An Abbreviated Report on Houghton Mifflin Harcourt's *Write Source Online's* Effects on Student Writing Skills

Prepared by:

Miriam Resendez, Senior Researcher

Dr. Mariam Azin, President

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PRES Associates, Inc.

Planning, Research & Evaluation Services

This report focuses on student outcomes in writing skills. A full report that includes survey data and qualitative feedback is available from PRES Associates.

For inquiries, please contact PRES Associates at:

info@presassociates.com

(307) 733-3255

Executive Summary

In recent years it has become increasingly apparent that good writing skills are a requirement for continued success in both academic and personal pursuits and that acquiring these skills must begin at an early age. While the nation as a whole has made some progress towards identifying and addressing the need for critical writing skills for all students, for example through a nearly nationwide adoption of the Common Core Standards, there is still a great need for research based writing curriculum. In order to address the gap in 21st century driven writing curriculum, Houghton Mifflin Harcourt redesigned its text-based Write Source Online program to a fully personalized digital language arts program covering all of the Common Core Writing, Language, Listening, and Speaking standards. This program was specifically developed to help all levels of students achieve proficiency in writing using cutting edge technology tools and 21st century skills.

To determine the efficacy of the Write Source Online, Planning, Research, and Evaluation Services (PRES) Associates, Inc. conducted a one-year randomized control trial (RCT). This study, which commenced in the Fall of 2012, was conducted in the 6-8th grades during the 2012-2013 school year. This report presents the findings from this study.

A total of 9 middle schools participated in the study. The final sample consisted of 1813 students (805 control; 1008 treatment) with 39 teachers/classes (19 control; 20 treatment). Teachers or their classes were randomly assigned to conditions (either use of the Write Source Online program or continued use of the writing curricula currently available at the school).

Major findings, organized by the key evaluation questions, include:

Do writing skills improve over the course of participating in Write Source Online? Does this vary by different types of students and levels of implementation?

Results showed significant growth over the course of the school year as measured by the national, standardized ITBS Written Expression and Iowa Writing tests. Write Source Online students grew by 3.9 percentile points on the Iowa Writing Test and by 5.6 percentile points on the ITBS Written Expression subtest.

All subpopulations of students using Write Source Online showed significant writing gains on one or both of the tests as well. In particular, students in all subpopulations showed significant writing gains on the ITBS Written Expression subtest, and a noteworthy number showed significant gains on the Iowa Writing Test. In sum, generally females and males, minorities and non-minorities, students receiving free/reduced lunch and those not, students in special education and those not, and students at various grade and ability levels showed significant gains in writing skills.

Analysis by Write Source Online implementation level showed that there was a relationship between teacher's level of implementation of the program and writing performance. Specifically, students whose teachers used the Write Source Online program with moderate and high fidelity showed the highest levels of gains as compared to teachers who used the program with low levels of fidelity as measured by the Iowa Writing Test. On the ITBS Written Expression subtest, all teachers, regardless of implementation level, showed significant writing gains.

Do gains in writing skills differ between students using Write Source Online as compared to similar students using other language arts program(s)?

Write Source Online students significantly outperformed students using other writing programs as measured by the Iowa Writing Test. Indeed, although treatment students started out at a lower level than control students on the pretest , Write Source Online students subsequently surpassed control students at post-testing. A similar pattern was observed on the ITBS Written Expression subtest, but such differences were not significant. As a reminder, the Iowa Writing Test measures students' ability to generate, organize, and express ideas via a rubric-scored authentic writing piece. In contrast, the ITBS measures students' ability knowledge of writing mechanics and grammar via multiple-choice questions. The results suggest that Write Source Online may be more sensitive in impacting students' holistic writing skills as compared to specific writing abilities.

Results by Iowa Writing Test rubric categories showed that Write Source Online students significantly outperformed control students in the areas of Voice and Conventions. Similar patterns were observed in Organization and Ideas; however, differences between groups were not statistically significant. The effect sizes obtained can be classified as small to moderate (d=.15 to .30) – however, only one effect exceeded the threshold (.25) for educational significance – the effect on the Iowa Writing Test category for Voice. While these can be classified as small effects, it should be noted that such small effects are typical of educational curricular research conducted in real-world applied settings, particularly when comparisons are being made across curricula covering similar content matter and implemented across classrooms following comparable pacing guidelines. After all, writing instruction occurs within a language arts/English classroom where reading instruction (which was the same regardless of group) also took place. Additionally, such small effects are not surprising given that teachers and students had only used Write Source Online for one school year and they typically only used the program 2-4 days per week, depending on class time. It takes time for teachers to become familiar with any program and for effects, if present, to fully manifest themselves in terms of student performance.

These effect sizes translate to Write Source Online students performing 6 percentile points higher than the average of control students on the Iowa Writing Test. Examination of effect sizes by the Iowa Writing Test rubric categories showed that Write Source Online students were 12 percentile points higher in the category for Voice and 8 percentiles higher in Conventions.

Do effects of Write Source Online on student performance vary as a function of different student or school level characteristics? That is, do study findings vary across different types of students, at different grade or ability levels, from diverse educational contexts or settings?

Analysis of subgroup differences also showed positive effects on student writing performance. Specifically, results showed significant differences on the Iowa Writing Test between Write Source Online students and control students in the following subgroups: African Americans and Whites, 7th graders, Special Education students, and students classified as "average ability" via the pretest. In all these cases, Write Source Online students showed greater performance

gains than control students from the same subgroup. In addition, Write Source Online 6th graders and students classified as high ability based on pretest performance outperformed control students in these subgroups on the ITBS Written Expression subtest. Only one negative effect was observed; 6th grade control students had significantly higher scores than Write Source Online students on the Iowa Writing Test.

In sum, students who used Write Source Online showed significantly greater gains as compared to students using other writing programs. In addition, with the exception of one effect, subgroup effects were in favor of Write Source Online students. While the vast majority of effects were observed on the Iowa Writing Test which provides a more authentic, holistic measure of writing ability, positive subgroup effects were also observed on the ITBS Written Expression subtest. Such consistency in findings across multiple outcome measures and subpopulations indicates that the Write Source Online program is effective in helping students attain important writing skills.

In sum, results from this RCT show that students who use the Write Source Online program perform significantly better than students using other writing programs. Furthermore, the consistency of positive effects in favor of the Write Source Online program across multiple outcomes and subgroups supports the conclusion that the Write Source Online program has a positive impact on student performance relative to other writing programs.

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Project Background

"Today, in the 21st Century, people write as never before – in print and online. We thus face three challenges that are also opportunities: developing new models of writing; designing a new curriculum supporting those models; and creating models for teaching that curriculum. Historically, we humans have experienced an impulse to write; we have found the materials to write; we have endured the labor of composition; we have understood that writing offers new possibility and a unique agency. Historically we composers pursued this impulse to write in spite of – in spite of cultures that devalued writing; in spite of prohibitions against it when we were female or a person of color; in spite of the fact that we – if we were 6 or 7 or 8 or even 9 – were told we should read but that we weren't ready to compose. In spite of. It's time for us to join the future and support all forms of 21st century literacy, inside school and outside school."

- "Writing in the 21st Century", a report from the National Council of Teachers of English

In recent years it has become increasingly apparent that good writing skills are a requirement for continued success in both academic and personal pursuits and that acquiring these skills must begin at an early age. Indeed, the 2007 Survey on Teaching Writing, conducted for The National Writing Project, reveals that a majority of Americans believe good writing skills are more important than ever and that learning to read and write goes hand in hand. Results also show that learning to write well is perceived as a key ingredient to acquiring other skills such as communications, grammar and critical thinking, and more than four fifths of American's surveyed believe students should learn to write well as a requirement for high school graduation. Unfortunately, the reality of writing skills in our nation's schools is bleak. The Nation's Report Card: Writing 2011, prepared by the National Center for Education Statistics (NCES), reports that only an alarming twenty-seven percent of students in grades 8 and 12 performed at the *Proficient* or higher level in writing in 2011. This means that an overwhelming majority of students tested in grades 8 and 12 were unable to "clearly demonstrate an ability to accomplish the communicative purpose of their writing."

"Adolescents entering the adult world in the 21st century will read and write more than at any other time in human history. They will need advanced levels of literacy to perform their jobs, run their households, act as citizens, and conduct their personal lives."

- Richard Vaca, author of Content Area Reading: Literacy and Learning Across the Curriculum

While the nation as a whole has made some progress towards identifying and addressing the need for critical writing skills for all students, for example through a nearly nationwide adoption of the Common Core Standards, there is still a great need for research based writing curriculum. As educators strive to meet these new, rigorous standards in writing, they require 21st century curriculum that supports their aligned goals and efforts.

"The ability to write logical arguments based on substantive claims, sound reasoning, and relevant evidence is a cornerstone of the writing standards, with opinion writing—a basic form of argument—extending down into the earliest grades. Research—both short, focused projects (such as those commonly required in

the workplace) and longer term in depth research —is emphasized throughout the standards but most prominently in the writing strand since a written analysis and presentation of findings is so often critical."

-The Common Core State Standards

In order to address the gap in 21st century driven writing curriculum, Houghton Mifflin Harcourt redesigned its text-based Write Source program to a fully personalized digital language arts program covering all of the Common Core Writing, Language, Listening, and Speaking standards. The program was designed to help students master the writing process; six Traits of writing; writing for different purposes; and grammar, language usage and mechanics skills. This program was also specifically developed to help all levels of students achieve proficiency in writing using cutting edge technology tools and 21st century skills.

To determine the efficacy of the Write Source Online, Planning, Research, and Evaluation Services (PRES) Associates, Inc. conducted a one-year randomized control trial (RCT). This study, which commenced in the Fall of 2012, was conducted in the 6-8th grades during the 2012-2013 school year. What follows is a report presenting findings from the 2012-2013 RCT.

Project Overview

The overarching purpose of this study is to rigorously evaluate the effectiveness of the Write Source Online program in helping middle school students attain important writing skills. Specifically, this study is designed to address the following research questions:

- Do writing skills improve over the course of participating in Write Source Online? Does this vary by different types of students and levels of implementation?
- Do gains in writing skills differ between students using Write Source Online as compared to similar students using other language arts program(s)?
- Do effects of Write Source Online on student performance vary as a function of different student or school level characteristics? That is, do study findings vary across different types of students, at different grade or ability levels, from diverse educational contexts or settings?

This report presents descriptive information and results of the RCT. Specifically, the remainder of this report includes: 1) a description of the design and methodology; 2) sample and site information, including descriptions of Write Source Online implementation; 3) results of the evaluation; and 4) conclusions. In addition, Appendix A contains detailed statistical results of all baseline, attrition and assessment analyses conducted on the data, including the analytical goals and framework employed.

Design & Methodology

Research Design

The present study was designed to address all standards and criteria described in the What Works Clearinghouse (WWC) Study Review Standards (2008) and the Joint Committee on Standards for Educational Evaluation's Program Evaluation Standards (1994). The research design consists of a one-year randomized

control trial, with random assignment of teachers/classes to a treatment (i.e., use of Write Source Online) or control group (i.e., use of other writing program) *within* schools[1]. Other important design and methodological features include:

- The study was conducted in the 6-8th grades during the 2012-13 school year.
- Random assignment occurred at the teacher or class level. Teachers at all grade levels (6-8) were assigned to treatment or control conditions at the beginning of the study.
- Clear site selection criteria were established along with accompanying rationale.
- To the extent possible, the control programs to which Write Source Online was compared were selected to be as distinct as possible given the common content taught.
- Extensive background data[2] was collected on instructional activities and materials employed in both treatment and control conditions so that distinctive pedagogical elements could be described given the common content taught.
- The threat of differential attrition was addressed via: 1) the initial site selection process[3]; 2) random assignment within schools, at the teacher/classroom level, to help ensure that attrition is relatively constant across both treatment and control groups; and 3) the characteristics of students who dropped out were statistically compared between treatment and control groups.
- Extensive implementation guidelines and monitoring procedures[4] were embedded to ensure the fidelity of treatment implementation.
- Two assessments aligned to national writing standards and offering a broad-range of content matter were used in order to enhance the sensitivity of the study to picking up treatment effects.
- The study employed pre/post measures of, among other things, (1) student performance; (2) school, teacher and writing-related attitudes; (3) teacher practices; and (4) teacher knowledge and characteristics.
- Student assessments, surveys, and classroom observation forms are valid and reliable as shown by technical documentation and statistical analyses performed.
- The study employed the use of statistical controls as well as random assignment to establish initial group equivalence[5].
- Analyses of assessment data were primarily conducted via multilevel modeling (MLM) with student and school/teacher level data to take into account dependency issues. In

[1] There are a number of reasons why random assignment to treatment conditions was done at the teacher/class level. The most important reason for selecting this level of assignment is that such a design provides an opportunity to help establish *causality* by eliminating the threat that school level factors could have potentially contributed to differences between treatment and control groups. An important issue to be considered with this design option, however, is that procedures must be put into place to ensure that the treatment and control classes are not contaminated through teachers sharing of Write Source Online materials. Indeed, this was accomplished through stringent guidelines provided to the teachers and close monitoring of their instruction and use of resources by researchers.

[2] Descriptive information was obtained so that, even if not all extraneous variables related to the outcome measures can be controlled, they can at least be measured and used as covariates in subsequent analyses.

[3] Sites that historically had more than 20% student attrition were not used in the study.

[4] Training provided and implementation guidelines reflect how Write Source Online should typically be used in schools.

[5] Random assignment helps to create group equivalence. However, it must be noted that with small sample sizes random assignment in and of itself does not assure initial group equivalence (Lipsey, 1990).

addition, the teacher/class level of analysis used in MLM matches the unit of random assignment.

Table 1 displays the timeline for the important study activities during the first year of the RCT. More detailed information on these activities, as well as measures used are discussed in the following section.

Measures

This section reviews the outcome and assessment measures that were administered, including descriptions of the items, and available reliability and validity information.

Student Assessments: In order to enhance the sensitivity of the RCT to detect any effects associated with the Write Source Online program, the Iowa Test of Basic Skills (ITBS) Written Expression subtest – Form E and the Iowa Writing Test were selected. Assessment selection was based on a thorough literature review of existing assessments to identify tests that were valid, reliable, measured various writing skills (e.g., writing for various purposes, organization and sentence structure, grammar, etc.), and that included content that reflected important concepts and skills in national writing standards.

a) The ITBS Written Expression Form E is a norm-referenced achievement test developed by the faculty and professional staff at Iowa Testing Programs and Riverside Publishing. Public and non-public schools participated in a series of pilot studies to standardize test scores and develop the 2010 norms.

Students were administered the Written Expression section of the ITBS Levels 12-14 tests (for grades 6-8 respectively). Each level of the tests were designed to be developmentally appropriate for students at these grade levels and are multiple-choice. This test is 40 minutes and contains 43-48 items, depending on the level. Questions focus on: the most appropriate way to

Table 1. Write Source Online RCT: Timeline of Activities

2012-13	Aug.-Sept.	Oct.	Nov.	Dec.	Jan.-Feb.	Mar.	April	May-June
Training and Program Implementation Begins	♦	♦						
Assessments and Surveys Administered	♦	♦					♦	♦
Site Observations		♦	♦	♦		♦	♦	
Teacher Logs*	♦	♦	♦	♦	♦	♦	♦	♦

*Note that teachers completed monthly teacher logs that monitor instructional activities and the use of program and other resources

express the ideas in a piece of writing; identification of the line of text that contains an error; and organization, sentence structure, clarity, and effective or inappropriate language.

The ITBS Written Expression subtest has demonstrated reliabilities ranging from .91-.92. Raw scores can be converted into standard scores, grade equivalents, percentile ranks, stanines, and normal curve equivalents. However, for all analyses, the standard score was used.

b) The Iowa Writing Test was designed to assess the student's ability to generate, organize, and express ideas in a variety of written forms. As a performance-based measure, it can add important information to the overall evaluation of student achievement in the language arts. For the study, students were given two different types of writing prompts: persuasive writing for the post-test and expository writing for the pre-test.

- **Persuasive Writing:** The persuasive essay states an opinion and supports it convincingly by drawing on the writer's personal experience or the experience of others, or by citing authority. Persuasive writing is neither completely objective nor wholly emotional; good persuasive writers consider the nature of the audience and use evidence they expect to be effective.

- **Expository Writing:** Expository writing takes many forms. It may tell how something is made or done, report on an experience, or explore an idea or concept. Expository writing conveys information to the reader in such a way as to bring about understanding, whether it be of a process or procedure, or of the writer's ideas about a concept.

Responses on the Iowa Writing Test were scored using the publisher's Analytic Scoring approach. Analytic scoring provided ratings in four different four-point scales (Ideas/Content, Organization, Voice, and Conventions). These are added together to produce a total score, which can be aligned to a percentile rank based on the 1992 norming study. Percentile ranks are available and were used in analyses.

Two independent raters (who were also teachers) were trained to use the scoring protocols in the test manual. Raters did not score the study tests until a high level of consistency was achieved. Documented reader reliabilities ranged from .75 to .80 and score reliabilities ranged from .55-.69 for these grade levels.

Student Survey: A student survey was developed primarily to measure:

- Attitudes about school *(e.g. I like school.)*
- Attitudes about writing-related activities *(e.g. I enjoy writing.)*
- Perceived writing ability *(e.g. I can write well.)*
- Effort and motivation (e.g., *I try hard in class.*)

The survey also included items on parental knowledge and support, teacher support, classroom experiences, and in the Spring survey, satisfaction with their writing program. These scales were included in order to obtain measures of the impact of the Write Source Online program on affective student outcomes[6] and to measure potential variables that may serve as covariates as needed (e.g., parental support). While some

[6] These findings are presented in the full report.

items were created by PRES Associates, others were derived from scales with published reliability and validity[7]. Internal consistency of the scales measuring attitudinal constructs range from .60 to .82. High scores represent a very positive attitude or strong agreement (scales are from 1 to 5).

Teacher Survey: Information was collected via surveys from all participating teachers. In addition to obtaining teacher background and demographic information, the survey was developed to measure:

- Classroom and instructional practices
- Writing/language arts-related preparation and knowledge
- Teacher knowledge of effective teaching practices (including those aligned to Common Core State Standards)
- Organizational factors/context
- Attitudes about writing curriculum

These measures were obtained to examine affective outcomes[8] as well as to gather background information (e.g., years of experience, education, etc.). Some items were obtained from existing scales, while others were developed for the study[9]. Internal consistency of the scales measuring attitudinal constructs range from .50 to .86. High scores represent a very positive attitude or strong agreement (scales are from 1 to 5).

Classroom Observations: A classroom observation form was developed to guide observations. This form was largely based on existing protocols that have been used across the nation[10]. Modifications were made to reflect content and practices typical of writing/language arts classes, as well as to examine implementation of key components of the Write Source Online program. Researchers conducting site visits and using classroom observation forms were trained extensively until a high level of agreement was demonstrated among observers on the various quantitative and qualitative items.

Procedures

To ensure that all treatment teachers participating in the study had sufficient knowledge and skills to successfully implement Write Source Online, teachers were provided with both implementation guidelines and Write Source Online training prior to implementation. In addition, monitoring procedures (via monthly instructional logs completed by teachers, classroom observations and interviews) were instituted to measure the extent to which teachers were implementing a similar instructional model as outlined by the Write Source Online program implementation guidelines.

The following section presents the procedures used to assist teachers in implementing the Write Source Online program, the monitoring procedures used by

[7] A subset of items were selected from entire surveys and modified to be consistent with today's language. Survey information can be obtained from the following sources: Hogan, T. P. (1975). *Manual for Administering and Interpreting the Survey of School Attitudes*. New York: Hartcourt Brace; Johnson, O. G. (1976). *Tests and Measurements in Child Development: Handbook II.* San Francisco: Jossey-Bass; Marsh, H. (1990). The structure of academic self-concept: The Marsh-Shavelson model. *Journal of Educational Psychology, 82*, 623-636.

[8] These findings are presented in the full report.

[9] Items in this survey were developed by PRES Associates and modified from the *Trends in International Mathematics and Science Study (TIMSS) 2003 Teacher Questionnaire Science Grade 8* (Washington, DC: National Center For Education Statistics) and the *2000 National Survey of Science and Mathematics Education Science Questionnaire* (Rockville, MD: Westat).

[10] The Classroom Observation Form was derived from the following protocols: Horizon Research's *Local Systematic Change Professional Development Classroom Observation Protocol*, and the *Texas Collaborative for Excellence in Teacher Preparation Classroom Observation Protocol*.

evaluators to determine treatment fidelity, methods used to obtain program feedback, and the test administration and scoring procedures employed.

Training

The training model for the Write Source Online study was designed to provide teachers with the necessary background and practical experiences to begin implementing the program with fidelity at the start of the 2012-2013 school year. It should be noted that the focus of these trainings was not on general writing professional development, but rather on the vision of the Write Source Online program, use of the materials and implementation of the key components, and how the program could best be used to effectively help students with writing skills and grammar.

Teachers participated in an online training with a Houghton Mifflin Harcourt professional trainer for approximately 3-4 hours at the start of the 2012-2013 school year. During the training, trainers provided an overview of all program components and clearly indicated key components teachers were required to use based on the implementation guidelines. The Houghton Mifflin Harcourt professional trainer also assisted teachers in understanding the Common Core Standards and College and Career Readiness Standards in writing and how those standards are addressed within the Write Source Online program. An emphasis was placed on which components were key and required, versus those that were strongly encouraged or just recommended. Handouts (including the implementation guidelines) were also provided. These included a list of dashboard activities, and specific instructions on utilizing the various online components. Much of the training was spent demonstrating how to create a Net-Text lesson and allowing teachers time to independently explore the dashboard and create lessons. Trainers also discussed the flow of the Teacher's Edition demonstrating where the various program components were located and how to incorporate those components into a lesson.

While follow up trainings were not offered as part of the efficacy study, trainers continued to provide support to the teachers for the duration of the study. Table 2 shows training received by each site during the study.

Table 2. 2012-13 Training Sessions by Site

	Initial Full Day Training
Site A	8/28
Site B[11]	10/23
Site C	7/31
Site D	7/31
Site E	9/26
Site F	8/23
Site G	8/23
Site H	8/27
Site I	8/23

Implementation Guidelines

Write Source Online teachers were provided with detailed implementation guidelines at the onset of the study in order to ensure they had a concise understanding of the essential program components and an understanding of the foundation of the Write Source Online program. Implementation guidelines were based on key program components as identified by HMH product managers and trainers. The guidelines were developed by PRES Associates with final input and revisions from HMH. These offered detailed direction on how the program should be used in the classroom, as well as what parts of the program were considered key (and required), versus what

[11] This school did not start the study until October.

program elements were considered optional. Given that writing is generally taught within Language Arts classes, teachers were only required to use Write Source Online 40 minutes a day, three times per week.

A summary of the Write Source Online activities are outlined below:

- ✓ **Interactive White Board Lessons** – Presentations that are designed to generate interest, promote engagement, and build background skills in each major form of writing.
- ✓ **Net-Text** – This online worktext features interactive instruction, online document creation, peer to peer commenting and integrated grammar.
- ✓ **Grammar Snap** – Each Grammar Snap lesson contains a Mini Lesson/video, Practice Activity, Game, and Quiz.
- ✓ *Write Source Online Portfolio* – Students publish their final papers to share and reflect on their writing.
- ✓ *Book Shelf* – The Book Shelf contains Write Source print component e-books which are available as an additional resource for teachers.
- ✓ *File Cabinet* – The File Cabinet contains printable teacher resources such as blackline masters and assessments.

For a full description of these key components, please see Appendix C.

Program Monitoring

Teacher Logs. Online teacher logs were used so that program implementation could be monitored on a real-time basis and to identify any issues or local events that had the potential to influence study results. Teachers were instructed to complete these on a monthly basis from August/September through April/May. The primary purpose of the teacher logs was to monitor program implementation and fidelity among Write Source Online classes. Researchers also collected monthly logs from control classes so instructional activities and content covered could be noted and also to monitor the extent to which any contamination may have occurred. Such background information provided researchers with a detailed data source on what was occurring in treatment and control classrooms with respect to language arts/writing instruction and practices. It also allowed researchers to identify areas of overlap in terms of content taught and instructional activities. The extent to which there are similarities and differences between classrooms can have an impact on observed differences between treatment and control classes and effect sizes. Thus, it is important to take these factors into consideration when interpreting study results. Information obtained via these logs included changes in student rosters, typical classroom activities, use of other writing resources and related exercises (including homework and independent practice), time spent on varies instructional activities, and for treatment classes, use of key Write Source Online program components.

