A Contextualized Reading-Writing Intervention for Community College Students

Dolores Perin and Rachel Hare

In recent years, discussion has arisen among educational researchers and practitioners on how best to teach academically underprepared community college students the basic skills they need to be able to learn from a college curriculum. Research conducted by the Community College Research Center (Perin & Charron, 2006) has found that many creative approaches are used in developmental education, but there exists little quantitative evidence on their effectiveness. The study summarized here begins to fill this research gap. With funding from the U.S. Department of Education's Institute of Education Sciences, an intervention called the Content Comprehension Strategy Intervention (CCSI) was developed and tested at three community colleges. CCRC researchers drafted and pilot-tested the intervention in collaboration with science and developmental education faculty and senior administrators at Bronx Community College. The intervention was further tested and revised at Los Angeles Pierce College and Norwalk Community College. In this Brief, we describe the intervention and present data suggesting that it is a promising strategy for community college students who need to improve their reading and writing skills.

The Intervention

The CCSI is a curricular supplement for upper-level developmental reading and writing courses, i.e., courses one level below college English. The aim of the intervention is to provide systematic practice in basic academic skills to augment and strengthen the learning occurring in developmental education classrooms. Self-directed and self-paced, the CCSI is used independently by students outside of class. It consists of 10 separate units, each taking 1–2 hours to complete (we developed two versions, each with 10 units, described below). The course instructor assigns one unit per week during one college semester. Students complete the work on their own time and return the completed unit to the instructor. The CCSI is also appropriate for use with tutors in a college academic learning center to help students develop reading and writing skills needed in disciplinary courses.

The ability to understand printed text and write analytically is critically important to academic learning, especially in college. Research on the cognitive psychology of literacy points to several skills that promote reading comprehension: the ability to summarize information in writing, to ask questions of oneself while reading, and to apply vocabulary knowledge (Edmonds et al., 2009; Gil, Bråten, Vidal-Abarca, & Strømsø, 2010; Rosenshine, Meister, & Chapman, 1996). Another important area is persuasive writing, which is often assigned but can be a difficult task for students even at the postsecondary level (Nussbaum & Schraw, 2007). Practice in these skills forms the core of the CCSI. In addition, students receiving the intervention practice answering multiple-choice reading comprehension questions similar in format to those found on high-stakes college reading tests.

Each week, the students participating in the study used the CCSI to practice the same skills — written summarization, question formulation, defining and using vocabulary, persuasive writing, and reading test preparation — using different reading passages. Varying levels of support, depending on the skill being practiced, were provided within the intervention in the form of guidelines. The most heavily supported skill was written summarization. Many college assignments, ranging from research papers and laboratory reports to personal memoir, require that information be summarized. To write a summary, it is necessary to distinguish between important and less important ideas, which underprepared college students can find difficult (Caverly, Nicholson, & Radcliffe, 2004). To support students as they prepared to write summaries in the CCSI, we provided highly focused questions that drew attention to the key ideas in a given reading passage. The students then used their answers to these "main idea" questions to write the summary. Over time, this support was reduced in order to help students summarize more independently. The instructions also indicated that in writing a summary, the students should paraphrase rather than copy from the reading passage, since earlier research had found a great deal of word-for-word copying in the summarization of developmental education students (Perin, Keselman, & Monopoli, 2003).

Minor support was also provided to help students comprehend the reading passages and represent information accurately in their summaries through a self-monitoring checklist that was completed by students after they had read the material in the unit. No support was provided for using the conventions of English (mechanics, such as proper grammar, punctuation, and spelling) while writing or for the other components of the intervention; rather, the students simply practiced using correct English through the act of writing.

Contextualization

An important feature of the intervention is that it is *contextualized*. Contextualization is an approach in which skills are taught with direct reference to real-life situations in order to make the skills meaningful to students

(Johnson, 2002). Instead of teaching reading and writing skills in the abstract, contextualized literacy instruction focuses on "authentic content." The guiding assumption is that skills learned through contextualized instruction are more likely to transfer beyond the course in which they are taught. According to this theory, such transfer would result from the similarity between the contexts of learning and eventual application as well as from increased student motivation.

Two sets of intervention units were developed, one contextualized and one not. The first set was contextualized in biology, authentic content in that many community college students must pass a science course to earn a degree. We selected biology because a large number of students, including many who aspire to health careers, fail this subject, in part because they have difficulty with the reading requirements. The biology units were anchored in five topics, all from anatomy and physiology: matter and energy, atoms, the heart, blood, and respiratory system functions. Each topic was used for a set of two units: the first unit in each pair used easier text in order to help students develop background knowledge, and the second used introductory college-level text on the same topic.

