establish a threshold for a minimally acceptable level of implementation nor did we intervene with low implementers. Previous research has found that teacher implemented interventions generally yield lower effects (Swanson, 1999). Although prior analyses indicated that level of fidelity did not explain variance in student outcomes and was thus not included in the analyses presented here, there is a possibility that other aspects of implementation fidelity not captured by our fidelity ratings (e.g., implementation quantity or procedural accuracy) may have played a role in the lack of change in comprehension.

The results indicating that additional professional development (Experienced STRIVE v. Novice STRIVE) did not result in any significant effects were surprising. Previous studies indicate sustained professional development is necessary to improve student outcomes.

Conclusions:

The results of this study reveal that a parsimonious comprehension and vocabulary intervention was effective. Initial focus on single-component instruction was designed to help students gain access to content-area text. When vocabulary and comprehension strategies were combined into a parsimonious intervention, students not only improved in vocabulary knowledge, but also in social studies content knowledge.

Among the lessons learned were the difficulties of measuring student vocabulary and content-knowledge learning. Vocabulary measurement was a hurdle. Because of the conceptual nature of content vocabulary, the depth of understanding of a word may be just as important as the number of words known. Currently, standardized measures of content-area vocabulary are rare; and when available are not closely related to classroom curriculum. A second challenge was the measurement of content-knowledge acquisition. District-developed tests are often fact-based and limited in scope. Additionally, these tests are unable to measure incremental changes in content knowledge. A more basic issue is a lack of convergence of what content-knowledge should be taught, and therefore, assessed.

Appendixes

Appendix A. References

Armbruster, B. B., & Anderson, T. H. (1984). Structures of explanations in history textbooks or so what if Governor Stanford missed the spike and hit the rail? *Journal of Curriculum Studies, 16,* 139-161.

Baumann, J. F., Kame'enui, E. J., & Ash, G. E. (2003). Research on vocabulary instruction: Voltaire redux. In J. Flood, D. Lapp, J. R. Squire & J. M. Jensen (Eds.), *Handbook of research on teaching the English language arts* (pp. 752-785). Mahwah, NJ: Erlbaum.

Baxter, S., & Reddy, L. (2007). *What content-area teachers should know about adolescent literacy*. Jessup, MD: National Institute for Literacy.

Chall, J.S., Jacobs, V.A., & Baldwin, L.E. (1990). The reading crisis: Why poor children fall behind. Cambridge, Mass.: Harvard University.

Cromley, J. G., & Azevedo, R. (2007). Testing and refining the direct and inferential mediation model of reading comprehension. *Journal of Educational Psychology, 99,* 311-325.

Espin, C. A., Busch, T. W., Shin, J., & Kruschwitz, R. (2001). Curriculum-based measurement in the content areas: Validity of vocabulary-matching as an indicator of performance in social studies. *Learning Disabilities Research & Practice, 16*(3), 142-151.

Heller, R., & Greenleaf, C. (2007). *Literacy instruction in the content areas: Getting to the core of middle and high school improvement.* Washington, DC: Alliance for Excellent Education.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Washington, D.C.: National Institute of Child Health and Human Development.

National Science Education Standards. (2004). *Standards for science teacher preparation*. Retrieved January 18, 2008, from www.nsdc.org/standards/index.cfm

Rand Reading Study Group. (2002). *Reading for understanding: Toward a RAND program in reading comprehension*. Santa Monica, CA: RAND.

Simmons, D. C., Hairrell, A., Edmonds, M., Vaughn, S., Willson, V. & Rupley, W. (under review). Effects of Teachers' Professional Development on Fourth-Grade Students' General and Content-Specific Reading Comprehension and Vocabulary Development.

Swanson, H. L. (1999). Instructional components that predict treatment outcomes for students with learning disabilities: Support for a combined strategy and direct instruction model. *Learning Disabilities Research and Practice, 14*(3), 129-140.

Willson, V. L., & Rupley, W. H. (1997). A Structural Equation Model for Reading Comprehension Based on Background, Phonemic, and Strategy Knowledge. *Scientific Studies of Reading, 1*(1), 45-63.

Appendix B. Tables and Figures
Not included in page count.

Table 1. Core practices in he featured professional development and intervention

	Comprehension Only Model	**Vocabulary Only Model**	**STRIVE Model**
Case 1	• Preteaching proper nouns and previewing • Self-questioning strategy	• Explicit vocabulary instruction using semantic organizers • Vocabulary practice activities	• Self-questioning strategy • Previewing • Explicit vocabulary instruction using semantic organizers • Main idea strategy instruction (Get the Gist)
Case 2	• Case 1 practices plus main idea strategy instruction (Get the Gist)	• Case 1 practices plus activities to activate background knowledge	• Case 1 practices plus word-learning strategies (using context clues to determine word meaning)
Case 3	• Case 1 and 2 practices plus summary writing using graphic organizers.	• Case 1 and 2 practices plus additional more challenging types of context clues	• Case 1 and 2 practices plus summary writing using graphic organizers.

Table 2. Results of model comparisons

Comparison	Sample	Results (with effect size)
Vocabulary Only to Typical Practice	***Year 1 (2006-2007)*** V: *N* = 18 TP: *N* = 14	***Gates-MacGinitie Reading Test: Comprehension subtest***: Not significant ***Vocabulary CBM***: Significant at .01 level (5.363) ***District Social Studies content:*** Indirectly significant through Teacher Quality. Quality effect (1.173)
Comprehension Only to Typical Practice	***Year 1*** C: *N* = 17 TP: *N* = 14	***Gates-MacGinitie Reading Test: Comprehension subtest***: NS ***Vocabulary CBM***: NS ***District Social Studies content***: (2.378)
STRIVE to Typical Practice	***Year*** 1 TP: *N* = 10 (4 teachers moved to STRIVE condition) ***Year 2 (2007-2008)*** STRIVE: *N* = 35	***Gates-MacGinitie Reading Test: Comprehension subtest***: NS ***Vocabulary CBM***: Significant at .01 level (5.343) ***District Social Studies content:*** NS
STRIVE to Vocabulary Only	***Year*** 1 V: *N* = 15 ***Year 2*** STRIVE: *N* = 35	***Gates-MacGinitie Reading Test: Comprehension subtest***: NS ***Vocabulary CBM***: Significant at .05 (2.902) in favor of Vocabulary only ***District Social Studies content***: Significant at .01 (4.597) in favor of STRIVE
STRIVE to Comprehension Only	***Year*** 1 C: *N* = 16 ***Year 2*** STRIVE: *N* = 35	***Gates-MacGinitie Reading Test: Comprehension subtest***: NS ***Vocabulary CBM***: Significant at .05 (3.473) in favor of STRIVE ***District Social Studies content***: Significant at .05 (4.333) in favor of STRIVE
STRIVE Experienced v. STRIVE Novice	**Year 2** Experienced: *N* = 17 Novice: *N* = 18	***Gates-MacGinitie Reading Test: Comprehension subtest***: NS ***Vocabulary CBM***: NS ***District Social Studies content***: NS