Results showed that teachers had, on average, a 89% completion rate. The ranges were 25% to 100%[12]. Teachers were contacted after failure to complete teacher logs each month. In cases of noncompliance, the school liaison was asked to consult with the teacher to see if there was anything that could be done to assist the teacher in completing the logs and for the most part

[12] Calculation based on 9 months in which teachers were asked to report on their activities.

this was an effective practice and log completion was relatively high with teachers.

Classroom Observation. Classroom observations were conducted for treatment and control classes during the Fall (October-December, 2012) and the Spring (March-April, 2013). The purpose of these observations was to better understand the instructional approaches and materials used by teachers with their students and to identify differences and similarities between classes taught by teachers that were randomly assigned to treatment or control conditions. Specifically, observations focused on how classroom activities were structured, what and how materials were used, and characteristics of the class including student engagement, classroom environment and culture, and teacher-student interactions. In addition, teachers were interviewed after the observations to obtain more specific information on the representativeness of the lesson, resources used, ability levels of the students, assessment practices, pacing, independent practices, test preparation strategies and feedback related to the program. The observations also allowed researchers to examine the extent to which class and teacher level differences could have influenced study results and to examine the threat of possible contamination between treatment and control classes.

Test/Survey Administration and Scoring

Assessments were administered during two time periods over the course of the study: (1) Fall (September through October 2012); and (2) Spring (April through May 2013)[13]. For the ITBS and Iowa Writing tests, the test publisher's standard testing procedures were followed. Teachers were instructed to contact PRES Associates if they needed additional guidance related to assessment administration. Iowa Writing test data was entered by data entry staff who were blind to assigned treatment conditions. ITBS Assessment data was scored by Riverside Publishing Scoring Services.

Student and teacher surveys were completed during the same time periods as the assessments (i.e., Fall 2012 and Spring 2013).

Site Selection Criteria

Criteria for developing an initial list of schools to be contacted for possible inclusion in the study included geographical diversity across different states, and public schools in urban or suburban areas so that a sufficient number of teachers would be available for purposes of random assignment. Schools meeting the aforementioned criteria were contacted and, of those, 85 indicated initial interest. Of these, 9 met additional criteria for study participation as indicated below and were selected to participate in the research study.

- Schools had to be willing to do teacher or class level random assignment;

[13] Administration dates depended on the school's start and end date. Teachers within each school followed a similar testing schedule. Generally, administration occurred within 1 month after the school year commenced (pretest) and within 1 month prior to the end of the school year (posttest).

- Historically low student mobility rates (less than 20%) as a means of helping control for the threat of attrition;
- Willingness/commitment to fully participate in all aspects of the study (e.g., random assignment and data collection);
- Technology accessibility within the classroom.

Other major criteria included: 1) that there be no other major writing initiative(s) at the school; and 2) the typical writing/language arts curricula employed by the school fell under the "comparison" programs which provided a contrast to the Write Source Online program.

Sample Description

Site Characteristics

Nine schools participated in the study. Schools were located in urban, suburban, and rural areas and were geographically dispersed across the U.S in the states of Arizona, Connecticut, Georgia, Kansas, Minnesota and Pennsylvania. A detailed case study of each of the schools is available in Appendix D.

Table 3 on the following pages shows the school-wide characteristics of each of the participating sites. As shown, school size ranged from small (n=200) to large (over 1100), and four schools are ethnically diverse (over 35% minority) .Characteristics specific to the study participants are provided in Table 4.

Table 3. School-Wide Student Demographics

School	School Size	Ethnic Breakdown	% Special Education	% of Limited English Proficient	% Economically Disadvantaged
Site A Arizona Grades 6-8	788	65% White, not Hispanic 26% Hispanic 2% American Indian/Alaskan Native 3% Black, not Hispanic 3% Asian/Pacific Islander	NR	1%	8%
Site B Connecticut Grades 6-8	256	85% White, not Hispanic 7% Hispanic 2% Black, not Hispanic 4% Asian/Pacific Islander 2% Two or more races	NR	NR	7%
Site C Georgia Grades 6-8	626	24% White, not Hispanic 25% Hispanic 1% Hawaiian Native/Pacific Islander 44% Black, not Hispanic 2% Asian/Pacific Islander	11%	4%	61%
Site D Kansas Grades 6-12	200	95% White, not Hispanic 4% Hispanic 1% American Indian/Alaskan Native 1% Black,not Hispanic 1% Two or more races	NR	NR	44%
Site E Minnesota Grades K-12	476	96% White, not Hispanic 1% Hispanic 3% Two or more races	NR	NR	49%
Site F Minnesota Grades 5-8	697	94% White, not Hispanic 3% Hispanic 1% Two or more races 2% Black, not Hispanic	NR	NR	30%
Site G Pennsylvania Grades PK-8	634	2% White, not Hispanic 78% Hispanic 19% Black, not Hispanic 2% Two or more races	NR	NR	NR

School	School Size	Ethnic Breakdown	% Special Education	% of Limited English Proficient	% Economically Disadvantaged
Site H Pennsylvania Grades 6-8	403	20% White, not Hispanic 22% Hispanic 5% Two or more races 35% Black, not Hispanic 18% Asian/Pacific Islander	16.6%	18.6%	97%
Site I Pennsylvania Grades 7-8	1165	82% White, not Hispanic 9% Hispanic 7% Black, not Hispanic 2% Asian/Pacific Islander	13.6%	9.7%	85.4%
National Population		**White-53.5% Hispanic-21.9% African Am.-17.6% Asian/Pacific Islander-5% Native American 1.2% Other 0.5%**	**13.2%**	**9.6%**	**45.4%**

Data on National Population was obtained from the U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD). Figures represent distributions across all grade levels and reported for 2011. NR=Not Reported

Student Characteristics

The final sample consisted of 1813 students (805 control; 1008 treatment) in 39 classes/teachers (19 control; 20 treatment). The study participants were in the 6-8th grades. Table 4 presents the demographic distribution among study participants. Note that only students who remained in the study throughout the year are included in this table and in the final analyses. The sample was fairly diverse, with 35% minorities.

Preliminary analyses[14] were performed to examine whether baseline differences existed as a function of student demographics. Chi-square analyses on the demographic characteristics noted in Table 4 showed one significant

Table 4. Student Demographics Distributions*

Characteristics		Control (n=805)		Write Source (n=1008)		Total (n=1813)		National
		Count	Percent	Count	Percent	Count	Percent	Percent
Gender *($\chi^2(1)=0.009$, $p=.92$)*	Male	400	50.4%	489	50.7%	889	50.6%	50.8%
	Female	393	49.6%	476	49.3%	869	49.4%	48.0%
Ethnicity *($\chi^2(3)=1.07$, $p=.78$)*	White	512	64.8%	622	64.7%	1134	64.7%	53.2%
	Hispanic	136	17.2%	157	16.3%	293	16.7%	21.9%
	African American	109	13.8%	147	15.3%	256	14.6%	17.6%
	Other	33	4.2%	36	3.7%	69	3.9%	1.7%
Grade *($\chi^2(2)=1.37$, $p=.50$)*	6	104	12.9%	147	14.6%	251	13.8%	--
	7	342	42.5%	398	39.5%	740	40.8%	--
	8	359	44.6%	463	45.9%	822	45.3%	--
Subpopulations								
($\chi^2(1)=10.04$, $p=.002$)	Special Ed Status	60	7.9%	118	12.6%	178	10.5%	45.4%
($\chi^2(1)=1.41$, $p=.24$)	Limited English Proficiency	28	3.5%	45	4.7%	73	4.1%	9.6%
($\chi^2(1)=3.12$, $p=.08$)	Free/Reduced Lunch Status	229	29.9%	246	26.1%	475	27.8%	13.2%
($\chi^2(2)=1.37$, $p=.50$)	Low Reading Level	155	19.4%	207	21.1%	362	20.3%	--
	Mid Reading Level	356	44.4%	412	41.9%	768	43.0%	--
	High Reading Level	290	36.2%	364	37.0%	654	36.7%	--

*Counts (and percents) do not include missing information. Ability level was determined by percentile standing on the ITBS Written Expression and Iowa Writing pretests. Students scoring at the top 33rd percentile were classified as high, students scoring at the bottom 33rd percentile were classified as low, and students scoring at the middle 66th percentile were classified as mid level.

[14] All details regarding analyses on baseline differences and attrition analyses are provided in Technical Appendix A.

difference, $p<.05$[15]. In particular, there was a higher proportion of Special Education students in the treatment group as compared to control group.

Differences in baseline writing performance were also examined based on analyses of pretest scores. Student level t-test analyses revealed one significant difference, $p<.05$, see Table 5. Control students had significantly higher pretest scores than treatment students as measured by the Iowa Writing Test's rubric category of "Conventions." However, on all remaining outcomes, including the overall scores for the two main outcome measures, the ITBS Written Expression and Iowa Writing Test, no differences were observed. Differences on other student characteristics were also examined. Results showed one significant difference between treatment and control students in perceived class climate, $p<.05$. No other differences were observed on measured student attitudes.

Attrition Analysis

Both measurement attrition (i.e., missing data due to students not completing assessments) and dropout attrition (i.e., missing data due to students leaving the study) were examined. Details on the attrition analysis are presented in Technical Appendix A, and are summarized herein. There was an overall dropout attrition of 5.9% (n=113) due to students leaving school or moving from treatment to control classes (or vice versa). While there was no evidence of differential attrition (attrition rates were similar across groups), there was some evidence of measurement attrition between those who provided post test data and those that did not. Specifically, the students who did *not* provide post-tests had significantly higher test scores at baseline and were in the treatment group; therefore, the difference was not in favor of the treatment group. In other words, any observed effects will have occurred despite this bias in favor of the control group.

Table 5. Sample Size, Means, Standard Deviations, and t-test (Student Level) Results for Assessments at Pre-testing

Pretest*	Group	N	Mean	Std. Dev.	*t*	Sig. Level
ITBS Written Expression	Write Source	961	236.12	46.88	-0.54	.59
	Control	785	234.91	46.14		
Iowa Writing Test	Write Source	966	60.09	32.63	0.73	.39
	Control	786	59.05	31.60		
Iowa Writing Test: Ideas	Write Source	965	61.61	33.60	1.85	.07
	Control	786	60.13	33.41		
Iowa Writing Test: Organization	Write Source	966	60.70	33.09	1.26	.21
	Control	786	58.76	30.70		
Iowa Writing Test: Voice	Write Source	966	63.84	33.54	0.80	.42
	Control	786	65.11	32.86		
Iowa Writing Test: Conventions	Write Source	965	50.56	23.69	2.17	.03
	Control	785	53.01	23.15		

[15] "Significant" means that we can be 95% or more confident that the observed differences are real. If the significance level is less than or equal to .05, then the differences are considered statistically significant. If this value is greater than .05, this means that any observed differences are not statistically significant and may be interpreted as inconclusive. However, at times this may be referred to as "marginally significant." In this case, the criterion is more liberal and means that we can be 90% or more confident that the observed differences are real.

Teacher and Class Characteristics

There were 39 classes/teachers that were randomly assigned to groups (20 treatment and 19 control), taught by a total of 26 teachers. Approximately 88% of teachers were female and 76% were Caucasian. In regards to educational background, 24% of teachers held a Bachelor's degree, 72% of teachers held a Master's Degree, and 4% held a PhD, primarily in English/Language Arts (36%), Curriculum and Instruction (20%), or Administration (16%). Teacher experience ranged from 1 to over 15 years, with an average of 6-8 years. No significant differences were observed among treatment and control teachers in terms of these demographic and background variables.

Control and treatment teachers were also very similar in terms of perceptions of autonomy in setting instructional goals, adequacy of resources, administrative support, parental support, collegiality, and knowledge of Common Core State Standards, $p>.05$. However, other differences did emerge in that treatment teachers reported having a positive class climate, being knowledgeable on how to help students, and following a descriptive approach to writing instruction to a greater extent than control teachers at baseline, $p<.05$.

Implementation of various typical activities that occur in middle school language arts classrooms were also analyzed based on information collected from the Fall classroom observations, teacher logs, and pre-teacher surveys. Results showed no significant differences between treatment and control classrooms in terms of diversity of student activities, amount of homework assigned, assessment use, provision of differentiated instruction, and percentage of students who turn in homework. No differences were observed in the amount of time spent on: a) warm-up activities, b) direct instruction, c) small group activities, d) independent practice, and e) classroom management. No differences were also observed in the extent to which specific components of reading and writing were emphasized during instruction (e.g., fluency, vocabulary, grammar, spelling, etc.), $p>.05$.

In sum, the two groups were comparable in terms of baseline student characteristics and outcomes. However, given significant differences observed in the areas of class climate, teacher knowledge to assist students, and descriptive approach to writing instruction, these were controlled for during analyses of outcomes.

Instructional Curricula

The focus of this study was to examine the effects of an entire core curriculum and as such, it must be compared to other core curricula that teach the same content area. With this in mind, researchers tried, to the extent possible, to select schools to participate in the study that used a control program that differed pedagogically from the Write Source Online program. For the Write Source Online RCT, participating schools used either three distinct published writing/language arts programs, or a myriad of resources.

Teachers involved in the study all taught concepts essential to writing and language arts instruction, along with reading in their Language Arts/English classrooms. Depending on the school and grade level, teachers paced their classes according to a school or state pacing guide to meet required standards, and/or taught according to student needs. Teachers that used the Write Source Online program, which is aligned to the Common Core State Standards, were able to use the program while still following their school/state pacing guide

Write Source Online

Houghton Mifflin Harcourt's Write Source Online program is a digital customizable writing and language arts program designed to be used in grades K-12. Aligned to the Common Core and College and Career Readiness State Standards, this program contains all the resources needed to help students master the key writing forms, writing process, Six Traits, grammar, usage, and mechanics skills. Organized around 7 writing units, each unit contains a daily instructional plan. Lessons take students through the prewriting, writing, revising, editing and publishing phases of the writing process. Resources for language and grammar lessons were also provided to enhance the writing process. The pacing of the program varied at 3-5 weeks per writing unit.

Students and teachers had access to a personalized Online Dashboard that contains all the necessary resources to have students complete assignments. The Online Dashboard for students includes Net-Text, Grammar Snap, Portfolio and Online Bookshelf, while the online dashboard for teachers includes the above as well as Interactive Whiteboard lessons, Virtual File Cabinet and Assignment manager.

The Net-text assignments on the online dashboard provide students with step-by-step instruction and practice for each step of the writing process. Net-text provides engaging instruction as students evaluate sample papers, complete grammar skill activities, and work with editable graphic organizers for prewriting and drafting. During revising, Net-text provides the opportunity for students to collaborate using the online peer-review feature, a key scaffolding strategy to develop and refine writing. This online worktext also enables students to publish to the larger Write Source community through ePortfolio.

The Grammar Snap feature is a multimedia application for grammar, usage, and mechanics. Grammar Snap uses multimedia to extend and reinforce grammar, usage, and mechanics skills. Grammar Snap activities include Interactive mini-lessons with audio, downloadable video pod casts, trackable assessments, and grammar games.

The Interactive Whiteboard Lessons are whole-class instructional lessons designed to introduce each form of writing. Designed for use with a Smart Board, these interactive lessons provide students with an engaging introduction to each of the writing forms.

Specific resources available include:

Teacher Resources

- Teacher's Edition
- Skills Book
- Daily Language Workouts
- Assessment Preparation

Digital Resources

- Student & Teacher Edition
- Net-Text
- Grammar Snap
- Interactive Whiteboard Lessons
- File Cabinet
- Online Portfolio
- Teacher Moderation

For a more detailed description of the program's key features and materials, see Appendix C-Implementation Guidelines.

Control Curricula

The type of control curricula used by teachers varied between teachers and sites. Table 6 shows the programs used at each of the sites. Teachers at schools B, D, E, F, H and I did not follow any published program but rather used a mixture of resources and only occasionally supplemented with a textbook for supplemental reading and instructional purposes. The control teachers at schools A, C and G had available and used as a resource, commercially published writing programs (programs 1, 2 and 3 respectively). However, these teachers also reported supplementing heavily with teacher created materials.

Most similar to Write Source Online, control program 1 is a traditional, writing program with a focus on the 6 traits, grammar usage and mechanic skills. Control program 1 is organized around each of the various writing forms. The program encourages students follow the writing process through each of the writing forms. Each form includes instruction for each of the six traits as well as integrated grammar instruction. Additionally this program includes opportunities for student modeling and scoring rubrics. This program was used primarily at school A.

Control program 2 is a traditional language arts program that focuses on a range of literacies including reading, writing, speaking, listening, viewing, and representing. The program is organized by four parts, each with chapters and lessons to address each element. The communications section focuses on descriptive, expository and persuasive writing while the other parts focus on grammar and usage mechanics. Each writing lesson contains a reading workshop, writing workshop, focus on viewing and representing and a focus on speaking and listening. The program also includes an accompanying skills practice book that includes grammar and language mechanics worksheets. At school C, teachers used this program in conjunction with teacher created materials to teach writing and grammar.

Control program 3 is a traditional writing and grammar program that focuses on the various writing forms, grammar usage and

Table 6. Primary Control Curricula by Site

	Program 1	Program 2	Program 3	Mixture of Resources
Site A: AZ	Sixth Grade (2005 Ed.)			Sixth Grade
Site B: CT				Seventh Grade
Site C: GA		Sixth, Seventh and Eighth Grade (2009 Ed.)		
Site D: KS				Seventh and Eighth Grade
Site E: MI				Sixth Seventh and Eighth grade
Site F: MI				Seventh and Eighth Grade
Site G: PA			Seventh and Eighth Grade (2001 Ed.)	Seventh and Eighth Grade
Site H: PA				Seventh and Eighth Grade
Site I: PA				Eighth Grade

mechanics. The program is organized into three parts, one part the focuses on the various writing forms as well as basic paragraph and essay structure, one part the focuses on grammar usage and mechanic skills and one part that focuses on writing in academia and the workplace. Each writing lesson contains activities for student modeling, scoring rubrics and skill exercises. At school G teachers used this program in conjunction with teacher created materials to teach writing and grammar.

The control curricula, including resources available, are described in more detail in Appendix E. As noted, all other control classrooms (in schools B, D, E, F, H and I) used a mixture of resources that teachers had collected over the years. These teachers used these resources to teach toward district/state writing curriculum maps. Resources generally included instruction in various writing forms (e.g., descriptive, expository, persuasive, etc.), grammar, mechanics, and the writing process.

Comparisons between Write Source Online and Control Program Content, Coverage and Practices

As a result of state and district curriculum and pacing guidelines prescribing writing and language arts content, treatment and control class coverage was similar with all teachers equally emphasizing specific types of writing. While writing forms may have been presented in a different sequence depending on the program used, for the most part, coverage of the various writing forms was comparable. Furthermore, it is important to note that the writing curriculum was only a portion of their total class instruction. After all, these are Language Arts/English classrooms and as a results, treatment and control classrooms engaged in very similar reading activities (e.g., they read the same literature, teachers taught the same comprehension strategies, etc.). Thus, in addition to being similar as a result of common curriculum mapping, they also taught the same reading content. The major difference between treatment and control classrooms was the inclusion of the Write Source Online program in treatment classes, which was utilized 2-4 days per week (average was 3 days and is typical of Write Source classrooms).

As shown in Table 7, examination of Write Source unit coverage during the school year showed that for the most part, treatment teachers covered the range of units available from the program. Within *each class*, teachers covered on average 4.5 units (range 1-7). Write Source Online program was utilized 2-4 days per week depending on the length of the class period; the average use was 3 days and is typical of Write Source Online classrooms. Thus, the "treatment dosage" was more limited than would be expected from a core subject curriculum.

Table 7. Write Source Unit Coverage

Unit Type	Total Teachers (N=16)
Descriptive	3
Narrative	11
Expository	11
Persuasive	9
Response to Literature	11
Creative	5
Research	7
Writing Process	11

With respect to the textbooks and the pedagogical approaches employed by the various writing/language arts curricula, there were some differences between control and Write Source Online programs. As previously noted, schools A, C and G used traditional, teacher delivered programs as their control curricula. These basal control materials were similar in their organization around the various writing forms and inclusion of grammar and usage mechanics.

However, there is a notable difference in the delivery of the writing process in the Write Source Online program versus the control programs. Control programs 2 and 3 were organized into multiple parts, each containing a writing section, and grammar and usage mechanics section. While Write Source Online contains both writing and grammar usage mechanics, Write Source is organized by each writing form and includes grammar and usage mechanics instruction within each of those writing forms. This allows students using Write Source Online to learn grammar and usage mechanics in the context of writing. As well, while the control programs contain instruction on multiple writing forms, control programs 2 and 3 do not include instruction on creative writing and poetry, and control program 2 does not include instruction on Response to Literature writing form as Write Source Online does. Furthermore, the control programs only deliver writing instruction through a traditional basal textbook delivery, while Write Source Online delivers engaging interactive lessons that allow students to receive constant feedback from their teacher throughout the writing process. As previously noted, Write Source Online program is also aligned to the Common Core and College and Career Readiness State Standards.

In terms of a typical lesson schedule, lessons in both control and treatment classes were relatively consistent. Lessons usually started with a warm up activity which may have included a journal writing prompt, daily language exercise or a question from the schools' respective state assessment. This would be followed by direct instruction from the teacher which included notes, group discussions, and modeling. Following direct instruction students would either work independently or in a small group to complete a writing assignment or grammar worksheet. Teachers would close with a summary of the day's lesson.

Both treatment and control teachers reported grading all writing assignments on a school/district/state created writing rubric. With regards to homework activities, teachers reported assigning homework various days of the week and to varying amounts. However, no significant differences were observed in the amount of homework assigned. Homework activities generally included anything unfinished in class, grammar worksheets, read and respond writing assignment or (in treatment classes) an assignment from Write Source Online. There were no significant differences observed regarding the emphasis on fluency, use of sophisticated vocabulary, reading, grammar, use of meaningful content, accuracy, and differentiated instruction in treatment and control classrooms.

In terms of specific instructional activities, no significant differences were observed between treatment and control teachers. All teachers reported teaching strategies for prewriting, drafting and revising, and editing and proof reading. As well all teachers reported having students work on the various writing forms, including poetry, expository writing, narrative writing, evaluative writing, expressive writing, persuasive writing, procedural writing, technical writing, and real world applications of writing. In addition, students in both treatment and control classrooms were equally likely to use a computer for completing writing assignments, engage in the writing processes, learn to use various resources, work in small groups, assess their own work, maintain a portfolio of their own work, and use graphic organizers.

As previously noted, the only significant differences observed were that treatment teachers were more likely to identify their teaching approach to writing as descriptive versus traditional. As well treatment teachers were significantly more likely to report knowing how to help students in writing. Class climate

was also rated significantly more favorable by treatment teachers than control teachers. No other significant differences were observed between treatment and control students.

In sum, Write Source Online and control classes were very similar to one another in terms of structure and content taught. Given this information, and the fact that the duration of the study and exposure to the program occurred during *one* school year, small effect sizes were expected. After all, even with training provided, there is a learning curve for teachers in their first year of implementing a new program. Indeed, it is recommended that *cumulative* student exposure be examined to determine the sustainability of effects observed.

Fidelity of Implementation

Three levels of implementation (low, moderate, and high) were assigned for teachers' implementation of key Write Source Online program components as noted in the implementation guidelines (see Appendix C). Triangulation of the available information[16] showed that five teachers did not typically follow the implementation guidelines with high fidelity. These teachers did use the Write Source Digital components such as Grammar Snaps, Net Text, or Interactive Whiteboard lessons on a more regular basis than the moderate and high implementers. Teachers noted that their use of the digital content was hampered by technology issues (either with the school's technology infrastructure or the Write Source website). The remaining 69% of treatment teachers implemented the program with adequate fidelity (high and moderate).