The other set of intervention units used a variety of unrelated themes drawn from developmental education textbooks. This set of units used 10 different topics, all on high-interest issues: genetic testing, entrepreneurship, censorship, drug addiction, the social consequences of air conditioning, the social role of news media, cosmetic surgery, the participation of African Americans in baseball, youth hazing, and the founding of Liberia.

Each student used either the biology or the developmental education version of the CCSI throughout the semester. Below, we refer to the biology text as "science" and the developmental education text as "generic." Both sets of units provided practice in the same reading and writing skills and were formatted in exactly the same way; what differed was the subject matter that formed the backdrop of the practice. Thus, every unit, regardless of subject matter, required that students practice summarizing a reading passage, formulating questions, working with vocabulary, writing a persuasive essay, and answering test-prep questions. While the intervention was being developed, Richard Bailey, faculty at Henry Ford Community College, worked with the project staff to conduct telephone interviews with a purposive sample of participants to determine their interpretation of intervention tasks. This information was taken into account during revision of the intervention.

Data and Methods

Sample

Six cohorts of community college developmental education students took part in the intervention during the project, which, as mentioned above, involved developing, testing, and retesting several iterations of the intervention. This Brief reports the findings for the final and fully developed version, which we administered to the last cohort, comprised of students attending 16 upper-level developmental reading and English courses at Los Angeles Pierce College and Norwalk Community College. The cohort consisted of 369 students, but we confined our data analysis to the 246 students who completed both the pre- and post-tests. Thirty-four percent of the students in the sample were of Hispanic background, 21 percent were White, and 20 percent were Black. Fifty-five percent were female, 60 percent were full-time students, 57 percent were aged 19 years or younger, and 67 percent had not taken prior remedial courses.

Measures

Two instruments were employed to assess the amount of gain associated with the intervention. The first, developed specifically for the project, was the Science Summarization Test, which presented a task closely related to the summarization practice received in the CCSI. During the test, however, the task is presented without the support provided within the intervention in order to assess students' ability to write a summary as in a typical college assignment. Alternate forms A and B of the instrument were developed and counterbalanced at pre- and post-test points to control for text effects.

We scored the students' writing samples on five dimensions: the number of main ideas from the source text that appeared in the summary, the accuracy of information in the summary, word count, the extent to which students paraphrased rather than copied the source text, and the use of writing conventions. A Teachers College faculty member, Stephen Peverly, worked with the project team to identify the main ideas in the source text. The number of main ideas in each student's summary was expressed as a proportion of the number of main ideas in the source text. Accuracy and conventions were measured on a four-point scale, and paraphrasing was scored on a two-point scale. Inter-rater reliabilities for the proportion of main ideas on the alternate forms were high ($r = .91$; $r = .94$).

Serious academic difficulty was apparent in the writing samples even though the participants were in the upper level of developmental education. Sentence structure was often poor, making it difficult for scorers to determine where sentences began and ended and what the writer had intended to say. Consequently, inter-scorer agreements were somewhat low (accuracy, 52 and 66 percent; conventions, 45 and 57 percent; paraphrasing, 83 and 79 percent; in each case for Form A and for Form B, respectively).

The second instrument was the Nelson-Denny Reading Test (Brown, Fishco, & Hanna, 1993), which we used to assess transfer from the contextualized reading skills practiced in the intervention to general reading ability. This measure, which is frequently administered to college students, is comprised of two subtests: vocabulary and reading comprehension. The scores for the subtests are summed to create a total score, which is then converted to a scaled score ($M = 200$, $SD = 25$). At the pre-test point we also administered two additional experimental measures, developed in collaboration with Linda Mason, Pennsylvania State University faculty, to assess students' knowledge of and interest in science. These measures served as covariates in the study.

Design

This was a quasi-experimental study in which faculty who taught 16 upper-level developmental reading and English course sections were recruited by college administrators. Twelve of the 16 course sections were assigned by the college to participate in the intervention (treatment group) and the other four were recruited to take the pre- and post-tests but not participate in the intervention (business-as-usual comparison group). Within each treatment course section students were randomly

assigned by CCRC project staff to use the science or generic version of the intervention. The data reported below are for students who completed both pre- and post-tests.

Findings

The intervention was found to be effective on several variables. An initial series of within-subject *t*-tests indicated that both the science and generic groups showed statistically significant gain in the proportion of main ideas identified on the Science Summarization Test, while the comparison group showed no significant difference on this measure. The science group also showed a significant increase in accuracy and word count from pre- to post-test, but the amount of paraphrasing decreased. The generic and comparison groups showed significant pre-post gain on the Nelson-Denny Test, but the science group did not. Neither the generic nor the comparison group showed statistically significant pre-post differences in accuracy, word count, or paraphrasing. None of the groups showed statistically significant gain in the conventions of writing.