When the average implementation for each of the key components is examined, results show that the majority of teachers tended to implement the Daily Language Workout, Grammar Snap, and reviewed the Teacher's Edition with high frequency. In contrast, teacher usage of the Assessment Guide, Interactive Whiteboard lessons, and Online Portfolio occurred with the least amount of frequency. Nevertheless, for the most part, participating treatment teachers did fairly well in implementing the program as noted in the implementation guidelines.

Appendix F provides a more detailed table describing the extent to which teachers utilized the various Write Source Online program components. For more information on how teachers implemented the Write Source Online program in their classrooms, see Appendix D: Case Studies.

Table 8. Level of Write Source Online Implementation

Level of WS Digital Implementation	Completion of Program Components
High	Consistent implementation of Write Source Online components and coverage of units= **6 teachers**
Moderate	Fairly consistent implementation of Write Source Online components and coverage of units = **5 teachers**
Low	Low implementation of Write Source Online components and coverage of units = **5 teachers**

Approximately 69% of teachers employed the Write Source Online Program with a moderate to high level of fidelity.

No evidence of contamination was observed between teachers or in classrooms. That is, control teachers did not use any components of the Write Source Online program with their students. However, there was some movement of students from treatment to control classes (or vice versa) over the school year. These students were excluded from the all program effect analyses that are subsequently reported.

[16] Information was analyzed from teacher logs, class observations, and exit interviews.

It should be noted that the potential for contamination was given careful consideration when determining the level of random assignment. Through years of research experience, PRES researchers have found that the benefits of random assignment at the teacher/class level (hence, controlling for school and teacher level factors) with careful monitoring of possible contamination, outweighs the risk of contamination. Procedures used to eliminate the threat of contamination included an in-depth study orientation with teachers, site visits made to both treatment and control classrooms to observe what was occurring in classrooms, and monthly teacher logs that monitored practices and materials used across both treatment and control classrooms.

Results

Do writing skills improve over the course of participating in Write Source Online?

In order to determine whether students who used Write Source Online showed significant learning gains over the course of a school year, analysis on outcomes were conducted via paired sample t-tests. Results showed significant growth on both the ITBS Written Expression subtest (5.6 percentiles) and the Iowa Writing Test (3.9 percentiles), $p<.05$.

Figure 1. Pre and Post ITBS Written Expression Performance by Write Source Online Students

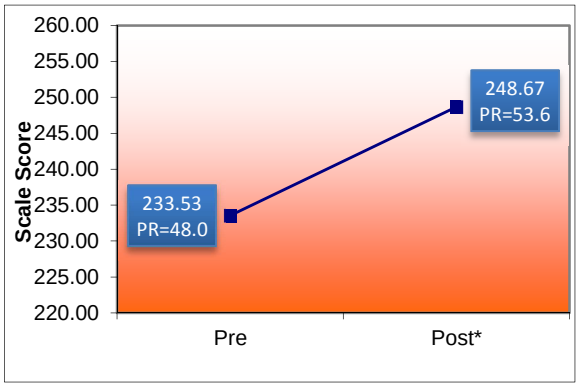
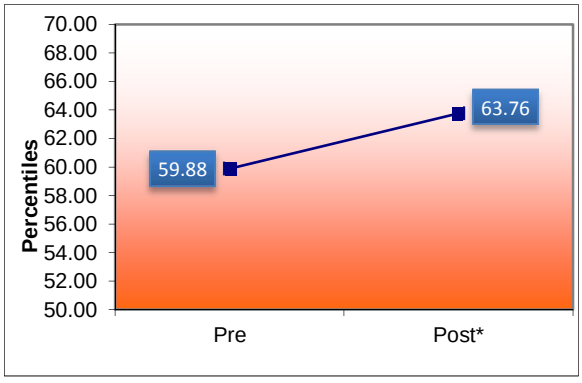


Figure 2. Pre- and Post Iowa Writing Test Performance by Write Source Online Students



Write Source Online students showed significant growth in both outcome measures, the Iowa Writing Test and the ITBS Written Expression subtest.

Do changes in writing performance among Write Source Online students vary by different types of students and levels of implementation?

In order to examine whether Write Source Online was associated with improvements among students of various subgroups, exploratory, descriptive analyses were conducted. Only the performance of *treatment* students in specific student populations (i.e. students receiving free/reduced lunch and students not receiving aid, males and females, minority and non-minority students, special education students and students not in special education, and students of various grade levels) was examined in these analyses. It should be noted that the sample sizes in some of the subgroups are small and there are unequal sample sizes between those in the special populations and those not for a number of variables[17]. Therefore, with the caveat that these analyses are limited, this provides readers with preliminary, descriptive information on whether the program is associated with improvements among various subgroups. Figures 7-12 display the results for the various subgroups.

Results showed that all subpopulations of students using Write Source Online showed significant learning gains on one or both outcome assessments. In particular, students in <u>all</u> subpopulations showed significant learning gains on the ITBS Written Expression subtest. In addition, males, 8th graders, Whites, African Americans, students in special education and those not, and students not receiving free/reduced lunch showed significant gains on the Iowa Writing Test. In sum, generally females and males, minorities and non-minorities, students receiving free/reduced lunch and those not, students in special education and those not, and students at various grade levels showed significant gains in writing skills, $p<.05$.

[17] The reader is referred to Technical Appendix A for statistics.

Grade Level

Figure 3. Write Source Online Students Performance Gains by Grade Level: Iowa Writing Test

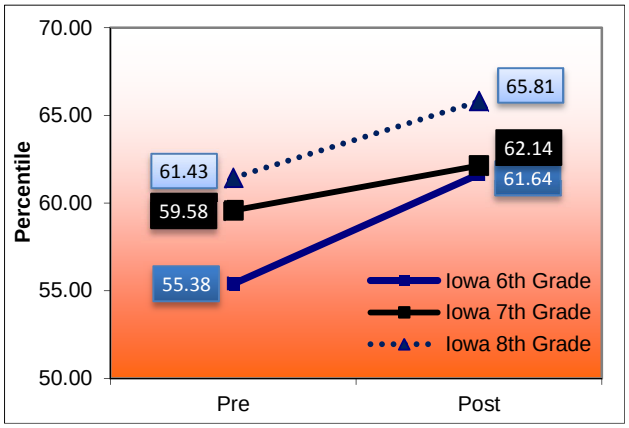
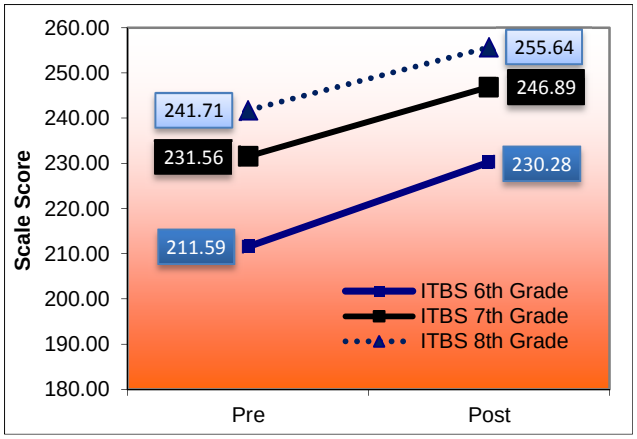


Figure 4. Write Source Online Students Performance Gains by Grade Level: ITBS Written Expression



Write Source Online students who were 8th graders showed significant learning gains on both outcome measures from pre- to post-testing. While 6th and 7th graders showed gains on both measures, they were only statistically significant on the ITBS Written Expression test.

Gender

Figure 5. Write Source Online Students Performance Gains by Gender: Iowa Writing Test

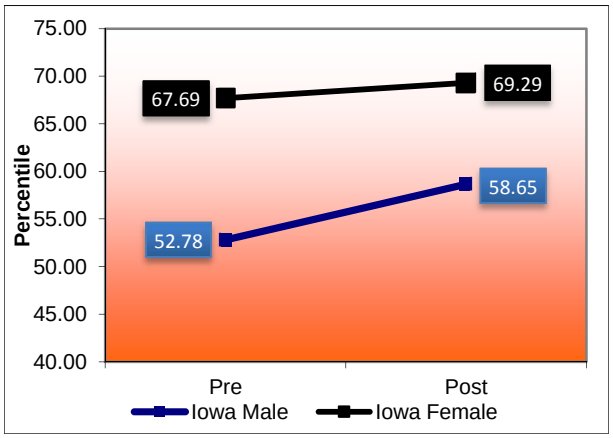
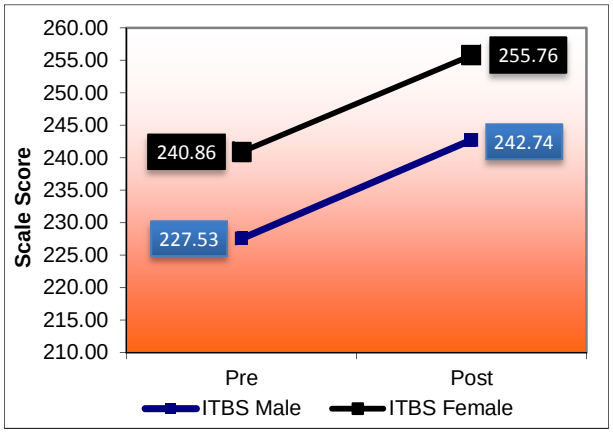


Figure 6. Write Source Online Students Performance Gains by Gender: ITBS Written Expression



Males using Write Source Online showed significant performance gains on the ITBS Written Expression and Iowa Writing Tests. In contrast, females showed significant gains only on the ITBS.

Race/ Ethnicity

Figure 7. Write Source Online Students Performance Gains by Race/ Ethnicity: Iowa Writing Test

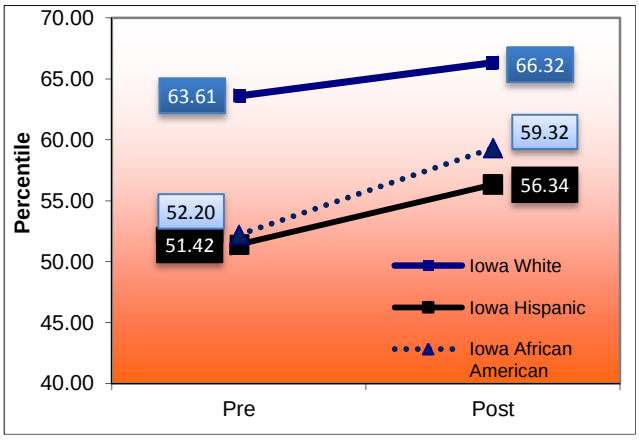
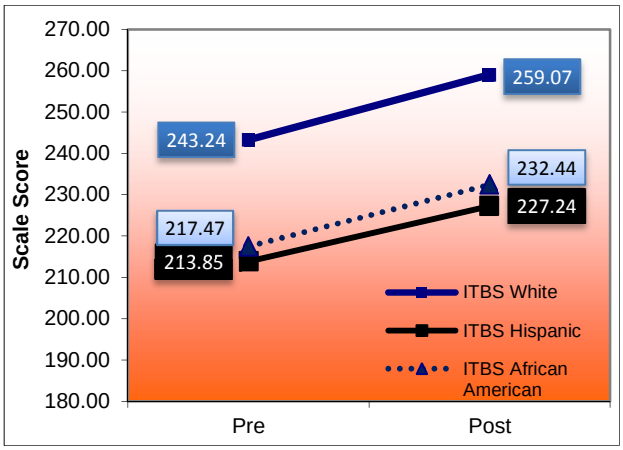


Figure 8. Write Source Online Students Performance Gains by Race/ Ethnicity: ITBS Written Expression



Significant learning gains were also observed among students of all ethnic backgrounds on the ITBS Written Expression subtest. Whites and African Americans, but not Hispanics, showed significant gains on the Iowa Writing Test.

Free or Reduced Price Lunch

Figure 9. Write Source Online Students Performance Gains by Free /Reduced Price Lunch: Iowa Writing Test

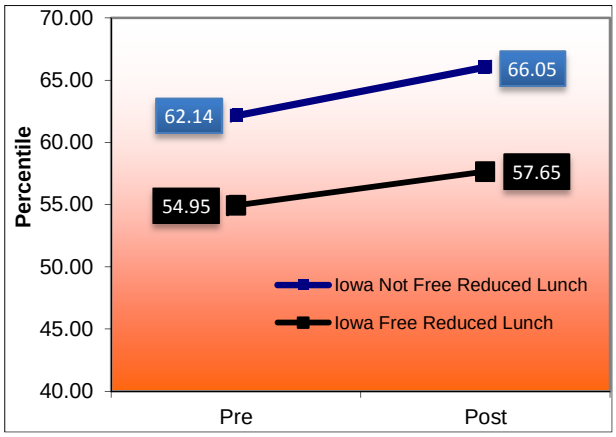
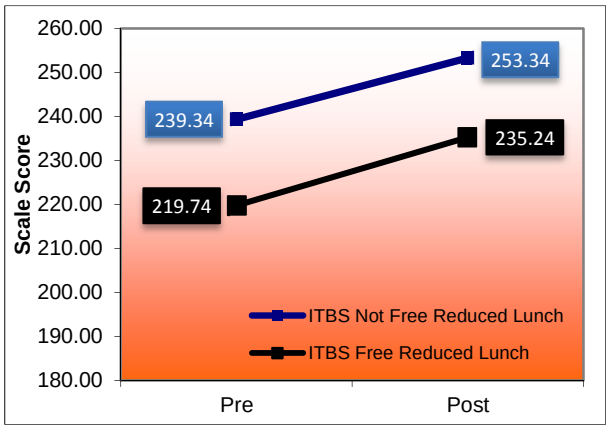


Figure 10. Write Source Online Students Performance Gains by Free /Reduced Price Lunch: ITBS Written Expression



Write Source Online students receiving free/reduced lunch and those not receiving this aid showed significant gains on the ITBS Written Expression subtest. While both types of students also showed gains on the Iowa Writing Test, these gains were only significant among students not receiving free/reduced lunch.

Special Education Status

Figure 11. Write Source Online Students Performance Gains by Special Education Status: Iowa Writing Test

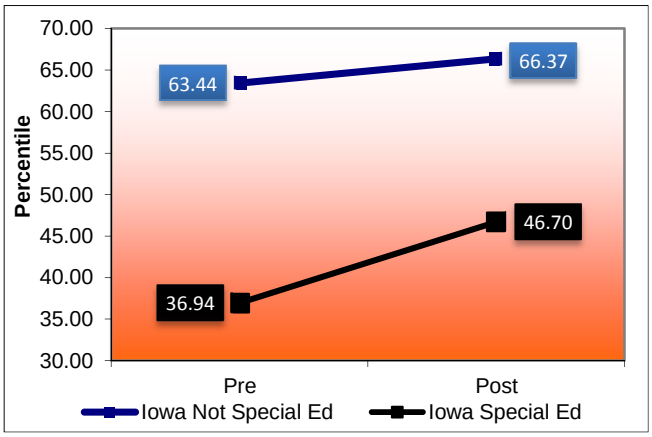
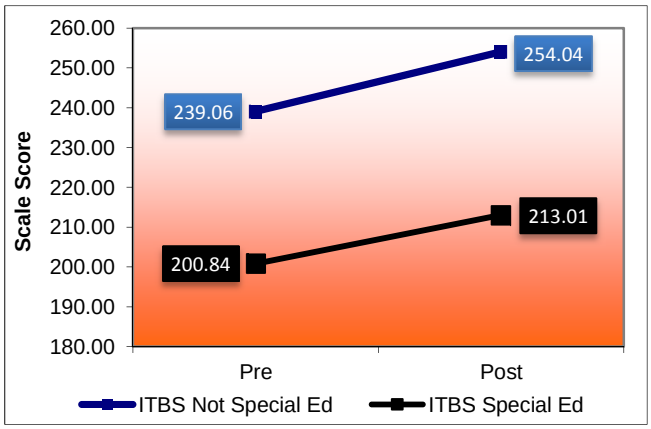


Figure 12. Write Source Online Students Performance Gains by Special Education Status: ITBS Written Expression



Write Source Online students who were in Special Education as well as those not in Special Education showed significant gains on both outcome measures.

Writing Levels

The average performance results from the ITBS Written Expression and Iowa Writing tests administered in the Fall was used to categorize students on initial writing level, since these are norm-referenced tests. Students who were at or below the 33rd percentile were classified at a low writing level, students who were at or above the 66th percentile were classified as high, and the remaining students were classified as average. Comparisons were made between the three identified writing levels. With the exception of high ability students on the Iowa Writing Test, results showed that students at all writing levels showed significant growth over the course of the school year. High ability students showed a significant decline in performance on the Iowa Writing Test.

Figure 13. Write Source Online Students Performance Gains by Writing Level: Iowa Writing Test

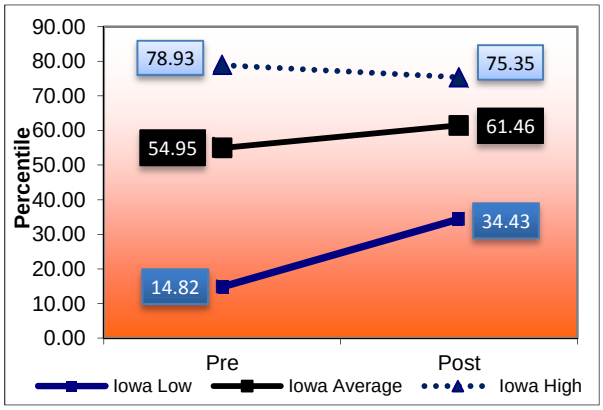
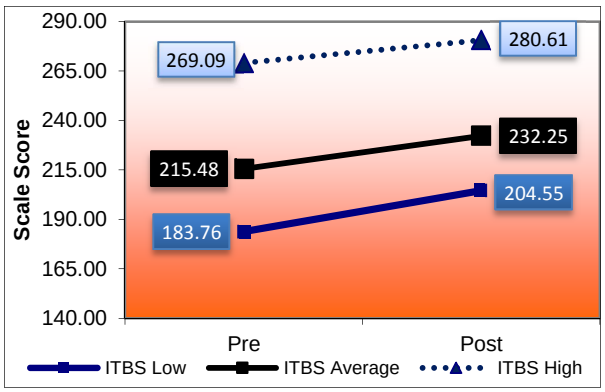


Figure 14. Write Source Online Students Performance Gains by Writing Level: ITBS Written Expression



With the exception of high ability students on the Iowa Writing Test, Write Source Online students at all writing levels showed significant learning gains on the ITBS Written Expression and Iowa Writing tests.

Implementation Levels

In addition to these analyses among subgroups of Write Source Online students, exploratory analyses on the relationship between overall levels of Write Source Online implementation of key program components and student performance were conducted. These analyses provide preliminary information on whether low to high implementation fidelity of Write Source Online components was associated with student performance.

Results showed significant relationships between overall Write Source Online implementation levels and improved performance on the ITBS Written Expression subtest, $p<.05$. Specifically, students whose teachers used the Write Source Online program with moderate and high fidelity showed the highest levels of gains as compared to teachers who used the program with low levels of fidelity as measured by the Iowa Writing Test. On the ITBS Written Expression subtest, all teachers, regardless of implementation level, showed significant learning gains, see Figures 15-16.

Preliminary analysis showed that teachers implementing the Write Source Online program with high and moderate fidelity showed greater gains on the Iowa Writing Test as compared to teachers implementing the program with low fidelity. In contrast, all teachers, regardless of level of implementation had students who made significant gains as measured by the ITBS Written Expression subtest.

Figure 15. Pre- and Post Iowa Writing Test Performance of Write Source Online Students by Implementation Level

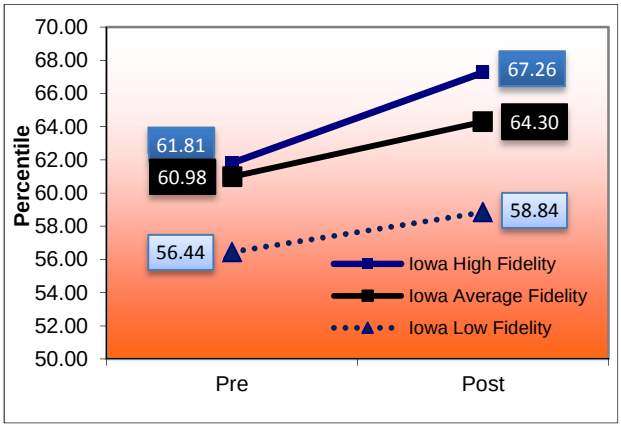
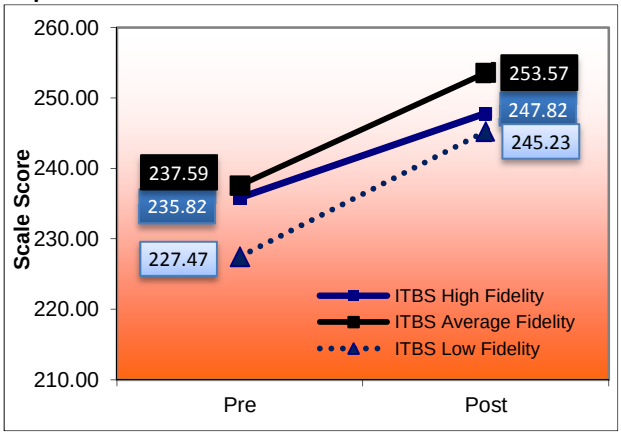


Figure 16. Pre- and Post ITBS Written Expression Performance of Write Source Online Students by Implementation Level



The aforementioned analyses focused on the extent to which Write Source Online is positively associated with student writing performance. Results clearly show significant improvements among students overall, and among subgroups of students. However, these analyses do not examine how Write Source Online students compared to students using other middle school writing programs. The following section presents analyses of how the writing performance of students taught via Write Source Online compares to the performance of students using other programs.

Do gains in writing skills differ between students using Write Source Online as compared to similar students using other language arts programs?

Prior to discussing the results found, it is important to understand the differences and similarities of the Write Source Online program and control curricula and classes. This will assist the reader in interpreting the results and effect sizes[18], a measure of the importance of an intervention.

As previously noted, control and treatment classes generally were exposed to the same content within schools. This is due to teachers following school/district curriculum pacing guides that dictate what content to cover at each grade level which was similar across the Write Source Online and control programs. In general all teachers emphasized the same amount of instruction on fluency, use of sophisticated vocabulary, reading, grammar, use of meaningful content, accuracy, and differentiated instruction.

That said, notable differences existed between Write Source Online versus the control programs. Specifically, Write Source is organized by each writing form and includes grammar and usage mechanics instruction within each of those writing forms. While control programs 2 and 3 contained similar writing and grammar elements, they were organized into separate units and did not integrate grammar within the context of the writing form. As well, control programs 2 and 3 did not include instruction on all the same types of writing as is available in Write Source Online. Other notable differences between Write Source Online and the control curricula

[18] Effect size (ES) is commonly used as a measure of the magnitude of an effect of an intervention relative to a comparison group. It provides a measure of the relative position of one group to another. For example, with a moderate effect size of d=.5, we expect that about 69% of cases in Group 2 are above the mean of Group 1, whereas for a small effect of d=.2 this figure would be 58% and for a large effect of d=.8 this would be 79%.

include: a) interactive online lessons, b) overall portability of the Write Source Online program, and c) the embedded alignment to the Common Core and College and Career Readiness State Standards.

Other notable differences observed was in teachers' self-rating of teaching style, in which treatment teachers rated their approach as more descriptive than traditional, and they rated themselves as having greater knowledge on how to help students in the classroom as compared to control teachers. Additionally class climate in treatment classes was rated more favorably. Otherwise, the instructional sequence and practices employed was comparable across treatment and control classes, and from teacher to teacher.

In summary, Write Source Online and control classrooms, with the exception of the program-based activities, were similar to one another in terms of structure. Given this information, and the fact that the duration of the study occurred during one school year and exposure to the program was limited to 2-4 days per week (and within a broader Language Arts/English classroom), small effect sizes were expected.

Results

Multilevel modeling was conducted to examine whether there were significant differences in growth of writing related skills between treatment and control students. That is, the three level models examine *changes* in outcomes between the pre and post-testing.

Results showed that Write Source Online students outperformed students using other writing programs as measured by the Iowa Writing Test, $p<.05$. Indeed, although treatment students started out at a lower level than control students on the pretest, Write Source Online students subsequently surpassed control students at post-testing, see Figures 17-18. No such significant differences were observed on the ITBS Written Expression subtest. As a reminder, the Iowa Writing Test measures students' ability to generate, organize, and express ideas via a rubric-scored authentic writing piece. In contrast, the ITBS measures students' knowledge of writing mechanics and grammar via multiple-choice questions. The results suggest that Write Source Online may be more sensitive to impacting students' holistic writing skills as compared to specific writing abilities.

Figure 17. Pre-Post Performance on Iowa Writing Test by Group

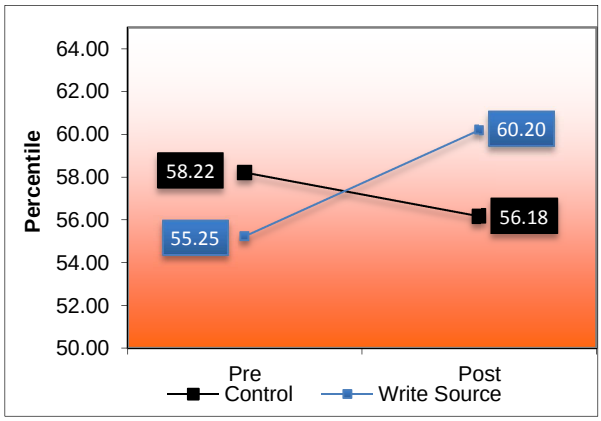
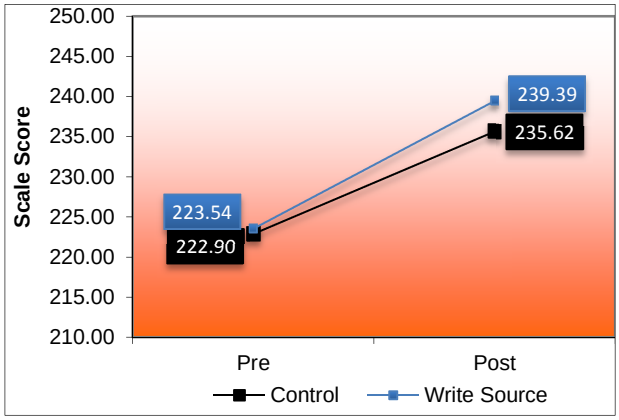
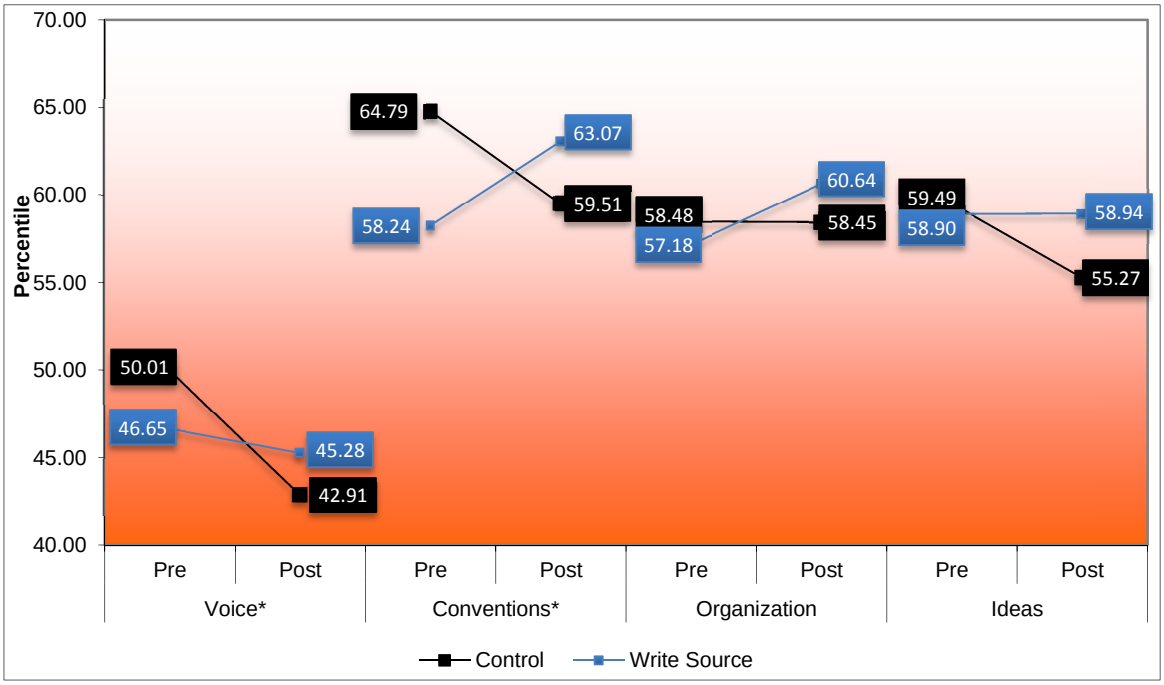


Figure 18. Pre-Post Performance on ITBS Written Expression Subtest by Group



Results showed that Write Source Online students outperformed control students on the Iowa Writing Test. A similar pattern was observed on the ITBS Written Expression subtest, but such differences were not significant.

Figure 19. Pre-Post Performance on Iowa Writing Test Rubric Category



*$p<.05$

In addition, examination of student performance within each of the Iowa Writing Test's rubric categories shows that Write Source Online students significantly outperformed control students in two areas. In particular, while both groups showed decreases in "Voice" from pre to post, the decrease among Write Source Online students was smaller (loss of 1 percentile point) as compared to control students (loss of 7 percentile points). Recall that a different writing type was tested at each time period; therefore the loss may be reflective of the more challenging writing style tested at post-testing (expository for pre-testing and persuasive for post-testing). A significant difference in favor of the Write Source Online students was also observed in the area of "Conventions." While similar positive patterns were observed in "Organization" and "Ideas," the differences were not statistically significant.

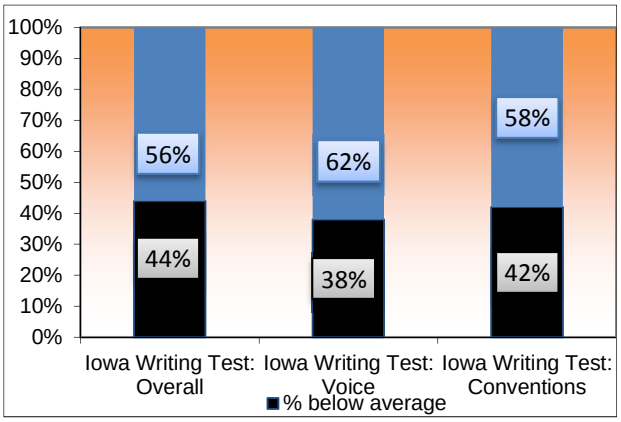
Results by Iowa Writing Test rubric categories showed that Write Source Online students significantly outperformed control students in the areas of Voice and Conventions. Similar patterns were observed in Organization and Ideas, but differences between groups were not statistically significant.

Effect Sizes

Effect size is a commonly used measure of the importance of the effect of an intervention (in this case, Write Source Online). The effect size obtained for the Iowa Writing Test was positive, indicating a favorable effect of the Write Source Online program on student writing performance. The effect size obtained for the overall score can be classified as small (d=.15), and does not exceed the threshold (.25) for educational significance. However, effect sizes for the two rubric categories that were significant, "Voices" and "Conventions," approached or exceeded the threshold with values of .30 and .20 respectively. Small effects are not surprising given that teachers and students had only used Write Source Online for one school year, and it takes time for teachers to become familiar with any program.

In order to better understand the effect observed as a result of exposure to Write Source Online, the effect size was translated to the percent of treatment students that can be expected to be *above* the average of the control group (see blue part of bar in Figure 20). As shown, students using Write Source Online are more likely to have scored above the average of control students as measured by the Iowa Writing Test, and its sub-scores.

Figure 20. Percent of Write Source Online Students Above and Below Average Relative to Control Students



Results show that 56% of Write Source Online students scored above the average control student as measured by the Iowa Writing Test: Overall. In other words, Write Source Online students were 6 percentile points higher than the average of control students on holistic writing skills. Examination of effect sizes by the Iowa Writing Test rubric categories showed that Write Source Online students were 12 percentile points higher in the category for "Voice" and 8 percentiles higher in "Conventions."

Do effects of the Write Source Online program on student performance vary as a function of different student characteristics?

To examine if there were differences in performance between different subgroups of Write Source Online and control students, subgroup effects were analyzed via multilevel modeling. Specifically, differences between Write Source Online and control students in the following subgroups were examined: grade, gender, ethnicity, free/reduced lunch status, special education status, and writing ability level. Note, it is important to view these analyses as exploratory given the smaller sample sizes involved and the fact that random assignment did not occur at the subgroup level[19]. Significant subgroup differences are discussed in the following sections.

[19] Detailed information on why this is exploratory and non-casual and statistics regarding these results are presented in Technical Appendix A.

Results by Student Subpopulations

Results showed a significant difference between Write Source Online students and control students in the following subgroups: African Americans and Whites, students in 7th grades, and Special Education students, as measured by the Iowa Writing Test. Sixth grade students who used Write Source Online also outperformed 6th grade control students on the ITBS Written Expression subtest. In contrast, 6th grade *control* students had significantly higher scores than Write Source Online students on the Iowa Writing Test. These results are shown in Figures 21-32. In sum, Write Source Online students generally outperformed control students within specific subgroups.

Female students who used Write Source Online and other writing program showed similar gains in writing performance.

Results by Gender

Figure 21. Pre-Post Performance on Iowa Writing Test by Group: Females

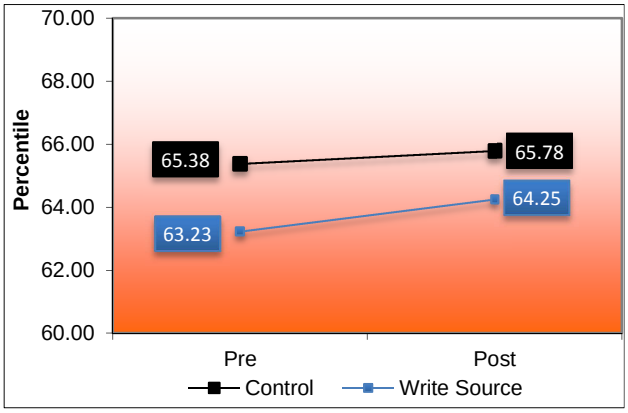
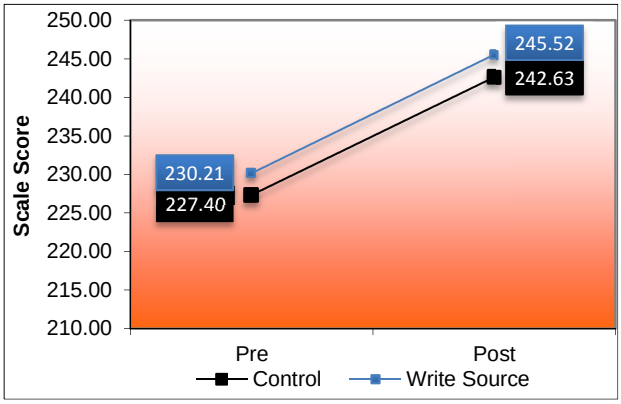


Figure 22. Pre-Post Performance on ITBS Written Expression by Group: Females



Grade Level

Figure 23. Pre-Post Performance on Iowa Writing Test by Group and Grade Level

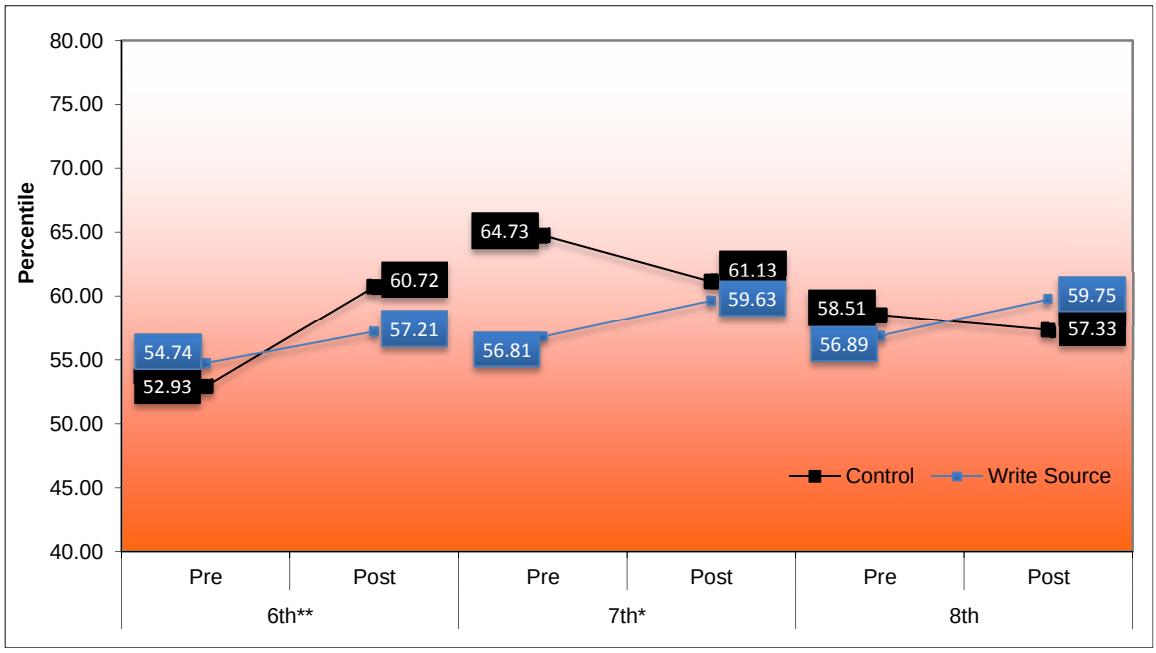
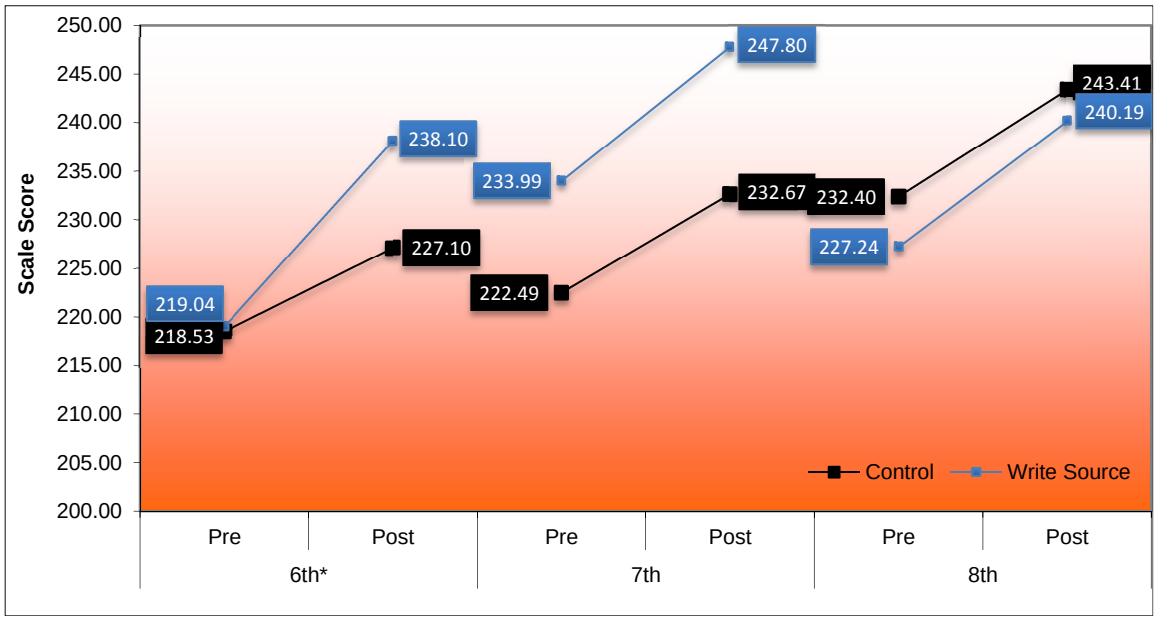


Figure 24. Pre-Post Performance on ITBS Written Expression by Group and Grade Level



*p<.05, ** p<.10

On the Iowa Writing Test, 7th grade students who used Write Source Online showed significantly greater writing gains than control students. The same pattern was observed among 6th graders on the ITBS Written Expression subtest. In contrast, 6th grade control students showed a marginally significant positive effect as compared to students who used Write Source Online.

Ethnicity

Figure 25. Pre-Post Performance on Iowa Writing Test by Group and Ethnicity

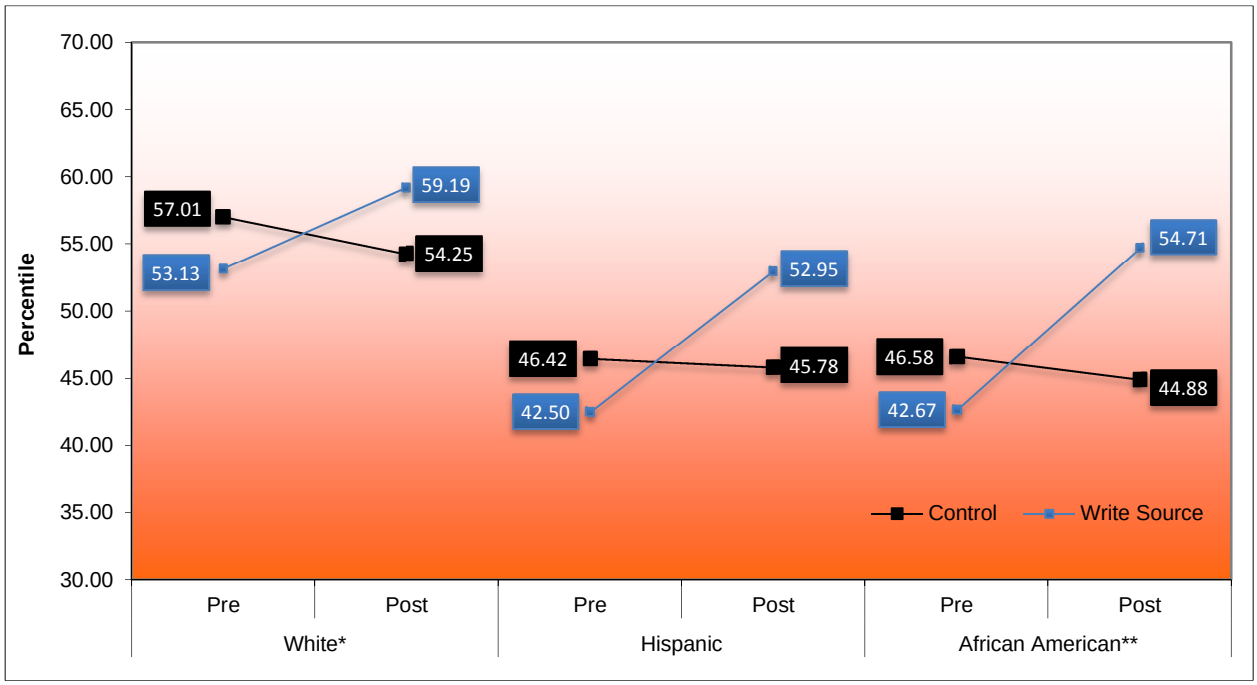
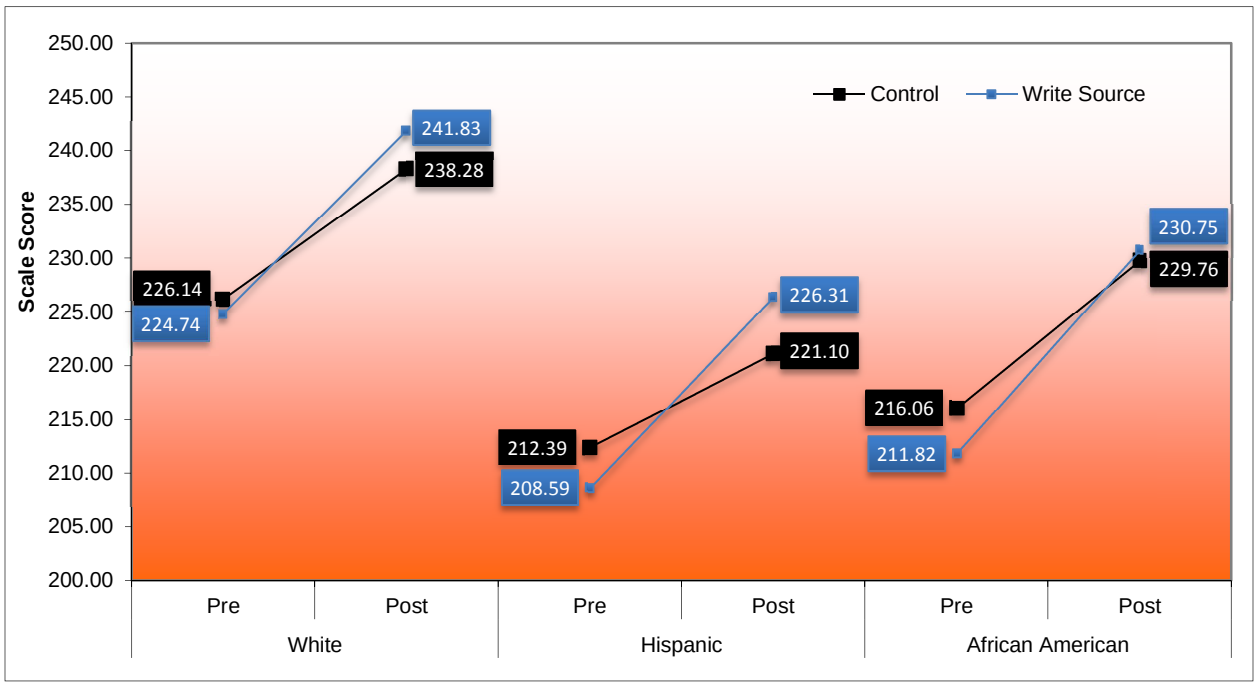


Figure 26. Pre-Post Performance on ITBS Written Expression by Group and Ethnicity



*$p<.05$, ** $p<.10$

White and African American students who used Write Source Online showed accelerated writing gains as compared to students who used other writing programs as measured by the Iowa Writing Test. No differences were observed among Hispanics or on the ITBS Written Expression subtest.

Special Education Status

Figure 27. Pre-Post Performance on Iowa Writing Test by Group: Special Education

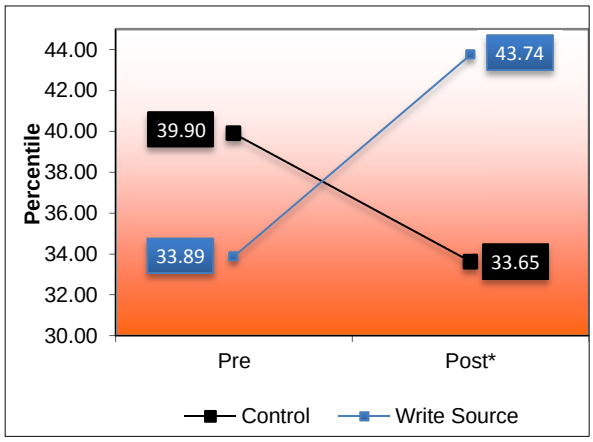
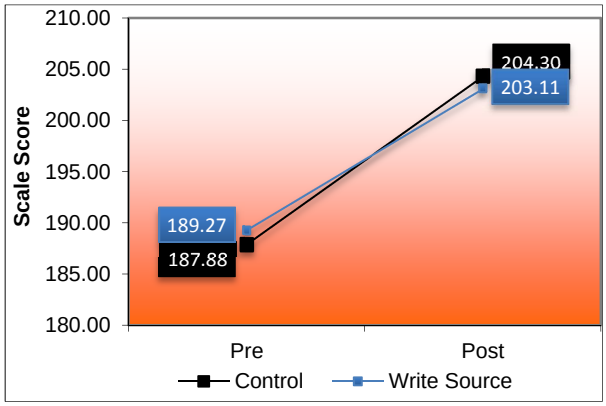


Figure 28. Pre-Post Performance on ITBS Written Expression by Group: Special Education



Special education students who used the Write Source Online program showed accelerated writing gains on the Iowa Writing Test as compared to special education students using other writing programs. No differences were observed on the ITBS Written Expression subtest.