To compare groups on the amount of pre-post gain associated with the use of the CCSI, the post-scores on the Science Summarization Test (the main outcome measure) and the Nelson-Denny Test (the transfer measure) were compared between groups using an analysis of covariance (ANCOVA) that controlled for pre-test scores. This method allowed us to account for any pre-existing differences between the treatment and comparison groups. Step 1 of each model adjusted for all background variables (science knowledge, science interest, and student characteristics) found in pre-screening to be related to the dependent variable, site of data collection, and pre-test score. Step 2 introduced group status (1 = intervention; 0 = comparison) to determine whether the post-test scores varied by group, controlling for the scores used in Step 1. The regression weights are measures of effect size in predicting standardized post-test scores from intervention, standardized pre-test scores, and background characteristics. The regression weights for the binary group membership variable show the post-test

standardized scores between the two groups, controlling for pre-test standardized scores. Separate analyses were conducted to compare the contextualized science condition to the business-as-usual comparison, the developmental education generic condition to the comparison group, and the science to the generic group. The unadjusted pre- and post-scores are shown in Table 1. All regression analyses for the Science Summarization Test used z-scores ($M = 0$, $SD = 1$) to provide a common metric for interpretation.

On the Science Summarization Test, both the science and generic text groups showed large statistically significant gain compared to the business-as-usual group on the proportion of main ideas that appeared in the written summary (ES = 0.62, $p < .01$; and ES = 0.36, $p < .05$ respectively). The difference was also statistically significant between the two intervention groups, with the science contextualization group showing greater gain than the generic text group (ES = 0.32, $p < .05$). The summaries written by the science group were more accurate than those of the comparison group (ES = 0.44, $p < .05$), but the generic group did not gain more than the comparison group. The science group's summaries were also more accurate than those of the generic group (ES = 0.33, $p < .05$). Students in both the science and generic conditions wrote more than the comparison group (ES = 0.70, $p < .001$; ES = 0.62, $p < .001$). However, the gain in word count did not differ between the science and generic groups. On the conventions measure, the gain was similar for the science and comparison groups. The gain on conventions was significantly lower in the generic than the comparison group (ES = -0.39, $p < .05$), and the science and generic groups did not differ in the amount of gain they showed on the conventions measure.

Since the paraphrasing measure on the Science Summarization Test was dichotomous, logistic regression was performed, again using the post-score as the outcome variable, controlling for pre-score (all scores were transformed to z-scores). The comparison group showed greater gain on paraphrasing than did the science group. The students in the comparison group were, on average, four times more likely to use their own words rather than copy word for word, controlling for all of the other variables in the model.

Table 1. Unadjusted Means and Standard Deviations for Pre-Test and Post-Test Scores

Measure	Total Sample				Science Group				Generic Group				Comparison Group			
	Pre-Test		Post-Test		Pre-Test		Post-Test		Pre-Test		Post-Test		Pre-Test		Post-Test	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Nelson-Denny Reading Test																
Total Scale Score	181.11	21.22	185.87	22.36	183.19	20.89	185.81	21.31	182.09	21.55	188.19	21.85	176.06	21.11	181.96	24.83
Science Summarization Test																
Proportion of Main Ideas	0.39	0.18	0.46	0.23	0.41	0.19	0.52	0.22	0.40	0.19	0.48	0.22	0.33	0.15	0.32	0.21
Word Count	106.05	35.62	108.60	41.65	108.21	34.22	117.43	39.72	109.57	38.17	115.03	35.62	95.40	31.85	79.84	43.78
Accuracy	2.90	0.66	3.06	0.63	2.99	0.68	3.22	0.63	2.90	0.61	3.01	0.54	2.74	0.69	2.86	0.71
Paraphrasing	0.83	0.38	0.69	0.46	0.78	0.42	0.57	0.50	0.83	0.38	0.74	0.44	0.91	0.29	0.84	0.37
Conventions	2.86	0.83	2.82	0.84	2.77	0.88	2.77	0.79	2.85	0.81	2.66	0.84	3.07	0.71	3.22	0.82
Science Covariates																
Science Knowledge Test	10.82	2.90	—	—	10.95	3.18	—	—	10.85	2.49	—	—	10.45	3.12	—	—
Science Interest Inventory	27.06	5.45	—	—	27.41	5.44	—	—	27.31	5.30	—	—	25.87	5.74	—	—

Notes: The Nelson-Denny Reading Test is a standardized measure ($M = 200$; $SD = 25$). The proportion of main ideas scores in the Science Summarization Test are in proportion form counterbalanced. Maximum values for Science Summarization Test variables: accuracy = 4; conventions = 4; paraphrasing = 1. Maximum values for science covariate variables: Science Knowledge Test = 20; Science Interest Inventory = 40. Sample sizes vary based on group and assessment measure. Nelson-Denny Reading Test ($n = 219$); science group ($n = 85$); generic group ($n = 85$); comparison group ($n = 49$). Science Summarization Test ($n = 199$); science group ($n = 82$); generic group; ($n = 77$); comparison group ($n = 40$). Science Knowledge Test ($n = 234$); science group ($n = 97$); generic group ($n = 97$); comparison group ($n = 40$). Science Interest Inventory ($n = 236$); science group ($n = 94$); generic group ($n = 94$); comparison group ($n = 48$).