Free/Reduced Lunch

Figure 29. Pre-Post Performance on Iowa Writing Test by Group: Students Receiving Free/Reduced Lunch

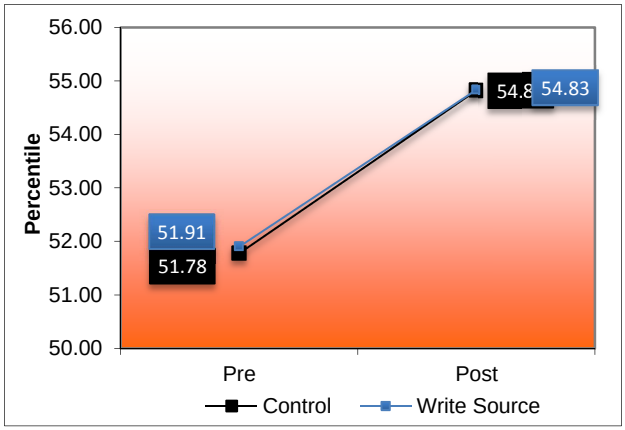
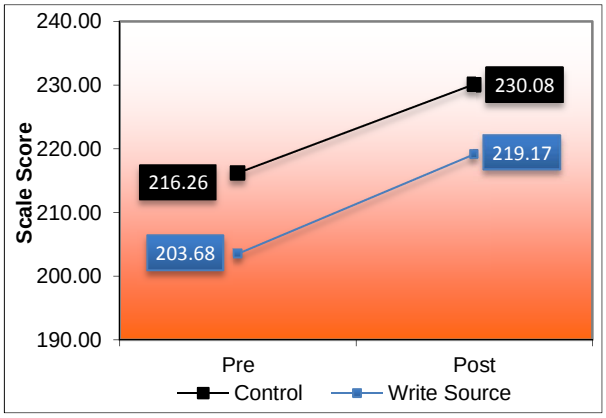


Figure 30. Pre-Post Performance on ITBS Written Expression by Group: Students Receiving Free/Reduced Lunch



Write Source Online students and control students receiving free/reduced lunch showed similar writing skills over time as measured by both outcomes measures.

Results by Writing Ability

It is important to closely examine the extent to which writing programs contribute to the continued progress of students at differing ability levels. With that in mind, students were categorized into writing levels depending on their percentile rankings on the ITBS and Iowa Writing Test at baseline (Fall, 2012). Students who scored at or above the 66th percentile were classified as high level students, students below the 33rd percentile were low ability students -- those between were classified as average performing. Significant differences were observed among high level students in that Write Source Online students showed significantly greater growth than high level control students on ITBS Written Expression subtest. As well, average level students who used Write Source Online outperformed average level students using other writing programs on the Iowa Writing Test, see Figures 31-32. Students of low ability levels showed comparable rates of growth across both treatment and control groups.

Figure 31. Pre-Post Performance on Iowa Writing Test by Group and Writing Level

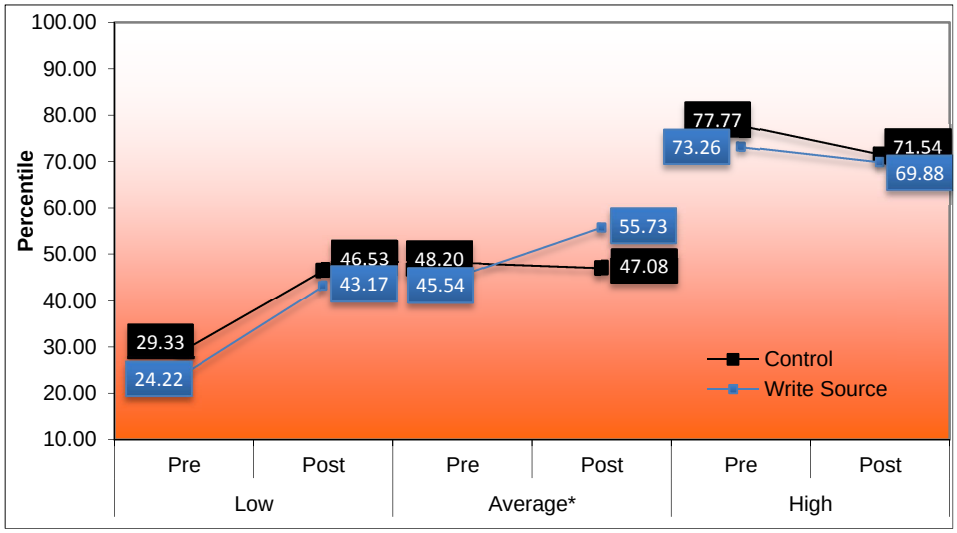
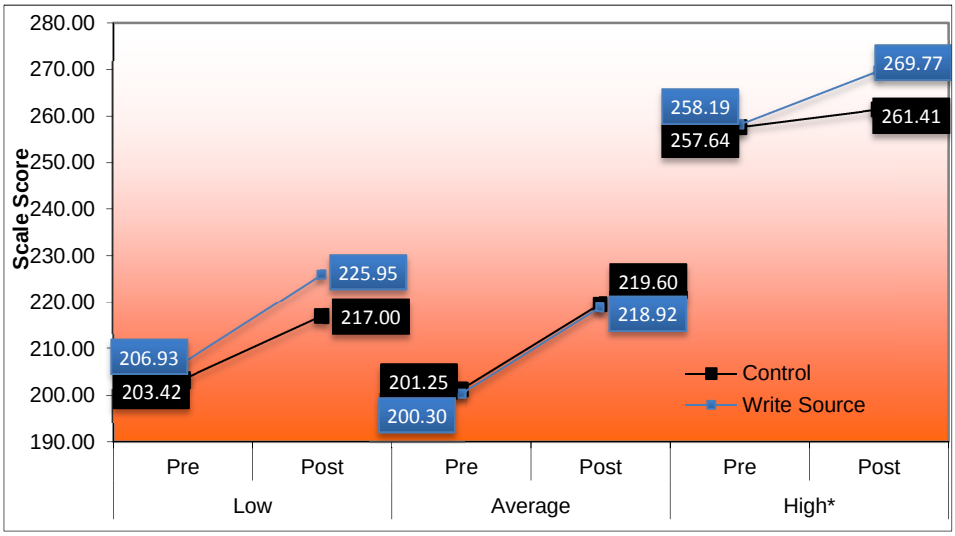


Figure 32. Pre-Post Performance on ITBS Written Expression by Group and Writing Level



Write Source Online students of average writing ability at pre-testing showed significant improvement on their writing skills compared to average level students who used other writing programs, as measured by the Iowa Writing Test. In addition, on the ITBS Written Expression subtest, Write Source students of high ability at pre-testing had higher performance gains than high ability control students.

In sum, students who used Write Source Online showed significantly greater gains as compared to students using other writing programs. In addition, with the exception of one effect, subgroup effects were in favor of Write Source Online students. While the vast majority of effects were observed on the Iowa Writing Test which provides a more authentic, holistic measure of writing ability, positive subgroup effects were also observed on the ITBS Written Expression subtest. Such consistency in findings across multiple outcome measures and subpopulations indicates that the Write Source Online program is effective in helping students attain important writing skills.

Conclusion

Findings from the randomized control trial indicate that Write Source Online is significantly related to positive student outcomes. Middle school students using the program showed significant growth in writing skills from pre- to post-testing. Moreover, significant differences were observed between Write Source Online and control students' performance as measured by the Iowa Writing Test. These findings occurred despite the fact that Write Source Online was used 2-4 times a week (which is typical of how it is used in real-world classrooms) and within the context of a Language Arts/English classroom where reading skills were also taught.

Furthermore, results also showed a number of significant differences between different subgroups of treatment and control students. Specifically, results showed significant differences on the Iowa Writing Test between Write Source Online students and control students in the following subgroups: African Americans and Whites, 7th graders, Special Education students, and students classified as "average ability" via the pretest. In all these cases, Write Source Online students showed greater performance gains than control students from the same subgroup. In addition, Write Source Online 6th graders and students classified as high ability based on pretest performance outperformed control students in these subgroups on the ITBS Written Expression subtest. Only one negative effect was observed; 6th grade control students had significantly higher scores than Write Source Online students on the Iowa Writing Test.

In sum, students who used Write Source Online showed significantly greater gains as compared to students using other writing programs. In addition, with the exception of one effect, subgroup effects were in favor of Write Source Online students. While the vast majority of effects were observed on the Iowa Writing Test which provides a more authentic, holistic measure of writing ability, positive subgroup effects were also observed on the ITBS Written Expression subtest. Such consistency in findings across multiple outcome measures and subpopulations indicates that the Write Source Online program is effective in helping students attain important writing skills.

Appendix A

Technical Appendix

Overview of the Technical Appendix

The purpose of this appendix is to provide fellow researchers with additional technical information to fully evaluate the scientific rigor of this study. Specifically, this appendix is written for technical audiences so that they may examine the statistical procedures employed as well as make more informed judgments of the internal and statistical conclusion validity of this study. It is *not* written for lay people. This *Technical Appendix* contains the following information:

- Analytical goals of these analyses
- Analytical framework
- Results of data analyses by analytical framework

Analytical Goals

The evaluation of Write Source Online focuses on the following broadly-framed goals:

1. *Assessment of effectiveness of the Write Source Online Program:* Write Source Online is examined in comparison to other writing programs. The analytical framework used to identify the effectiveness of the Write Source Online program is causal in a numbers of ways:

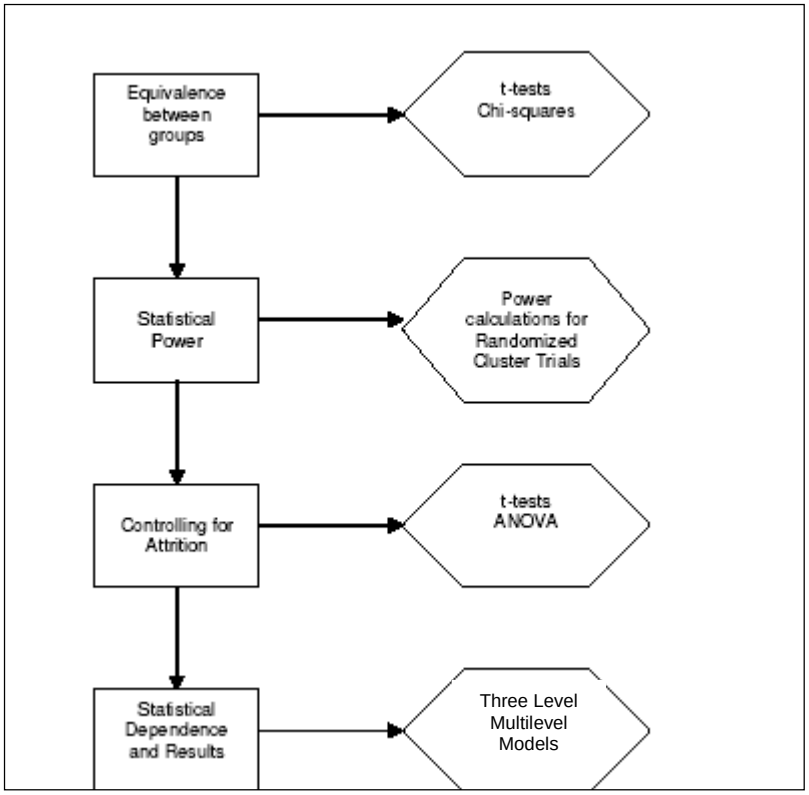
(i) As described in the body of this final report, a well-planned randomized control trial was implemented;
(ii) The analytical procedures pay close attention to multiple threats to internal validity including selection effects and attrition (Shadish, Cook, and Campbell, 2002);
(iii) Given that students are "nested" within classrooms, the data are unlikely to be independent across students; dependence in outcomes is modeled by implementing hierarchical linear models (Raudenbush and Bryk, 2002);

2. Knowledge development: The implemented design also provides an opportunity to examine student and classroom/program measures that may be associated with program effectiveness for Write Source Online. This relationship between student and classroom characteristics and program effectiveness is viewed as primarily associative and not causal for two reasons: (a) The implemented design is focused on estimating causal *main effects* for the program; the statistical power to identify program effects within subgroups is much lower; (b) There have been very few studies that have examined subgroup effects of Write Source Online as well as writing interventions as a whole. In the absence of a strong program theory, the subgroup effects are viewed as empirical patterns that need theoretical frameworks and other rigorous experimental designs in the future to be estimated "causally."

Analytical Framework

Figure A1 below and accompanying narrative show the four-step analytical procedures that were implemented to evaluate the effectiveness of Write Source Online.

Figure A1. Description of Analytical Framework



(i) *Establishing group equivalence*: The differences in the treatment and control group were examined by conducting t-tests and chi-square analyses at the student, class and teacher levels on a range of baseline outcomes and other student and teacher characteristics. Care was taken to ensure that measures on which the groups differed significantly were used as covariates in subsequent analyses.

(ii) *Statistical power*: Dependency in the data decreases the statistical power to detect significant differences. Specifically, increased values of intra-class correlations (higher dependency in the data) results in reductions in statistical power. The power to detect significant differences in clustered random trials was calculated for a range of intra-class correlations and effect sizes, and also with and without a cluster covariate.[20]

(iii) *Controlling for attrition*: In this step, consideration is given to attrition as a potential threat to both internal and external validity of the study (Cook and Campbell, 1979).

[20]The use of a cluster-level covariate that is correlated with the outcomes of interest increases the power of the test (Raudenbush et al., 2005).

Both issues of measurement attrition (i.e., missing data due to student absences or lack of test administration) and dropout attrition (i.e., missing data due to students leaving the study) were examined.

Measurement Attrition

First, chi-square analysis was performed to determine if the proportion of measurement attrition was equivalent among both groups. In other words, this analysis examined whether there was a significant relationship between students who provided and did not provide data (at *each* time point) and group assignment (treatment vs. control). Second, ANOVAs were run to determine whether there were performance differences between those who completed the tests and those who did not by group using posttest measures (to examine those not providing pretest measures) and pretest measures (to examine those not providing posttest measures). An interaction between group and test completion status would be indicative of a bias because the type of treatment students who did not complete the test would be different than the type of control students who did not complete the test.

Dropout Attrition

The potential problems of overall attrition and differential attrition due to students leaving the study was first "diagnosed" using a simple statistical procedure; specifically, chi-square analysis was conducted to determine if the proportion of dropout attrition was equivalent among both groups. Second, in order to determine whether there was differential attrition on pretest measures, ANOVAs were run to determine if there was (1) a significant interaction between group and attrition status, and (2) a significant main effect for attrition status (Cook and Campbell, 1979). A significant interaction would indicate a threat to internal validity because the type of student dropping out of the treatment group would be different than the type of student dropping out of the control group. A significant main effect would indicate a threat to external validity because the students remaining in the study would be different than the students who dropped out of the study.

(iv) *Statistical Dependency and Results:* Three-level multilevel models were implemented to estimate program effects. In the three-level model, student outcomes and characteristics were modeled at level 1, student level characteristics were modeled at level 2, and teacher characteristics were modeled at level 3. Appendix B describes the mathematical equations representing the three-level multilevel models.

Results

This section is organized according to the aforementioned analytical framework.

1. Establishing Group Equivalence

a) The relationship between various student demographic variables and group status was examined. Results showed that one variable was significantly associated with group, $p<.05$. There was a higher proportion of treatment students who were in Special Education than Write Source Online students. For more information, see Table 4 within the main report.

a) Pre-test differences on the assessment measures were examined, see Table A1. Student level t-test analyses revealed one significant difference, $p<.05$. Control students had significantly higher pretest scores than treatment students as measured by the Iowa Writing Test's rubric category of "Conventions." However, on all remaining outcomes, including the overall scores for the two main outcome measures, the ITBS Written Expression and Iowa Writing Test, no differences were observed.

Table A1. Sample Size, Means, Standard Deviations, and *t*-test (Student Level) Results for Assessments at Pre-testing

Pretest*	Group	N	Mean	Std. Dev.	*t*	Sig. Level
ITBS Written Expression	Write Source	961	236.12	46.88	-0.54	.59
	Control	785	234.91	46.14		
Iowa Writing Test	Write Source	966	60.09	32.63	0.73	.39
	Control	786	59.05	31.60		
Iowa Writing Test: Ideas	Write Source	965	61.61	33.60	1.85	.07
	Control	786	60.13	33.41		
Iowa Writing Test: Organization	Write Source	966	60.70	33.09	1.26	.21
	Control	786	58.76	30.70		
Iowa Writing Test: Voice	Write Source	966	63.84	33.54	0.80	.42
	Control	786	65.11	32.86		
Iowa Writing Test: Conventions	Write Source	965	50.56	23.69	2.17	.03
	Control	785	53.01	23.15		

b) Differences on other student characteristics were also examined. Results showed no significant differences in perceived parental and teacher support, parental attitudes toward education, school environment, school engagement, perceived writing ability, writing anxiety, writing enjoyment, writing effort/motivation, and perceived importance of writing, $p>.05$. However, a significant difference was observed in class climate, with treatment students perceiving a more positive climate than control students, $t(1690)=2.14$, $p=.03$.

c) With respect to teacher characteristics, there were no significant differences between control and treatment teachers in terms of perceptions of autonomy in setting instructional goals, adequacy of resources, administrative support, parental support, collegiality, knowledge of Common Core State Standards, teaching experience, participation in professional development in the prior three years, gender, minority status and highest degree earned, $p>.05$. However, differences were observed in teacher perceptions of class climate, $t(37)=2.50$, $p=.02$, knowledge to help students, $t(37)=1.87$, $p=.07$, and extent to which teacher followed a descriptive approach to writing instruction[21], $t(37)=2.12$, $p=.04$. Treatment teachers reported having a positive class climate, being knowledgeable on how to help students, and following a descriptive approach to a greater extent than control teachers at baseline.

d) Implementation of various typical activities that occur in middle school language arts classrooms were also analyzed based on information collected from the initial logs (August-Sept.) and pre teacher surveys. Results showed no significant differences between treatment and control classrooms in terms of diversity of student activities, amount of homework assigned, assessment use, provision of differentiated instruction, and percentage of students who turn in homework, $p>.05$. There were also no differences in the amount of time spent on: a) warm-up activities, b) direct instruction, c) small group activities, d) independent practice, and e) classroom management. No differences were also observed in the extent to which specific components of reading and writing were emphasized during instruction (e.g., fluency, vocabulary, grammar, spelling, etc.), $p>.05$.

In sum, based on these preliminary analyses the two groups were very comparable in terms of baseline student characteristics and outcomes. However, given significant differences observed between teachers (and students with respect to class climate) in the aforementioned three areas, these were controlled for during analyses of outcomes.

2. Statistical Power

The following assumptions were used to calculate the power to detect effects:

- Significance level (α) = 0.05;
- 39 clusters (classes) with an average class size of 26.
- Calculations were done both without and with a cluster covariate. Our prior research has shown that this value can range from 0.32 to 0.80. The power analysis with a moderate cluster-level covariate was set at 0.50.
- The calculations were done on a range of intra-class correlations. Research conducted by PRES Associates has shown that this value can range from 0.07 to 0.55. In addition, the What Works Clearinghouse has set a default value of 0.20 when adjusting statistics for clustering.

[21] Writing descriptively means paying close attention to the details by using all five senses. Teachers using a descriptive writing approach can develop descriptive writing skills through modeling and the sharing of quality literature full of descriptive writing and calling students' attention to interesting, descriptive word choices in classroom writing.

The *Optimal Design* software was used in the calculations in this section (Raudenbush et al., 2005). This program is designed to determine the power of longitudinal and multilevel research. Figure A2 describes the power for a cluster randomized trial for a range of intra-class correlations *without* any cluster covariate for low, medium and high power (effect sizes corresponding to 0.2, 0.5, and 0.8 respectively). Figure A3 describes the power for a cluster randomized trial with a correlated cluster variable (r = 0.50). The key point from the graphics below is that there is enough power to reasonably detect a moderate to large effect size, or a small effect if the intra-class correlation was relatively low.

Figure A2. Power vs. Intra-Class Correlations for a Range of Effect Sizes (No Cluster-Level Covariate Included)

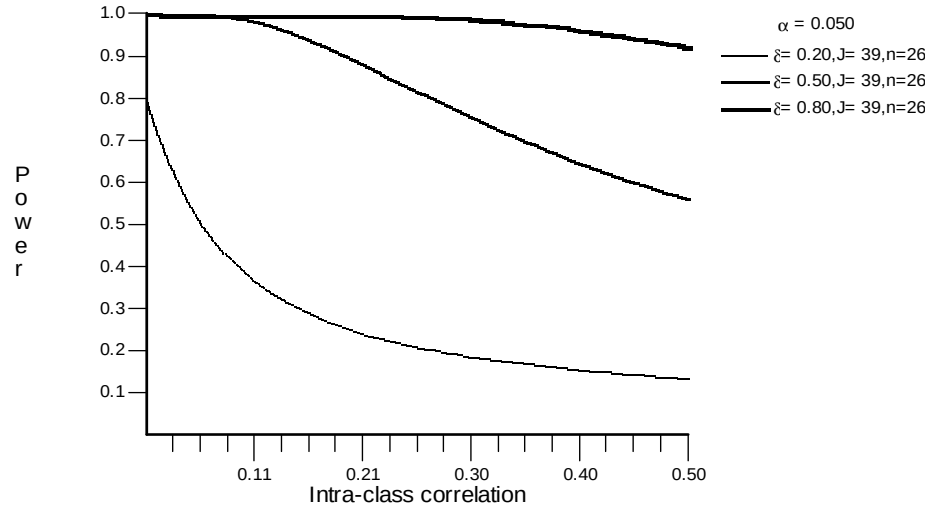
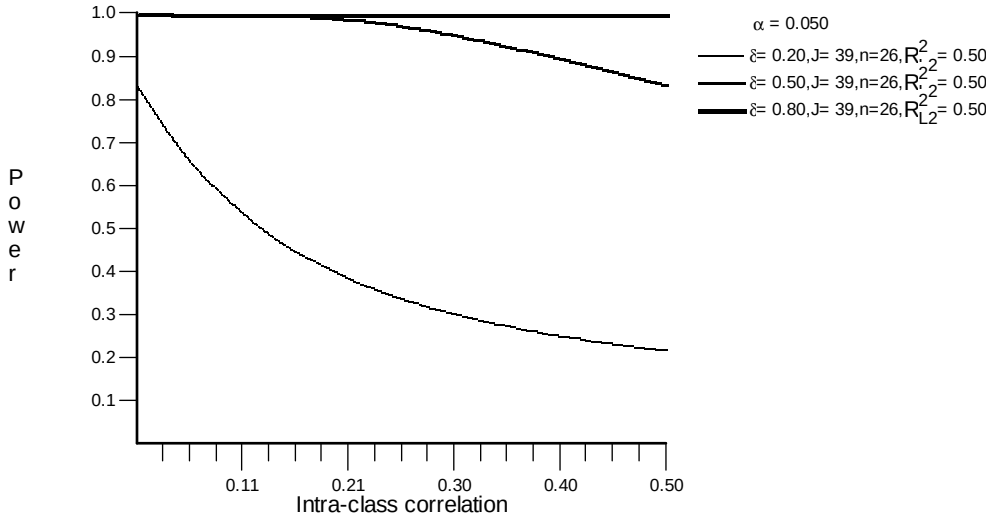


Figure A3. Power vs. Intra-Class Correlations for a Range of Effect Sizes (Cluster-Level Covariate Included)



Note: In figures A2 and A3, J refers to number of clusters, n refers to the average cluster size, δ refers to the effect size, α is the significance level, and r^2 is the correlation coefficient between the cluster-level covariate and the individual-level outcomes.

3. Attrition Analysis

As previously noted, both measurement attrition (i.e., missing data due to students not completing assessments) and dropout attrition (i.e., missing data due to students leaving the study) were examined. The approach taken in this project was to seek a consistent pattern of results of program effects across a range of methods. In this section, the observed pattern of differential attrition is examined to determine if it can explain the pattern of the observed results.