Also, it was found that experimental condition (science, generic, comparison) was not a statistically significant predictor of post-test Nelson-Denny total scaled scores in any of the analyses, controlling for pre-score and the other pre-screened variables.

Conclusion

The Content Comprehension Strategy Intervention, a curricular supplement for upper-level developmental reading and writing students in community colleges, showed a promising pattern of results. Our results are particularly encouraging in view of the lack of previous studies with evidence on effectiveness, i.e., studies that compare pre- and post-scores for basic skills interventions using a comparison group. The CCSI provided practice in several areas of literacy that enable learning in college: summarizing dense, expository text; formulating questions while reading; learning vocabulary; writing persuasive essays on controversial topics related to a reading passage; and answering traditional multiple-choice questions that appear on tests.

The intervention, whether contextualized in science or using generic developmental education text, resulted in statistically significant gain on several variables, most notably the proportion of main ideas from a source text included in a student-written summary. Since identifying main ideas in text can be challenging for academically underprepared students, this finding represents an important improvement. After completing the CCSI, the contextualized science group identified 52 percent of the main ideas, up from 41 percent, and the generic group identified 48 percent of the main ideas, up from 40 percent. The business-as-usual comparison group did not improve on this measure. It is encouraging to note that the group practicing basic skills using science text also improved in the ability to present accurate information in a summary. What is less encouraging is the lack of gain on the standardized reading test (Nelson-Denny) and in the conventions of writing. Although neither general reading skills nor writing conventions were targeted in the intervention, gains in these areas might be expected since the students were attending developmental education courses while using the intervention.

In any case, the positive pattern of pre-post results on measures directly related to the intervention activities, especially the inclusion of main ideas and the accuracy of written summaries, suggests that the CCSI would be a useful addition to developmental education in community colleges to help students prepare for college-level discipline-area courses that require the reading of highly factual, densely written text. One notable finding is that both the science contextualization and the generic text conditions showed the same pattern of results for the proportion of main ideas identified in a summary, while only the science contextualization condition seemed to promote the accuracy of information summarized.

An area for further investigation is the increased prevalence of word-for-word copying among the science contextualization group relative to the comparison group. Table 1 shows that knowledge of science was low in all three groups. One hypothesis is that with weekly exposure to the science material, students in the science group began to realize that they had limited knowledge of the anatomy and physiology material and resorted to copying, feeling less confident in their ability to express unfamiliar concepts in their own words. This and other dimensions of the study will be discussed in a longer paper currently in preparation.

A limitation of the study is that the grant project did not have the means to administer maintenance or additional transfer measures. Future research would be required to learn whether the benefits are generalizable and long-lasting.

References

Brown, J. I., Fishco, V. V., & Hanna, G. S. (1993). *The Nelson-Denny Reading Test, Forms G and H*. Itasca, IL: Riverside/Houghton-Mifflin.

Caverly, D. C., Nicholson, S. A., & Radcliffe, R. (2004). The effectiveness of strategic instruction for college developmental readers. *Journal of College Reading and Learning, 35*, 25–49.

Edmonds, M. S., Vaughn, S., Wexler, J., Reutebuch, C., Cable, A., Tackett, K. K., et al. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. *Review of Educational Research, 79*(1), 262–300.

Gil, L., Bråten, I., Vidal-Abarca, E., & Strømsø, H. I. (2010). Understanding and integrating multiple science texts: Summary tasks are sometimes better than argument tasks. *Reading Psychology, 31*(1), 30–68.

Johnson, E. B. (2002). *Contextual teaching and learning: What it is and why it's here to stay*. Thousand Oaks, CA: Corwin Press.

Nussbaum, M. E., & Schraw, G. (2007). Promoting argument-counterargument integration in students' writing. *The Journal of Experimental Education, 76*(1), 59–92.

Perin, D., & Charron, K. (2006). "Lights just click on every day:" Academic preparedness and remediation in community colleges. In T. Bailey & V. S. Morest (Eds.), *Defending the community college equity agenda* (pp. 155–194). Baltimore, MD: Johns Hopkins University Press.

Perin, D., Keselman, A., & Monopoli, M. (2003). The academic writing of community college remedial students: Text and learner variables. *Higher Education, 45*(1), 19–42.

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research, 66*, 181–221.

Dolores Perin is Professor of Psychology and Education at Teachers College, Columbia University, and a Senior Research Associate at the Community College Research Center, Teachers College, Columbia University.

Rachel Hare is a Senior Research Assistant at the Community College Research Center, Teachers College, Columbia University.