Dropout Attrition

There was an overall attrition of 5.9% due to students leaving school, transferring out of study classrooms, or moving from a treatment to control classroom (or vice versa). Analyses were performed to examine if there was *differential attrition* as a result of students leaving. First, analyses were performed to examine if the proportion of dropout attrition was equivalent among both groups. As shown in Table A2, results showed that this was the case.

Table A2. Number of Students by Enrollment Status*

	Students		
	Control	Treatment	Total
Total students enrolled in Fall	851 (100.0%)	1075 (100.0%)	1926 (100%)
Students who moved/left/ transferred out	46 (5.4%)	67 (6.2%)	113 (5.9%)
Total students remaining throughout school year	805 (94.6%)	1008 (93.8%)	1813 (94.1%)

*$\chi 2$ (1)= 0.59, p =.44

Secondly, analyses were performed to examine whether baseline performance differences existed between students who remained in the study and those who left and group assignment. Of interest in these ANOVAs were the interactions of group assignment and attrition status and the main effect for attrition status. A significant interaction would indicate a threat to internal validity. Similarly, a main effect for attrition status would suggest a threat to external validity.

Examination of the *interactions* showed no significant group by attrition status interaction on writing skills. However, a main effect for attrition was observed on the ITBS Written Expression subtest. Specifically, students who remained in the study had higher pretest scores than those who left, see Table A3. No other differences were observed on the remaining outcome measures.

Table A3. ANOVA Results for Pre-Tests by Group and Attrition Status

Measure	Attrition Status	Group	N	Mean	Sd.	ANOVA for interaction	ANOVA for main effect
ITBS-Written Expression	Attrition	Control	30	202.17	47.07	F(1, 1828)=0.47, p=0.50	F(1, 1828) =28.54, p<0.001
		Treatment	52	210.79	40.62		
	No change	Control	785	234.91	46.14		
		Treatment	961	236.12	46.88		
Iowa Writing Test	Attrition	Control	24	60.14	31.92	F(1, 1822)=0.03, p=0.86	F(1, 1822)=0.19, p=0.66
		Treatment	46	57.55	32.51		
	No change	Control	786	59.05	31.60		
		Treatment	966	60.09	32.63		

Measurement Attrition

A small portion of the students did not have data available at pre or post test due to absences on test administration days. Table A4 lists the number (and percent) of students who were in the study throughout the school year but did not provide pre or post tests. Chi-square analyses showed a significant relationship. Specifically, there were more treatment students who did not take the pretest *and* posttest as compared to control students.

Furthermore, to examine if there were any *performance* differences between those who completed tests and those that did not by group, ANOVAs were run on the post-test measures (to examine those not providing pretest measures) and on pretest measures (to examine those not providing posttest measures). Significant interactions between measurement attrition status and group assignment would suggest a bias. Results showed one significant interaction on the ITBS Written Expression subtest. The baseline performance of Write Source students who did not provide post-tests (270.5) was significantly larger that the baseline performance of students who did provide post-tests (233). This difference was smaller among control students (253 vs 232 respectively).

Table A4. Number of Students Who Did Not Provide Pre and Post Data

	Admin Time	N (%) Who Did Not Take Test			Chi-Square	ANOVA for interaction
		Control	Write Source	Total		
ITBS Written Expression	Pre (N=1750)	18 (2.2%)	45 (4.5%)	63 (3.5%)	$\chi2(1)=6.63$, p=0.01	F (1, 1746)=4.89, p=.03
	Post (N=1615)	120 (14.9%)	78 (7.7%)	198 (10.9%)	$\chi2(1)=23.64$, p<0.001	F (1, 1610)=1.91, p=.17
Iowa Writing Test	Pre (N=1753)	18 (2.2%)	42 (4.2%)	60 (3.3%)	$\chi2(1)=5.21$, p=0.02	F (1, 1752)=1.40, p=.24
	Post (N=1722)	40 (5.0%)	51 (5.1%)	91 (5.0%)	$\chi2(1)=0.008$, p=0.93	F (1, 1722)=0.001, p=.97

In summary, there was no evidence for dropout attrition. While there was some evidence for measurement attrition, it should be noted that the difference was not in favor of the treatment group. The students who did not provide post-tests had significantly higher test scores at baseline and were in the treatment group. Thus, any observed effects will have occurred despite this bias in favor of the control group.

4. Statistical Analysis of Outcomes Measures

Analysis of Growth among Treatment Students

Paired t-tests for Change from Pretest to Posttest

Table A5 presents the means obtained for treatment students using Write Source Online at pre- and posttest as measured by the outcome measures. Paired sample t-tests were conducted to examine whether there was significant change from pretest to posttest. Results showed significant growth (i.e., improvement in performance) on the ITBS Written Expression and Iowa Writing Test overall scores. When the rubric categories of the Iowa Writing Test were examined, results showed significant increases in Organization and Voice. A significant decrease was observed in use of conventions as well.

Table A5. Pre-Post Scores for Treatment Students (Paired Sample t-test Results)

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
ITBS Written Expression	Pre	233.53	45.99	888	-13.20	887	0.000
	Post	248.67	45.84	888			
Iowa Writing Test	Pre	59.88	32.69	925	-3.36	924	0.001
	Post	63.76	26.20	925			
Iowa Writing Test: Ideas	Pre	61.30	33.72	924	.441	923	0.660
	Post	60.73	26.69	924			
Iowa Writing Test: Organization	Pre	60.64	32.96	925	-3.45	924	0.001
	Post	64.96	27.54	925			
Iowa Writing Test: Voice	Pre	63.58	33.67	925	-2.57	924	0.010
	Post	66.88	28.83	925			
Iowa Writing Test: Conventions	Pre	50.44	23.82	922	3.32	921	0.001
	Post	47.41	18.85	922			

Growth Analysis of Subgroups of Treatment Students

Exploratory analysis was also performed to examine the relationship between Write Source Online and subgroup performance. That is, the results summarized in this section deal with the performance among treatment students only. It is important to note that due to the small sample sizes, no causal, conclusive statements should be made. Nevertheless, these results are presented for preliminary, exploratory purposes. Analyses were performed for the following subgroup categories: gender, ethnicity, free/reduced lunch status, special education status, grade level, and students at various writing levels. Analysis were also conducted on fidelity of implementation levels among treatment teachers (low, moderate, high).

The accompanying tables (A6-A12) include the paired t-tests' results. For these analyses, only treatment students within these subgroups are included. This provides preliminary information on whether students in these subgroups show growth in writing performance.

Gender

Table A6. Paired t-test Results for Treatment Students by Gender

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
Male							
Iowa Writing Test	**Pre**	52.78	33.63	464	-3.392	463	.001
	Post	58.65	27.80	464			
ITBS Written Expression	**Pre**	227.53	43.83	431	-10.675	430	.000
	Post	242.74	44.97	431			
Female							
Iowa Writing Test	**Pre**	67.69	29.74	450	-1.04	449	.300
	Post	69.29	23.12	450			
ITBS Written Expression	**Pre**	240.86	47.03	439	-10.96	438	.000
	Post	255.76	45.70	439			

Grade Level

Table A7. Paired t-test Results for Treatment Students by Grade Level

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
6th							
Iowa Writing Test	**Pre**	55.38	3.08	120	-1.842	119	.068
	Post	61.64	2.44	120			
ITBS Written Expression	**Pre**	211.59	3.16	129	-8.439	128	.000
	Post	230.28	3.28	129			
7th							
Iowa Writing Test	**Pre**	59.58	34.48	380	-1.381	379	.168
	Post	62.14	28.67	380			
ITBS Written Expression	**Pre**	231.56	48.48	333	-9.172	332	.000
	Post	246.89	47.10	333			
8th							
Iowa Writing Test	**Pre**	61.43	30.63	425	-2.687	424	.008
	Post	65.81	23.54	425			
ITBS Written Expression	**Pre**	241.71	44.44	426	-9.629	425	.000
	Post	255.64	45.63	426			

Free-Reduced Lunch Status

Table A8. Paired t-tests Results for Students by Free/Reduced Lunch Status

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
Not Eligible for Free or Reduced Price Lunch							
Iowa Writing Test	**Pre**	62.14	31.95	655	-2.933	654	.003
	Post	66.05	25.22	655			
ITBS Written Expression	**Pre**	239.34	46.55	625	-12.941	624	.000
	Post	253.86	45.93	625			
Free or Reduced Price Lunch							
Iowa Writing Test	**Pre**	54.95	33.42	238	-1.133	237	.259
	Post	57.65	27.78	238			
ITBS Written Expression	**Pre**	219.74	42.14	226	-7.826	225	.000
	Post	235.24	43.34	226			

Race/Ethnicity

Table A9. Paired t-tests Results for Students by Race/Ethnicity

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
White							
Iowa Writing Test	**Pre**	63.61	32.17	601	-1.98	600	.048
	Post	66.32	24.56	601			
ITBS Written Expression	**Pre**	243.24	46.30	556	-12.80	555	.000
	Post	259.07	45.64	556			
Hispanic							
Iowa Writing Test	**Pre**	51.42	32.16	148	-1.50	147	.136
	Post	56.34	29.64	148			
ITBS Written Expression	**Pre**	213.85	41.19	147	-6.01	146	.000
	Post	227.24	40.39	147			
African American							
Iowa Writing Test	**Pre**	52.20	32.00	132	-2.28	131	.024
	Post	59.32	27.78	132			
ITBS Written Expression	**Pre**	217.47	39.03	132	-5.61	131	.000
	Post	232.45	40.13	132			

Special Education Status

Table A10. Paired t-tests Results for Students by Special Education Status

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
Not Special Education							
Iowa Writing Test	**Pre**	63.44	31.33	781	-2.371	780	.018
	Post	66.37	24.50	781			
ITBS Written Expression	**Pre**	239.06	45.26	743	-14.11	742	.000
	Post	254.04	44.89	743			
Special Education							
Iowa Writing Test	**Pre**	36.94	31.33	113	-2.73	112	.007
	Post	46.70	33.76	113			
ITBS Written Expression	**Pre**	200.84	37.89	106	-5.29	105	.000
	Post	213.01	36.90	106			

Writing Levels

Table A11. Paired t-test Results for Treatment Students by Writing Skill Level at Pretest

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
Low Level (Bottom 33%)							
Iowa Writing Test	**Pre**	14.82	16.76	136	-7.77	135	.000
	Post	34.43	27.65	136			
ITBS Written Expression	**Pre**	183.76	25.30	137	-8.36	136	.000
	Post	204.55	31.63	137			
Average Level (Mid 33%)							
Iowa Writing Test	**Pre**	54.95	27.18	371	-3.34	370	.001
	Post	61.46	24.21	371			
ITBS Written Expression	**Pre**	215.48	31.46	371	-10.70	370	.000
	Post	232.25	35.32	371			
High Level (Top 33%)							
Iowa Writing Test	**Pre**	78.93	23.94	418	2.26	417	.025
	Post	75.35	18.27	418			
ITBS Written Expression	**Pre**	269.09	35.65	380	-7.87	379	.000
	Post	280.61	36.75	380			

Implementation Fidelity Levels

Table A12. Paired t-test Results for Treatment Students by Level of Implementation

Test	Time	Mean	Std. Deviation	N	t	df	Sig.
Low Fidelity of Implementation							
Iowa Writing Test	**Pre**	56.44	33.21	291	-1.09	290	.276
	Post	58.84	29.17	291			
ITBS Written Expression	**Pre**	227.47	44.65	300	-10.48	299	.000
	Post	245.23	44.68	300			
Moderate Fidelity of Implementation							
Iowa Writing Test	**Pre**	60.98	31.91	266	-1.57	265	.117
	Post	64.30	22.82	266			
ITBS Written Expression	**Pre**	237.59	47.99	267	-8.97	266	.000
	Post	253.57	48.18	267			
High Fidelity of Implementation							
Iowa Writing Test	**Pre**	61.81	32.70	368	-3.10	367	.002
	Post	67.26	25.47	368			
ITBS Written Expression	**Pre**	235.82	45.07	321	-7.24	320	.000
	Post	247.82	44.70	321			

Analysis of Program Effects

Independent Sample t-tests

Table A13 describes the means for the treatment and control groups for the two main outcomes at post-testing. Independent sample t-tests were conducted for each of the outcomes. A statistically significant difference in favor of the treatment group was obtained for the Iowa Writing Test. However, these differences do not account for clustering. The multilevel models described below incorporate dependency issues described above as a result of the hierarchical nature of the data.

Table A13. Sample Size, Means, Standard Deviations, and *t*-test (Student Level) Results for Assessments at Post-testing

Test	Group	Mean	Std. Deviation	N	t	df	Sig.
Iowa Writing Test	Control	58.89	27.29	765	-3.43	1720	.001*
	Write Source	63.36	26.45	957			
ITBS Written Expression	Control	244.85	47.75	683	-1.00	1608	.32
	Write Source	247.21	46.20	927			

** = p<.05*

Multilevel Models

Three-level multilevel models were implemented to examine program impacts. The three level model focuses on both the *levels* in outcomes at baseline and *change* in outcomes from baseline to follow-ups[22]. In this model, the first level incorporates changes over time for each individual. The second level includes student level covariates. The third level incorporates class/school level information. This first set of initial models examines only the direct effects of the program (see Appendix B for mathematical description of the model). Separate multilevel models were run for each of the following assessments.

Outcome measures in the model include:

- ITBS Written Expression, Iowa Writing Test, and Iowa Writing Test rubric categories (Voice, Conventions, Organization, Ideas)

Student level covariates in the model include:

- Group (Treatment=1; Control=0)

Other individual level covariates including special education status and free/reduced lunch status were also available. However, due to small sample sizes and/or missing data for these variables, these covariates were excluded from the multilevel analysis as this would reduce the analytical sample. Teacher/class level covariates included class climate, knowledge to help students with learning, and extent to which descriptive approach to writing instruction was employed. As well, school (dummy coded) was included at level 3.

The direct effects multilevel model was run on each of the measures noted above. Table A14 summarizes the results of the main program effects. Note that each measure in Table A14 corresponds to the program effect coefficients estimated for that dependent variable from a separate multilevel model. Significant differences (at the .05 level) in the slope (growth rates) at were observed between the treatment and control groups for the following measures: Iowa Writing Test overall score, Iowa Writing Test: Voice, and Iowa Writing Test: Conventions. All observed effects were positive, in favor of the treatment group.

Note that unlike the results presented in Table A13, these analyses incorporate student and teacher level information. When this is done via multilevel modeling, significant differences are obtained as described above. The effect sizes are also calculated; the effect sizes for the effect of Write Source Online on student performance ranged from .15 to .30.

[22] Note that although significant differences were observed for the Word Analysis subtest at pre-testing via the t-tests, analyses of pretest differences via the multilevel models showed no significant baseline differences. Therefore, three level models were run on the Word Analysis subtest. That said, two-level models controlling for pretest performance on Word Analysis were also conducted and revealed consistent results.

Table A14. Main Program Effects from Multilevel Models[a]

Outcome Measures	Coefficient	Std. Error	t-ratio	df	Sig. Level	Effect Size [23]
ITBS Written Expression Scale Score -**Pretest**	0.64	5.59	0.115	1773	0.91	
ITBS Written Expression Scale Score –**Slope**	3.12	2.21	1.416	1491	0.16	--
Iowa Writing Test Percentile: Overall -**Pretest**	-2.96	2.99	-0.990	1773	0.32	
Iowa Writing Test Percentile: Overall–**Slope**	6.98	2.32	3.003	1609	0.003	.15
Iowa Writing Test Percentile: Conventions -**Pretest**	-3.37	2.28	-1.475	1773	0.14	
Iowa Writing Test Percentile: Conventions –**Slope**	5.74	1.82	3.149	1609	.002	.20
Iowa Writing Test Percentile: Voice -**Pretest**	-6.55	3.16	-2.08	1773	0.04	
Iowa Writing Test Percentile: Voice–**Slope**	10.11	2.56	3.95	1609	0.001	.30
Iowa Writing Test Percentile: Organization -**Pretest**	-1.30	2.86	-0.456	1773	0.65	
Iowa Writing Test Percentile: Organization–**Slope**	3.49	2.46	1.418	1609	0.16	--
Iowa Writing Test Percentile: Ideas -**Pretest**	-0.59	2.90	-0.204	1773	0.84	
Iowa Writing Test Percentile: Ideas–**Slope**	4.26	2.60	1.642	1609	0.10	--

*$p<.05$

Multilevel Models of Subgroup Effects

Subgroup effects were analyzed via multilevel modeling. The main effects multilevel models were re-specified to re-estimate program effects for the following subgroups: gender (*female)*, ethnicity (*White, Hispanic, African American*), grade, free/reduced lunch status, special education status, and writing ability level. Given strong correlations between the various interaction terms and multicollinearities in the model, the subgroup effects were obtained by adding the interaction term(s) corresponding to each subgroup separately. Thus, separate models were run to obtain subgroup effects.

It is important to view this analysis as exploratory for a number of reasons: (i) the treatment and control groups were not randomized by subgroups; (ii) the sample sizes for a number of the subgroups are quite small; and (iii) differences were obtained between the treatment and control groups at baseline for some of the subgroups.

Tables A15-A16 summarize the results of the subgroup analyses for the key outcome measures. Only statistical significant results are presented. In addition, to ease in the presentation of findings, only coefficients associated with the interaction between subgroup designation and group are presented in the tables.

Significant effects were obtained for many subgroups. Specifically, results showed significant differences on the Iowa Writing Test between Write Source Online students and control students in the following subgroups: African Americans and Whites, 7th graders, Special Education students, and students classified as "average ability" via the pretest. In all these cases, Write Source Online students showed greater performance gains than control students from the same subgroup. In addition, Write Source Online 6th graders and students classified as high

[23] Formula for calculating the effect size is in Appendix A.

ability based on pretest performance outperformed control students in these subgroups on the ITBS Written Expression subtest. Only one negative effect was observed; 6th grade control students had significantly higher scores than Write Source Online students on the Iowa Writing Test.

In sum, these results suggest that Write Source Online may be more effective with certain subgroups as compared to other writing programs, but additional research is needed before more definitive conclusions about the impact of Write Source Online on subgroups of students can be made.

Table A15. Subgroup Effects from Multilevel Models: Iowa Writing Test

	Coefficient	Std. Error	t-ratio	Sig. Level
White				
Baseline	-3.41	3.09	-1.106	0.27
Follow-up	6.65	2.65	2.512	0.01
African American				
Baseline	-1.45	4.53	-0.321	0.75
Follow-up	8.52	4.87	1.750	0.08*
Special Education				
Baseline	-6.01	4.64	-1.296	0.20
Follow-up	16.11	5.71	2.822	0.005
Average Level				
Baseline	-2.27	1.98	-1.147	0.25
Follow-up	10.88	2.64	4.120	<.001
Grade 6				
Baseline	5.33	6.50	0.820	0.41
Folllow-up	-8.41	4.79	-1.756	0.08*
Grade 7				
Baseline	-8.66	4.56	-1.898	0.06
Folllow-up	7.59	2.76	2.747	0.006

*p<.10

Table A16. Subgroup Effects from Multilevel Models: ITBS Written Expression

	Coefficient	Std. Error	t-ratio	Sig. Level
High Level Writers				
Baseline	-0.02	3.27	-0.007	0.99
Follow-up	7.41	3.02	2.450	0.01
Grade 6				
Baseline	-4.41	11.70	-0.377	0.71
Follow-up	9.56	4.50	2.124	0.03

Appendix B

Mathematical Details of Multilevel Models

The Structure of the Three-level Multilevel Model for Program Effects

The three-level multilevel model had the following structure (note that the variable names are described in the text):

Level-1 Model

$$\text{Outcome}_{tij} = \pi_{0ij} + \pi_{1ij}*(TIME_{tij}) + e_{tij}$$

Level-2 Model

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}*(GROUP_{ij}) + r_{0ij}$$
$$\pi_{1ij} = \beta_{10j} + \beta_{11j}*(GROUP_{ij})$$

Level-3 Model

$$\beta_{00j} = \gamma_{000} + \gamma_{001}(SCHOOLA_j) + \gamma_{002}(SCHOOLE_j) + \gamma_{003}(SCHOOLG_j) + \gamma_{004}(SCHOOLF_j) + \gamma_{005}(SCHOOLD_j) + \gamma_{006}(SCHOOLH_j) + \gamma_{007}(SCHOOLB_j) + \gamma_{008}(SCHOOLC_j) + \gamma_{009}(DESCSCAL_j) + \gamma_{0010}(HELPSCAL_j) + \gamma_{0011}(CLASSSCA_j) + u_{00j}$$
$$\beta_{01j} = \gamma_{010}$$
$$\beta_{10j} = \gamma_{100} + \gamma_{101}(SCHOOLA_j) + \gamma_{102}(SCHOOLE_j) + \gamma_{103}(SCHOOLG_j) + \gamma_{104}(SCHOOLF_j) + \gamma_{105}(SCHOOLD_j) + \gamma_{106}(SCHOOLH_j) + \gamma_{107}(SCHOOLB_j) + \gamma_{108}(SCHOOLC_j) + \gamma_{109}(DESCSCAL_j) + \gamma_{1010}(HELPSCAL_j) + \gamma_{1011}(CLASSSCA_j)$$
$$\beta_{11j} = \gamma_{110}$$

Note that γ_{110} is a measure of program impact.

Effect Size

Following the guidelines set forth by the What Works Clearinghouse (2008), the effect sizes were calculated using the following formula:

> *Hedges's g for intervention effects estimated from HLM analyses is defined in a similar way to that based on student-level ANCOVA: adjusted group mean difference divided by unadjusted pooled within-group SD. Specifically,*

$$g = \frac{\gamma}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{(n_1+n_2-2)}}}$$

> *where γ is the HLM coefficient for the intervention's effect, which represents the group mean difference adjusted for both level-1 and level-2 covariates, if any; n_1 and n_2 are the student sample sizes, and S_1 and S_2 are the posttest student-level SDs for the intervention group and the comparison group, respectively.*

Appendix C:

Write Source Online Implementation Guidelines

HOUGHTON MIFFLIN HARCOURT

Write Source Online RCT Study

Implementation Guidelines

INTRODUCTION

Welcome and thank you for participating in the Randomized Control Trial being conducted by PRES Associates[24], on the Houghton Mifflin Harcourt *Write Source Online* program. We hope your experience with our study will be a rewarding one. Not only will you contribute to cutting edge research, but you will also benefit from targeted professional development provided by Houghton Mifflin Harcourt professional training specialists.

We realize that it can be challenging to change former teaching practices and implement a new writing program. We understand that there may be associated obstacles and challenges with the beginning of implementation of any new program. For these reasons, we want and need to hear from you so that we can help guide you through any initial challenges you might encounter. In fact, it is critical that any problems encountered are addressed as soon as possible to ensure that this program is being implemented to its full potential. Feel free to contact PRES Associates via e-mail at studies@presassociates.com if you have any questions, problems or concerns. We greatly appreciate the time and effort you will contribute towards making this study a success.

The following provides answers to some common questions teachers may have related to this study. Please read through all of these and should you have further questions, please contact PRES Associates.

WHY IS THIS RESEARCH BEING DONE?

As you are aware, the No Child Left Behind Act (NCLB) of 2001 requires that educational materials and strategies used by educators in the classroom *must be proven by scientific research to improve student achievement in the classroom.* Houghton Mifflin Harcourt has developed a strong research model for determining that their programs are scientifically based. As part of this research agenda, Houghton Mifflin Harcourt has contracted with PRES Associates, an external educational research firm, to conduct a randomized control trial (RCT) focused on a rigorous evaluation the effectiveness of the *Write Source Online* program in helping middle school students (grades 6-8) attain critical writing skills.

[24] PRES Associates is an external, independent, educational research firm with an established track record in conducting large-scale, rigorous evaluations on the effectiveness of research materials.

WHAT ARE THE TRAININGS FOR?

It takes more than a good curricular program to provide effective and meaningful lessons in writing. It also takes good teachers with a thorough understanding of the curriculum, who are supported by professional development, school administrators, and parents/guardians. To this end, it is hoped that through the professional development training session provided by Houghton Mifflin Harcourt on the use of its writing program, all teachers participating in the study will gain the knowledge and skills to successfully implement this program fully from the start.

As you will soon learn, this writing program provides numerous teaching resources and supports. In order to implement this program successfully, it is essential that teachers have a thorough understanding of the resources provided by the *Write Source Online* program. Rather than having teachers figure it out on their own, professional trainers will guide you through this process, offering examples of when to use certain materials, how to structure and pace classroom instruction, what types of assessments to administer, and so forth.

WHY DO I NEED TO FOLLOW THESE IMPLEMENTATION GUIDELINES?

Teacher Implementation Guidelines have been developed as part of this research study on *Write Source Online* in order to promote full and effective use of the program. The guidelines are being provided to teachers as a reference to draw from when implementing the new program in their class(es). Specifically, the *Write Source Online* implementation guidelines point out key program components that *must* be implemented during writing instruction because they are integral to the program and have the greatest influence on student learning and performance. In addition, it is critical to ensure that all teachers are implementing a similar instructional model. That is, if teachers are modifying the program to an extent that it no longer resembles the original program, the research study will not provide accurate information on the effects of the *Write Source Online* program. In sum, by providing these implementation guidelines, we are attempting to (1) maximize the potential of this writing program to help your students, and (2) ensure that the program is being implemented with fidelity across all teachers using the program. To reiterate, *it is essential that all teachers using the program fully apply the following implementation guidelines as prescribed.* That being said, there are optional parts to the program as well as ancillary resources that provide you with the flexibility you need to address unique student needs or contexts. *We trust your professional judgment and ask that you try to implement the program as best you possibly can while meeting your students' instructional needs.*

Again, thank you for your participation in this study. You are an integral part of this endeavor and we appreciate your assistance. We look forward to working with you.

Using the Write Source Online Program

It is expected that teachers will utilize the Write Source Online program a minimum of 45 minutes a day, at least 3 times per week. While teachers have been provided with the Write Source print materials (i.e., Teachers Edition and Assessment Guide), it is expected that most classroom instruction and assignments would stem from Write Source Online resources.

Teaching the Unit

The Write Source Online program is organized by 7 forms of writing: Descriptive Writing, Narrative Writing, Expository Writing, Persuasive Writing, Response to Literature, Creative Writing, and Research Writing. Each form of writing represents a Unit within the Teachers Edition and each Unit includes a suggested weekly plan for writing instruction. Teachers should follow the weekly plan as indicated utilizing the Write Source Online components as indicated.

- **Items in bold below are critical core instructional activities that have been identified as necessary for optimal use of the *Write Source Online* program and as a study participant we will need you to incorporate these instructional activities into your writing lessons.**
- *Items italicized below have been identified as important activities, but are not required for use as part of the study;* if you are able to incorporate them great, but if not, that's ok too.

Components of Write Source Online

- ✓ **Interactive White Board Lessons** – It is very important that the Interactive Whiteboard lessons are utilized to introduce each Writing Unit. These presentations are designed to generate interest, promote engagement, and build background skills in each major form of writing.
- ✓ **Net-Text** – Assign Net-Text assignments as they correspond to the Writing Unit to explore each stage of the writing process. This online worktext features interactive instruction, online document creation, peer to peer commenting and integrated grammar.
- ✓ **Grammar Snap** – Assign Grammar Snap lessons as they correspond to the Writing Unit to reinforce and extend understanding of key topics. Each Grammar Snap lesson contains a Mini Lesson/video, Practice Activity, Game, and Quiz. It is left to the teachers' discretion to decide which Grammar Snap activities are assigned within each lesson.
- ✓ *Write Source Online Portfolio* – Students should utilize the Portfolio as it corresponds to the Writing Unit plan as a forum to share and reflecting on their writing.
- ✓ *Book Shelf* – The Book Shelf contains Write Source print component e-books which are available as an additional resource for teachers.
- ✓ *File Cabinet* – The File Cabinet contains printable teacher resources such as blackline masters and assessments. Teacher discretion is allowed in deciding how and when to utilize these resources.

Appendix D:

Case Study of Site Visits

Case Study of Site Visits

Site visits are crucial in terms of helping us better understand the context in which a program is being used. In addition, environmental factors (e.g. school factors, local history effects) can influence the results of a study making it necessary, at the very least, to document such factors. The case study of site visits is accomplished by triangulating the data from the site/classroom observations, post-observation interviews, the implementation logs, and capturing the perspectives of various participants[25]. The following provides information about each of the sites, collected from the participating teachers, school administrators, and our own school-related research.

School A

About the School: School A is a public middle school located in an suburban residential community in Arizona. The school consists of a mid-aged building that houses students in grades 6-8. During the 2010-2011 school year, enrollment at School A was 788 with a student to teacher ratio of 18 to 1.

In 2012, Arizona used the Arizona Instrument to Measure Standards (AIMS) to test students in grades 6-7 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Arizona. Results show that 64% of 6th grade students and 63% of 7th grade students at School A were proficient or above in writing, which is higher than the state average of 56% and 52% respectively. The student population is predominantly White:

- 65% White
- 26% Hispanic
- 3% Asian
- 3% Black

Approximately 8% of the students at the school were eligible for free or reduced-price lunches, and 1% were classified as English Language Learners.

Study Participants: Two 6th grade teachers participated in the study with 6 classes randomly assigned (3 control and 3 treatment). Thus, there were 6 participating study classes. The 6 classes contained approximately 162 students, with an average class size of 27, and a range of 19 to 33.

[25] It is important to note that, when interpreting information from such qualitative data collection techniques, the data reported consist of recurrent and shared themes that emerged. That is, comments from a single individual which are not reflective of a larger proportion of respondents are not identified as a finding or "theme."

Both teachers had classes that they characterized as typical for the most part, with both teachers noting a mix of high and low students in all classes with one exception. One teacher had one control class that was considered "high" with many higher performing students.

Writing Curriculum and Resources: The control program consisted of a 2005 middle grades writing textbook. However, it was commented that this book was only used to supplement lessons on grammar and usage mechanics. Students also had access to an online program that students accessed at home to get extra help with writing and grammar skills.

The control program used at School A was similar to the Write Source Online program with its focus on the 6 traits and grammar usage and mechanic skills. Other similarities include organization around each of the various writing forms, integrated grammar instruction and opportunities for student modeling and scoring rubrics. In general though, the Write Source Online program is a technology driven program that provides interactive instruction and feedback at every level of the writing process.

In treatment classes, the teacher was observed following the Write Source Online program exclusively and adhering to the implementation guidelines.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teachers only taught reading and writing). Classes lasted for 52 minute periods (students had a double period to cover both reading and writing instruction) and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section had access to a class set of textbooks that the teacher used as a reference.

Writing instruction in treatment and control classrooms varied somewhat in structure. Treatment classroom lessons for non-computer lab days generally started with a bell work activity followed by a brief whole group review. This occurred every day of the week except for Friday when the teacher would give the students a brainteaser activity instead. The teacher would then provide direct instruction and modeling for 20-30 minutes. This was then followed by students completing an activity or worksheet independently for 15 minutes. Two days a week the teacher would take the students to the computer lab to access the Write Source Online program. In general the teacher reported not assigning homework on a regular basis but would occasionally have students complete a Write Source Online assignment at home.

Lessons in the control classrooms would generally begin with students reading examples from their text book or the teacher using online resources to provide examples. Next the teacher would lead the class in a modeling activity on the smart board for about 10 minutes. This would be followed by independent practice work with partners for 10 minutes. Following the independent activity they would reconvene to discuss answers as whole group. Class would end with a short writing assignment that the teacher used as an exit ticket. The only homework the teacher assigned was reading.

Assessment: In terms of assessment practice there was very little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion,

etc.) occurred with equal regularity in both treatment and control classes. As well, teachers used a 6+1 writing rubric to grade all writing assignments that all writing teachers in the school followed. The only difference between treatment and control classes was use of the Write Source Online program topics for their writing assignments.

***Comparability**:* In terms of overall comparability, both the Write Source Online and the control classrooms were similar with few exceptions. For example, writing strategies and the writing process was presented in both treatment and control classes and students in both treatment and control were taught the same concepts, although the sequence and materials used were different. However, treatment classrooms were more likely to teach grammar in the context of writing and teach literary devices such as similes and metaphors. Both classrooms included equal instruction on procedural writing, expressive writing and expository writing. However, students in treatment classrooms had more instruction on persuasive and narrative writing and more often utilized graphic organizers. In addition students in treatment classrooms had more opportunities to use a word processor for completing writing assignments than did control students. Among the participating teachers' classes, no contamination was noted and student engagement and interest was average.

School B

About the School: School B is a public middle school located in a suburban residential community in Connecticut. This school is an academy with enrollment based on a lottery that students may choose to attend and is located on a satellite campus at a local high school building. The academy houses students in grades 6-8 and receive all the same instruction as students in the regular campus but focuses on Science, Technology, Engineering and Mathematics. During the 2012-2013 school year, enrollment at School B was 256 with a student to teacher ratio of 14 to 1.

In 2012, Connecticut used the Connecticut Mastery Test (CMT) to test students in grades 6-8 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Connecticut. Results show that 84% of 7th grade students at School B were proficient or above in writing, which is higher than the state average of 66%. The student population is predominantly White:

- 85% White
- 7% Hispanic
- 4% Asian
- 2% Black
- 2% Two or more races

Approximately 7% of the students at the school were eligible for free or reduced-price lunches which is less than the state average of 34%.

Study Participants: One teacher participated in the study: this teacher taught both a treatment and control class due to the small school population. At the 7th grade level, the teacher taught one

treatment class period and one control class period for a total of two classes (1 control and 1 treatment). Thus, there were 2 participating study classes. The 2 classes contained approximately 50 students, each with a class size of 25.

The teacher characterized both participating classes as lower for the most part. The treatment class was considered "low" with many lower performing and special education students. The control class was considered "low-average" with low to average performing students. This class also included students with individual education plans.

Writing Curriculum and Resources: Curriculum for the control class consisted of a mix of whatever resources the teacher had collected over the years, both commercial and teacher made, for their writing program. There was not a commercial program in place at School B. The teacher followed the district curriculum map to determine the timeline of topics to cover throughout the year but mostly paced the classes based on student needs. For the participant's treatment class the teacher was able to follow the curriculum map while using the Write Source Online program.

There were a few similarities between the teacher-created control program and the Write Source Online program. Similarities included opportunities for computer use in the classroom and grammar instruction. However, in general the Write Source Online program integrated more structure in the writing process and grammar instruction was more in depth and to a larger degree than the control programs the teachers created. In addition, the treatment class had organized lesson plans in terms of when and how to deliver writing and grammar lessons, while within the control class, the teacher had to create and structure the lessons they taught based on what they considered necessary in order to follow the district curriculum map.

In the treatment class, the teacher was observed following the Write Source Online program and adhering to the implementation guidelines. The teacher stated that she used all of the Write Source Online components except for the Online Portfolio and print materials.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teacher only taught language arts). Classes lasted for 56 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section did not have access to a commercially published textbook.

Writing instruction in treatment and control classrooms followed the same structure, the only difference between the two classes was the materials used. Both treatment and control classes followed the same 6 week structure for completing a writing unit. A unit would generally begin with and introduction to the writing topic and a mini project to apply the concept. Students would then begin writing their topic papers with instruction focused on introductory paragraph strategies and body paragraph building. Next students would work on transitions and their conclusion paragraphs. Finally students would edit and revise their papers and submit their final drafts. The teacher would also typically introduce new vocabulary words on a Monday and have students complete a read and respond exercise on Fridays. Anything not finished in class was to be completed as homework. In addition, the teacher would assign homework from the Write

Source Online program, such as grammar snap activities or file cabinet worksheets, to students in treatment classes. Students in control classes were not typically assigned additional homework.

Assessment: In terms of assessment practice there was very little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. As well, the teacher used a state developed writing rubric to grade all writing assignments in both treatment and control classrooms. Additionally the teacher would have both groups of students take vocabulary quizzes on Fridays and a grammar quiz two times a month. The only difference between the treatment and control class was the treatment class used the Write Source Online program topics for their writing assignments.

Comparability: In terms of overall comparability, both the Write Source Online and the control classrooms were very similar with few exceptions. For example, the writing process and grammar activities were presented in both treatment and control classes, and students in both treatment and control were taught the same concepts, although the materials used were different. However, treatment classrooms were more likely to explicitly teach spelling, grammar and punctuation rules and actively engage in all steps of the writing process. Additionally students in the treatment classroom were slightly more likely to edit their own work throughout the writing process provide critical/evaluative writing review. Both classrooms included equal classroom instruction on persuasive, expressive and expository writing forms. However, students in treatment classrooms had slightly more instruction on narrative writing and more often had students complete free-write activities. Other similarities between treatment and control classrooms included similar opportunities to use a word processor for completing writing assignments and student self-assessment. Among the participating teacher's classes, no contamination was noted and student engagement was average.

School C

About the School: School C is a public middle school located in a suburban residential community in Georgia. The school consists of a mid-aged building that houses students in grades 6-8. During the 2010-2011 school year, enrollment at School A was 626 with a student to teacher ratio of 15 to 1.

In 2012, Georgia used the Middle Grades Writing Assessment (MGWA) to test students in grade 8 in Writing. The test is standards-based, which means it measures how well students are mastering specific skills defined for each grade by the state of Georgia. Results show that 80% of 8th grade students at School C were proficient or above in English Language Arts, which is lower than the state average of 82% in 8th grade. The student population is predominantly Black:

- 44% Black
- 25% Hispanic
- 24% White
- 4% Two or more races
- 2% Asian

Approximately 61% of the students at the school were eligible for free or reduced-price lunches, 4% were classified as English Language Learners and 11% were classified as students with disabilities.

Study Participants: Eight teachers participated in the study: four teachers were treatment and four teachers were control. At the 6th grade level there were three teachers teaching five treatment classes and one teacher teaching two control classes. At the 7th grade level there were two teachers teaching three treatment classes and three teachers teaching four control classes. At the 8th grade level there was one teacher teaching eight treatment classes and two teachers teaching three control classes. In total there were 19 participating study classes, 10 treatment and nine control classes. The 19 classes contained approximately 425 students, with an average class size of 22, and a range of 9 to 32.

The participating teachers characterized participating classes a mix of high and low students with some exceptions. One control teacher, which taught both 7th and 8th grade classes had only gifted students, and another control teacher that taught both 6th and 7th grade classes had students that were considered remedial. Likewise, one treatment teacher that taught both 6th and 7th grade classes had only remedial students that were segregated from the "regular" classes and another treatment teacher that had 6th grade classes considered students the class to be high.

Writing Curriculum and Resources: Curriculum for the control classes consisted of a commercially published textbook and a mix of whatever resources the teachers had collected over the years, both commercial and teacher made, for their writing program. While all teachers had this commercially published textbook available to the students, all control teachers commented that this text was used as a reference book for review and used teacher created materials to plan their lessons. All teachers followed the district curriculum map to determine the timeline of topics to cover throughout the year. For the treatment classes the teachers were able to follow the curriculum map while using the Write Source Online program.

There were a few similarities between the control program used and the Write Source Online program. Similarities included instruction throughout the writing process and comprehensive language and grammar lessons. Both programs also include opportunities for modeling. However, the Write Source Online program focused more on providing students opportunities for interactive instruction and support for 21st century learners.

In the treatment classes, the teachers were observed following the Write Source Online program and adhering to the implementation guidelines. The treatment teachers stated that they had used all of the Write Source Online components except for the Online Portfolio. One treatment teacher additionally stated that they had been unable utilize the Interactive White Board lessons as often due to an incompatibility with their white board program.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teachers only taught language arts). Classes lasted for 50 minute periods and occurred every day during the same time for the duration of the year. All students participating in the

treatment section had access to Write Source Online materials. Students participating in the control section had access to their commercially published language arts program adopted by the school district.

There was little variation in writing instruction in treatment and control classrooms. All lessons generally started with a 5 minute warm up activity. Most teachers used some sort of grammar activity for this; teachers using Write Source Online stated that they used something from the Daily Language Workouts book for this. Next the teacher would provide whole group instruction which would lead to a small group or individual activity. In treatment classes this would generally be a Net-Text assignment or Grammar Snap activity. Classes would end with a summarizing activity in which the class would return to whole group and the teacher would summarize what was learned that day.

Homework activities varied between treatment and control classes. For most teachers anything not finished in class was to be completed as homework. All control teachers reported not assigning any additional homework for the most part. Treatment classes typically assigned homework 4 nights a week from the Write Source Online program such as Grammar Snap activities or File Cabinet worksheets. However, the treatment teacher with remedial students only reported not assigning any additional homework.

Assessment: In terms of assessment practice there was very little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. As well, the teachers used a state developed writing rubric to grade all writing assignments in both treatment and control classrooms. Additionally all teachers used common district assessments on a quarterly basis. Two of the treatment teachers reported also administering a weekly grammar quiz. The only difference between treatment and control classes was the treatment teachers used the Write Source Online program topics for their writing assignments.

Comparability: In terms of overall comparability, with the exception of the 7^{th} and 8^{th} grade gifted classes, both the Write Source Online and the control classrooms were similar with few exceptions. For example, spelling grammar and punctuation rules, pre writing/planning, drafting and revising, and editing and proofreading strategies were presented in both treatment and control classes with equal regularity. As well students in both treatment and control were taught the same writing forms, due to district and state curriculum maps, although the materials used were different. However, treatment teachers were more likely to teach grammar in the context of writing, teach students test taking strategies and use graphic organizers during writing instruction. In addition students in treatment classrooms had more opportunities to work with multiple reference sources (e.g., dictionary, encyclopedia, and internet sites) than did control students. Among the participating teachers' classes, no contamination was noted.

School D

About the School: School D is a public middle school located in a rural residential community in Kansas. The school consists of a mid-aged building that houses students in grades 6-12. During the 2010-2011 school year, enrollment at School D was 200 with a student to teacher ratio of 10 to 1.

In 2009, Kansas used the Kansas State Assessments (KSA) to test students in grade 8 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Kansas. Results show that 44% of 8th grade students at School D were proficient or above in writing, which is lower than the state average of 74%. The student population is predominantly White:

- 95% White
- 4% Hispanic
- 4% Asian
- 1% Black
- 1% Two or more races

Approximately 44% of the students at the school were eligible for free or reduced-price lunches which is less than the state average of 48%.

Study Participants: One teacher participated in the study: this teacher taught both a treatment and control class due to the small school population. The teacher taught one 7th grade treatment class period and one 8th grade control class period for a total of two classes (1 control and 1 treatment). Thus, there were 2 participating study classes. The 2 classes contained approximately 48 students, each with a class size of 24.

The teacher characterized both participating classes as mixed with both high average and low students.

Writing Curriculum and Resources: Curriculum for the control class consisted of a mix of whatever resources the teacher had collected over the years, both commercial and teacher made, for their writing program. There was not a commercial program in place at School D. The teacher followed the district curriculum map to determine the timeline of topics to cover throughout the year but mostly paced the classes based on student needs. For the participants treatment class the teacher was able to follow the curriculum map while using the Write Source Online program.

There were a few similarities between the teacher-created control program and the Write Source Online program. Similarities included opportunities for computer use in the classroom and grammar instruction. However, in general the Write Source Online program integrated more structure in the writing process and grammar instruction was more in depth and to a larger degree

than the control programs the teacher created. In addition, the treatment class had organized lesson plans in terms of when and how to deliver writing and grammar lessons, while the teacher had to create and structure the lessons they taught in the control class based on what she considered necessary in order to follow the district curriculum map.

In the treatment class, the teacher was observed following the Write Source Online program and adhering to the implementation guidelines. The treatment teacher stated that she used all of the Write Source Online components except for the Online Portfolio and digital file cabinet materials.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teachers only taught language arts). Classes lasted for 51 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section did not have access to a commercially published textbook.

Writing instruction in treatment and control classrooms followed the same daily structure, the only difference between the two classes was the materials used. The only exception to this was the warm up activity, in which treatment students only would receive a 10 minute warm up activity at the beginning of class. Following this both treatment and control classes would spend approximately 25-30 minutes in whole group instruction on the days lesson. Then students would complete an assignment either in small groups or independently. Anything not finished in class was to be completed as homework. Students in treatment and control classes were not typically assigned additional homework.

Assessment: In terms of assessment practice there was very little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. As well, the teacher used a writing rubric to grade all writing assignments in both treatment and control classrooms. The only difference between treatment and control classes was the treatment class used the Write Source Online program topics for their writing assignments.

Comparability: In terms of overall comparability, both the Write Source Online and the control classrooms were very similar with few exceptions. For example, the writing process and grammar activities were presented in both treatment and control classes and students in both treatment and control were taught the same concepts, although the materials used were different. However, treatment classrooms were more likely dedicate more classroom time to fluency and grammar instruction. Students in control classrooms had slightly more instruction on poetry, persuasive writing and more often had opportunities for free-write activities. Similarities between treatment and control classrooms included similar opportunities to use a word processor for completing writing assignments, instruction in narrative, expository and technical writing forms, and opportunities for small group work. Among the participating teacher's classes, no contamination was noted.

School E

About the School: School E is a public middle school located in a rural residential community in Michigan. The school consists of a mid-aged building that houses students in grades K-12. During the 2010-2011 school year, enrollment at School E was 476 with a student to teacher ratio of 16 to 1.

In 2013, Michigan used the Michigan Educational Assessment Program (MEAP) to test students in grade 7 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Michigan. Results show that 44% of 7th grade students at School E were proficient or above in writing, which is lower than the state average of 52%. The student population is predominantly White:

- 96% White
- 3% Two or more races
- 1% Hispanic

Approximately 49% of the students at the school were eligible for free or reduced-price lunches which is greater than the state average of 46%.

Study Participants: One teacher participated in the study: this teacher taught both treatment and control classes due to the small school population. The teacher taught one randomly assigned treatment class period and one control class period at 6th, 7th, and 8th grades for a total of six classes (3 control and 3 treatment). Thus, there were 6 participating study classes. The 2 classes contained approximately 121 students, each with a class size of 20.

The teacher characterized all 6th and 7th grade participating classes as mixed with both high average and low students. However, the 8th grade treatment class was characterized as having more "low" performing students and the control class was characterized as having more "high" performing students. All class periods contained students with individualized education plans.

Writing Curriculum and Resources: Curriculum for the control classes consisted of a mix of whatever resources the teacher had collected over the years, both commercial and teacher made, for the writing program. There was not a commercial program in place at School E. The teacher followed the Michigan State Standards to determine topics to cover throughout the year but mostly paced the classes based on student needs. For the treatment classes the teacher paced the class based on the Write Source Online program covering the necessary topics under the state standards.

There were a few similarities between the teacher-created control program and the Write Source Online program. Similarities included opportunities for computer use in the classroom and grammar instruction. However, in general the Write Source Online program integrated more structure in the writing process and grammar instruction was more in depth and to a larger degree than the control programs the teachers created. In addition, the treatment class had organized lesson plans in terms of when and how to deliver writing and grammar lessons, while the teacher

had to create and structure the lessons they taught in control classes based on what they considered necessary in order to follow the state standards.

In the treatment class, the teacher was observed following the Write Source Online program and adhering to the implementation guidelines. The treatment teacher stated that had used all of the Write Source Online components except for the Interactive Whiteboard lessons.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teacher only taught language arts). Classes lasted for 48 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section did not have access to a commercially published textbook.

Writing instruction in treatment and control classrooms followed the same structure, except for Thursdays and Fridays when the treatment students would visit the computer lab to access Write Source Online materials. Control classes and treatment classes (on days not visiting the computer lab) follow the same daily structure. Class would generally begin with a teacher created Do's and Don'ts warm up worksheet and then whole class instruction on grammar and sentence structure for writing. Then students would complete a whole class activity in which students write a paragraph as a class on the white board. Finally the teacher would either review needed concepts or assign an independent in class assignment. On days in which treatment students would visit the computer lab, students would work independently to complete Net-Text assignments. Students were allowed to play Grammar Snap games only when finished with the Net-Text assignment. Anything not finished in both treatment and control classes was to be completed as homework. For the most part students were not typically assigned additional homework although treatment students had access to Write Source Online at home and typically accessed the Grammar Snap games at home.

Assessment: In terms of assessment practice there was little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. As well, both treatment and control students completed a grammar quiz once or twice a week, however the treatment students would use the Grammar Snap quizzes and the control students would use a teacher created quiz. Both treatment and control students were also graded on a final written project each quarter. The only difference between treatment and control classes was the treatment classes used the Write Source Online program topics for their writing assignments.

Comparability: In terms of overall comparability, both the Write Source Online and the control classrooms were very similar. For example, the writing process and grammar activities were presented in both treatment and control classes, and students in both treatment and control were taught the same concepts, although the materials used were different. Students in both treatment and control classroom were just as likely to engage in the writing process, develop an understanding of genres and forms and receive specific instruction on fluency and accuracy. Among the participating teacher's classes, no contamination was noted and student engagement and interest was average.

School F

About the School: School F is a public middle school located in a rural residential community in Michigan. The school consists of a mid-aged building that houses students in grades 5-8. During the 2010-2011 school year, enrollment at School F was 697 with a student to teacher ratio of 15 to 1.

In 2013, Michigan used the Michigan Educational Assessment Program (MEAP) to test students in grade 7 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Michigan. Results show that 62% of 7th grade students at School F were proficient or above in writing, which is higher than the state average of 52%. The student population is predominantly White:

- 94% White
- 3% Hispanic
- 2% Black
- 1% Two or more races

Approximately 30% of the students at the school were eligible for free or reduced-price lunches which is less than the state average of 46%.

Study Participants: Four teachers were randomly assigned: two 7th grade teachers and two 8th grade teachers. At each grade level there was one participating treatment teacher and one participating control teacher. The 7th grade treatment teacher taught three class periods and the 7th grade control teacher taught four class periods for a total of seven classes (4 control and 3 treatment). The 8th grade treatment teacher taught four class periods and the 8th grade control teacher taught three class periods for a total of seven classes (4 treatment and 3 control). Thus, there were 14 participating study classes. The 14 classes contained approximately 328 students, each with a class size of 23.

For the most part teachers characterized their classes as mixed with low, average and high performing students. However, the 7th grade treatment teachers stated that he had one class with mostly higher performing students and one class with lower to average performing students. As well in the 8th grade, the control teacher had two classes with mostly higher performing students and the treatment teacher characterized one class as high and two classes as low with the remaining class as average to high. Most participating class periods contained a few students that were designated as special education.

Writing Curriculum and Resources: Curriculum for the control classes consisted of a mix of whatever resources the teachers had collected over the years, both commercial and teacher made, and various internet resources. There was not a commercial program in place at School F. Both treatment and control teachers worked together to determine topics to cover throughout the year since there was not a district or school curriculum map in place, but mostly paced the classes based the literature that also needed to be covered in their reading/language arts.

While the control teachers did not have access to a commercially published language arts program both treatment and control teachers worked together to establish sequencing for topics and writing units. However, the Write Source Online program provided students with more structure in the writing process and constant feedback at every step. Additionally the Grammar Snap program provided students with an interactive multi-media platform to teach grammar and language mechanics. Treatment teachers, however, reported experiencing difficulties when trying to access the Net-Text assignments, particularly when trying to create their own Net-Text assignment. Otherwise the treatment teachers stated that they were able to use Grammar Snap activities on a regular basis.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teachers only taught reading/language arts). Classes lasted for 55 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section did not have access to a commercially published textbook.

Writing instruction in treatment and control classrooms within the same grade level followed the same structure. Seventh grade treatment and control classes followed the three week structure for completing a writing unit. A writing unit would generally begin with a brainstorming activity that included prewriting as a group collaboration. Prewriting activities would also include graphic organizers, examples and related topic reading. This would lead to students completing their first rough draft. Once the draft was complete students would peer edit the rough drafts and work with the teacher to further revise and proofread. When completed students would publish their final drafts. In the 8th grade treatment and control teachers followed the same two week cycle for completing a writing assignment. A writing unit would begin with an introduction to the assignment and brainstorming activity. Students would then complete an outline for their paper and write their first draft based on this outline. The students would then spend a few days peer editing and revising their papers followed by a one day whole group round table edit. Students would then have one day to finalize and publish their writing assignments.

Anything not finished in both treatment and control classes was to be completed as homework. For the most part students were not typically assigned additional homework the 7th grade control teacher reporting assigning homework 2-3 times per week. This homework was teacher created and would tie a writing assignment to their reading assignments.

Assessment*:* In terms of assessment practice there was little variation between the control and treatment classes as teachers were required to administer the same assessments. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. In 7th grade, both treatment and control teachers reported administering monthly spelling and vocabulary quizzes. The 8th grade treatment teacher reporting administering bi-weekly Grammar Snap quizzes and a quarterly grammar test based on the questions produced by the Grammar Snap program. All treatment and control teachers reported that all writing assignments were graded as formative assessments based on a state developed writing rubric.

***Comparability**:* In terms of overall comparability, both the Write Source Online and the control classrooms were similar. For example, both treatment and control teachers focused writing instruction on the 6 traits and placed equal emphasis on fluency, grammar, sophisticated vocabulary development and the use of meaningful content. As well, students in both treatment and control classroom were just as likely work in small groups and edit their own writing assignments. However, students in treatment classes were more likely to use a computer to complete writing assignments and students in control classes were more likely to develop an understanding of the various genres and writing forms. Students in both treatment and control classes were taught the same writing forms and concepts, although the materials used were different. Among the participating teacher's classes, no contamination was noted.

School G

About the School: School G is a public middle school located in a suburban residential community in Pennsylvania. The school consists of a newer building that houses students in grades 7-8. During the 2010-2011 school year, enrollment at School G was 634 with a student to teacher ratio of 12 to 1.

In 2012, Pennsylvania used the Pennsylvania System of State Assessments (PSSA) to test students in grade 8 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Pennsylvania. Results show that 80% of 8th grade students at School G were proficient or above in writing, which is higher than the state average of 73%. The student population is predominantly White:

- 82% White
- 9% Hispanic
- 7% Black
- 2% Asian

Study Participants: Five teachers participated in the study: two 7th grade teachers, two 8th grade teachers and one 7th and 8th grade teacher. At each grade level there was one participating treatment teacher and one participating control teacher. The additional teacher with both 7th and 8th grade classrooms was also a treatment teacher. The 7th grade treatment teacher taught five class periods and the 7th grade control teacher taught five class periods for a total of ten classes (5 control and 5 treatment). The 8th grade treatment teacher taught five class periods and the 8th grade control teacher taught five class periods for a total of ten classes (4 treatment and 3 control). The teacher with both 7th and 8th grade classrooms had a total of three 7th grade treatment classes and two 8th grade treatment classes. Thus, there were 25 participating study classes. The 25 classes contained approximately 615 students, each with an average class size of 25.

Most teachers characterized their participating classes as typical with a mix of high and low students with some exceptions. The 7th grade treatment teacher characterized two of her classes as accelerated, 8th grade treatment teacher characterized three classes as having higher performing students and the 7th and 8th grade treatment teacher characterized one of the 7th grade

classes as having higher performing students. Both the 7th and 8th grade control teachers had two classes that contained higher performing students. Many of the participating classes had some students with individualized education plans.

Writing Curriculum and Resources: Curriculum for the control classes consisted of a commercially published writing and grammar textbook, and a mix of teacher created resources. Both treatment and control teachers reported following a school curriculum map to determine the topics and sequencing throughout the year. The treatment teachers however, reported altering the curriculum map to fit the Write Source Online program.

There were a few similarities between the control program used and the Write Source Online program. Similarities included a focus on the various writing forms and in depth instruction in grammar and usage mechanics. Both programs also include opportunities for modeling. However, the Write Source Online program focused more on providing students opportunities for interactive instruction and support for 21st century learners. As well, the Write Source Online program provided students with interactive instruction in the writing process and more opportunities for direct feedback.

In the treatment classes, the teachers were observed following the Write Source Online program and adhering to the implementation guidelines. The treatment teachers stated that had used all of the Write Source Online and print components except for the Online Portfolio.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teachers only taught reading/language arts). Classes lasted for 43 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section had access to their commercially published language arts program adopted by the school district.

Writing instruction in treatment and control classrooms followed the same structure. Class would generally begin with a bell ringer warm up activity that may include a journal writing assignment, grammar, critical thinking, spelling or analogy activity. Then the teacher would lead the class in direct instruction on the day's lesson providing modeling and class discussion. Following direct instruction students would work independently or in groups on a writing assignment. For treatment classes this assignment would include a NetText or Grammar Snap activity on the computer or a worksheet from the online File Cabinet. Class would end with a summary or wrap up activity of the day's lesson. Anything not finished in both treatment and control classes was to be completed as homework. Homework assignments varied by teacher; the three treatment teachers assigned homework regularly with varying amounts of days. Homework assignments generally included grammar activities or a teacher created read and respond activity. Of the two control teachers, one teacher reported assigning grammar homework two days of the week and the other teacher reported not assigning any additional homework.

Assessment: In terms of assessment practice there was little variation between the control and treatment classes. Formative assessment (i.e. checking work, daily language checks, etc.) occurred with equal regularity in both treatment and control classes. As well, summative

assessments (i.e. writing/grammar quizzes, unit tests, etc.) occurred in both treatment and control classes. Writing assignments were also graded as assessments using a school developed rubric. The treatment teachers stated that they used the Grammar Snap quizzes as study guides for their quizzes and unit tests. The only difference between treatment and control classes was the treatment classes used the Write Source Online program topics for their writing assignments.

***Comparability**:* In terms of overall comparability, both the Write Source Online and the control classrooms were very similar. Typical classroom activities and instructional practices occurred with equal regularity in treatment and control classes, however, the materials used by the teachers were different. However, control students were more likely to be able to select their own writing topics which are largely due to the nature of the Write Source Online program in which students follow the writing prompts given. The only differences noted between treatment and control classes was the emphasis on fluency, the use of sophisticated vocabulary, reading, grammar, the use of meaningful content and accuracy. Among the participating teacher's classes, no contamination was noted.

School H

About the School: School H is a public school located in an urban residential community in Pennsylvania. The school consists of an older building that houses students in grades K-8. During the 2012-2013 school year, enrollment at School H was 403 with a student to teacher ratio of 14 to 1.

In 2012, Pennsylvania used the Pennsylvania System of State Assessments (PSSA) to test students in grade 8 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Pennsylvania. Results show that 19% of 8th grade students at School H were proficient or above in writing, which is lower than the state average of 73%. The student population is predominantly Hispanic:

- 75% Hispanic
- 20% Black
- 3% Other
- 1% White

Approximately 97% of the students at the school were eligible for free or reduced-price lunches, 18.6% were classified as English Language Learners and 16.6% were classified as students with disabilities.

Study Participants: Two teachers participated in the study: one 7th grade teacher and one 8th grade teacher. Each teacher had a randomly assigned treatment classroom and control classroom (2 control and 2 treatment). Thus, there were 4 participating study classes. The 4 classes contained approximately 74 students, each with an average class size of 18.5.

Overall teachers characterized their classes as mixed with high, average and low performing students. All classes had students that were classified as English Language Learners and students individualized education plans.

Writing Curriculum and Resources: Curriculum for the control classes consisted of a mix of whatever resources the teachers had collected over the years, both commercial and teacher made, and anything that could be obtained online for the writing program. There was not a commercial program in place at School H. The control classes also had access to a commercial published Literature anthology from which the teachers created "read and respond" writing activities. Both teachers reported following the Common Core Standards and a district created pacing guide but stated that instruction was more teacher driven. For the treatment classes the teachers were able to follow the Common Core Standards and district created pacing guide while using the Write Source Online program.

There were a few similarities between the teacher-created control program and the Write Source Online program. Similarities included student engagement and instruction in the writing process, and instruction in fluency and vocabulary. However, in general the Write Source Online program integrated more structure in the writing process, and instruction on grammar and sentence structure was interactive and engaging. In addition, treatment students had more opportunities for constructive feedback during the writing process and independent practice.

In the treatment class, the teachers were observed using the Write Source Online program. The treatment teachers stated that they had used all of the Write Source Online components.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teacher only taught language arts). Classes lasted for 90 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section did not have access to a commercially published writing/grammar textbook.

Writing instruction in treatment and control classrooms followed the same structure, the only difference between the two classes was the materials used. Both treatment and control classes followed the same 2 week structure for completing a writing assignment. This would begin with teacher modeling, guided practice and examples. The teacher would then lead the class in brainstorming activities for their topic and a prewrite. Following the prewrite, students would complete their first rough draft independently. Students would then work in groups to peer edit their rough drafts. Teachers would also work with students during the revising process providing necessary feedback before the final draft was written. On days in which students were not completing a writing assignment the teachers would generally introduce new vocabulary words on Monday and have a vocab quiz on Friday. As well Thursdays were typically spent in the computer lab working on constructed response assignment based on the current reading assignment.

Anything not finished in both treatment and control classes was to be completed as homework. Both treatment and control students would also be assigned additional homework every day of

the week. Homework activities generally included grammar sentence structure worksheets. The 8th grade teacher reported using PSSA prep activities for homework during the spring.

***Assessment**:* In terms of assessment practice there was little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. Writing assignments in both treatment and control classes were graded on a state developed writing rubric on a monthly basis. As well, the 8th grade teacher created weekly grammar quizzes for students based on their PSSA prep. The only difference between treatment and control classes was the treatment classes used the Write Source Online program topics for their writing assignments.

***Comparability**:* In terms of overall comparability, both the Write Source Online and the control classrooms were very similar. For example, the writing process (prewriting, drafting, revising, editing, and publishing), vocabulary and grammar development activities were presented in both treatment and control classes, and students in both treatment and control were taught the same concepts, although the materials used were different. However, students in treatment classes were slightly more likely to work in pairs or small groups, use computers, develop an understanding of genres and forms, and work with the teacher in guided writing practice. Likewise students in control classes were slightly more likely to choose their own writing topics and engage in peer critiquing. Students in both treatment and control classroom were just as likely to work on vocabulary development, use graphic organizers, and practice using quotes with citations. Among the participating teacher's classes, no contamination was noted and student engagement and interest was average.

School I

About the School: School I is a public school located in an urban residential community in Pennsylvania. The school consists of an older building that houses students in grades 6-8. During the 2012-2013 school year, enrollment at School I was 1165 with a student to teacher ratio of 17 to 1.

In 2012, Pennsylvania used the Pennsylvania System of State Assessments (PSSA) to test students in grade 8 in writing. The tests are standards-based, which means they measure how well students are mastering specific skills defined for each grade by the state of Pennsylvania. Results show that 53% of 8th grade students at School I were proficient or above in writing, which is lower than the state average of 73%. The student population is predominantly Black:

- 34% Black
- 21% Hispanic
- 20% White
- 19% Asian
- 7% Two or more races

Approximately 85.4% of the students at the school were eligible for free or reduced-price lunches, 9.7% were classified as English Language Learners and 13.6% were classified as students with disabilities.

Study Participants: Two 8th grade teachers participated in the study. One teacher taught one treatment class period and one teacher taught one control class period (1 treatment and 1 control) Thus, there were 2 participating study classes. The 2 classes contained approximately 66 students, each with an average class size of 33.

Both teachers characterized their classes as mixed although reported having mostly higher performing students. Neither class had students that were classified as English Language Learners or students with individualized education plans.

Writing Curriculum and Resources: Curriculum for the control class consisted of a mix of whatever resources the teacher had collected over the years, both commercial and teacher made, for their writing program. There was not a commercial writing program in place at School I. The control class also had access to a daily oral language workbook and a writing resource book created by a fellow teacher in the district. Both teachers reported following the Common Core Standards and a district created curriculum map but stated that this was not very structured and vague. For the treatment class the teachers were able to follow the Common Core Standards and district created pacing guide while using the Write Source Online program.

There were a few similarities between the control program the teacher created and the Write Source Online program. Similarities included instruction in the writing process, daily grammar, mechanics and usage instruction and integration of literature in writing lessons. However, in

general the Write Source Online program integrated more structure in the writing process and instruction on grammar and mechanics was interactive and engaging. In addition, treatment students had more opportunities for computer use in the classroom and student self-assessment.

In the treatment class, the teacher was observed using the Write Source Online program. The treatment teacher stated that had used all of the Write Source Online components except for the Online Portfolio and available print materials.

Instructional Practices and Strategies: Writing instruction occurred throughout the day (the study teacher only taught reading/language arts). Classes lasted for 45 minute periods and occurred every day during the same time for the duration of the year. All students participating in the treatment section had access to Write Source Online materials. Students participating in the control section did not have access to a commercially published writing/grammar textbook.

Writing instruction in treatment and control classrooms followed the same structure, the only difference between the two classes was the materials used. Both treatment and control classes followed the same structure for completing a writing assignment. This would begin with an introduction to the topic and teacher modeling. This modeling sometimes included sharing sample essays graded on the PSSA rubric. The teacher would then lead the class in brainstorming activities and have students complete a graphic organizer. Students would complete their first rough draft independently. Once the first draft was complete students would then peer edit their rough drafts. Teachers would also work with students during the revising process providing necessary feedback before the final draft was written. The treatment teacher also reported completing grammar activities on a weekly basis and having students respond to writing prompts in an educational magazine for extra practice. Likewise, the control teacher reported beginning every lesson with a daily language prompt.

Anything not finished in both treatment and control classes was to be completed as homework. With regards to assigning additional homework, the control teacher reported assigning only reading homework and not additional writing homework. The treatment teacher reported having students complete a writing assignment at home on a monthly basis and assigning grammar homework twice a week.

Assessment: In terms of assessment practice there was little variation between the control and treatment classes. Informal assessment (i.e. observation, checking homework, discussion, etc.) occurred with equal regularity in both treatment and control classes. Writing assignments in both treatment and control classes were graded on a state developed writing rubric on a quarterly basis. The only difference between treatment and control classes was the treatment classes used the Write Source Online program topics for their writing assignments.

Comparability: In terms of overall comparability, both the Write Source Online and the control classrooms were similar. For example, the writing process (prewriting, drafting, revising, editing, and publishing), and grammar in the context of writing was presented in both treatment and control classes, and students in both treatment and control were taught the same concepts, although the materials used were different. However, students in treatment classes were slightly more likely to use computers, apply inquiry skills in writing, assess their own work and use

different types of details to develop ideas. Furthermore, the treatment teacher was more likely to teach narrative writing, literary analysis, and use mini lessons to emphasize writers craft. Likewise students in control classes were slightly more likely to edit their own work. The control teacher was also more likely to explicitly teach spelling, language and grammar rules, technical writing and strategies for editing and proofreading. Students in both treatment and control classroom were just as likely to use meaningful content, graphic organizers, work in small groups and learn to use resources (i.e. dictionary, thesaurus). Among the participating teacher's classes, no contamination was noted and student engagement was average.

Appendix E:

Key Features and Resources for Treatment and Control Programs

Table E1. Program Features and Pedagogy of Treatment and Control Programs

	Write Source Online	Control Program 1: (2005)	Control Program 2: (2009)	Control Program 3: (2001)
Key Program Features and Pedagogy	▪ Fully aligned to Common Core and College and Career Readiness Standards for student success. ▪ Provides detailed coverage of the writing process, Six Traits, grammar, usage, and mechanics skills, and the key writing forms: ▪ SkillsBook provides additional practice for grammar, usage, and mechanics. ▪ Interactive Whiteboard Lessons that provide whole-class instructional lessons designed to introduce each form of writing. ▪ Contains a searchable resource of printable activities through the Virtual File Cabinet ▪ GrammarSnap feature that uses engaging multimedia to extend and reinforce grammar, usage, and mechanics skills. Includes the following: o Interactive Mini Lessons o Grammar Games o Downloadable video podcasts o Trackable assessments ▪ Organized into 8 writing form units, each with 2 Net-Text lessons ▪ Net-Text Lessons typically consist of the following elements: o Step-by-step instruction and practice for each step of the writing process. o Allows students to publish their work through ePortfolio o Opportunities for modeling through sample papers, o Editable graphic organizers for prewriting and drafting o Complete grammar skill activities o provides the opportunity for students to collaborate using the online peer-review feature o Real-time teacher write-along support	▪ Complete coverage of the Writing process and Six Traits ▪ Incudes prewriting strategies, graphic organizers, and student models ▪ Visual support ▪ integrated grammar instruction with practice and application ▪ student models and rubrics ▪ Organized by writing form	o Additional practice for grammar usage and mechanics skills o Organized by 4 parts, Grammar Usage and Mechanics, Sentences and Paragraphs, Communications and References o Communications section focuses on descriptive, expository and persuasive writing o Provides opportunities for student modeling o Connections to literature included with every writing section o Writing lessons typically consist of the following: o Prewriting o Writing o Revising o Publishing	▪ Organized by 3 parts, Writing, Grammar Usage and Mechanics, and Academic and Workplace skills ▪ Writing section focuses on Narrative, Decriptive, Expository, Research and Assessment writing forms ▪ Lessons typically consist of the following elements: o Student modeling o Scoring rubrics o Skill exercises

Table E2. Program Resources of Treatment and Control Programs

	Write Source Online	Control Program 1: (2005)	Control Program 2: (2009)	Control Program 3: (2001)
Program Resources	**Student Resources** ▪ Write Source Online Dashboard ➢ Online Student Edition ➢ Net-Text ➢ Grammar Snap ➢ Online Portfolio **Teacher Resources** ▪ Teacher's Edition ▪ Skills Book ▪ Daily Language Workouts ▪ Assessment Guide **Digital Resources** ▪ Student & Teacher Edition ▪ Skills Book ▪ Daily Language Workouts ▪ Assessment Guide ▪ Teacher Edition ▪ Interactive Whiteboard Lessons ▪ Net-Text assignments ▪ Grammar Snap ▪ Manage Portfolio ▪ File Cabinet ▪ Teacher Moderation	▪ Teacher's Edition ▪ Student Edition	▪ Teachers Edition ▪ Student Edition ▪ Grammar, Usage and Mechanics Language Skills Practice	▪ Teacher's Edition ▪ Student Edition

*Note that while these are the program materials listed with the control program, it us unknown whether control teachers had access to all of these resources whether because they were not purchased initially or because items have been transferred from teacher to teacher and lost over time, etc. In general, however, control teachers had access to the Student Editions and Teacher Edition. In addition, control teachers may have incorporated other program materials (other than the primary program).

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Appendix F:

Use of Write Source Online Resources

Table F1. Percent of Usage of Write Source Digital Resources

	Never	Rarely	Sometimes	Often	Every day or almost every day
Introduced the lesson using "Interactive White Board Lessons"	42.9%	35.7%	7.1%	14.3%	0.0%
Had students complete a "Net-Text" activity/assignment.	7.1%	28.6%	50.0%	14.3%	0.0%
Engaged students in a "grammar snap" activity	0.0%	7.1%	42.9%	42.9%	7.1%
Had students publish their finished essay using the "online portfolio"	78.6%	14.3%	0.0%	7.1%	0.0%
Utilized the online "bookshelf" to access the Write Source student textbook	35.7%	7.1%	35.7%	14.3%	7.1%
Utilized a worksheet from the online "file cabinet"	35.7%	14.3%	35.7%	7.1%	7.1%
Used Digital activities to deliver instruction.	42.9%	28.6%	21.4%	7.1%	0.0%
Teacher's Edition	7.1%	42.9%	7.1%	35.7%	7.1%
Skills Book	7.1%	42.9%	28.6%	21.4%	0.0%
Daily Language Workouts	28.6%	35.7%	7.1%	7.1%	21.4%
Assessment Guide	57.1%	14.3%	14.3%	7.1%	7.1%

Table F2. Percent of Usage of Write Source Print Resources*

	Never	Rarely	Sometimes	Often	Every day or almost every day
Teacher's Edition	0.0%	66.7%	33.3%	0.0%	0.0%
Skills Worksheet Book	66.7%	33.3%	0.0%	0.0%	0.0%
Language Skills Book	33.3%	66.7%	0.0%	0.0%	0.0%
Assessment Guide Book	66.7%	33.3%	0.0%	0.0%	0.0%
Student Edition	33.3%	33.3%	0.0%	33.3%	0.0%

* While the study focused on Write Source Online, teachers were also provided with print resources.

PRES Associates, Inc.

PO Box 10730
Jackson, WY 83002
Phone: 307-733-3255, Fax: 307-222-0312
info@presassociates.com