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Efficacy of learning strategies instruction in adult basic education

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Abstract

Results from randomized controlled trials of learning strategies instruction with 375 adult basic education (AE) participants are reported. Reading outcomes from whole group strategic instruction in one of four learning strategies were compared to outcomes of reading instruction delivered in the context of typical adult education units on social studies, history, and science. Both experimental and control conditions experienced high attrition and low attendance, resulting in only 105 control and 100 experimental participants' data in outcome analyses for the trials of the four learning strategies. Reading outcomes for these completers were not significantly different between experimental and control conditions, and each group achieved minimal gains. We discuss possible reasons for the non-significant effect from the intervention, including insufficient instructional dosage.

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Reading comprehension is an essential skill for solving problems in academic settings as well as in such nonacademic tasks as following work directions or making health-related choices (National Reading Panel, 2000; Snow, 2002). Researchers and policy makers have suggested that even beyond its individual effects, reading is inseparably linked to many of the nation's "pressing issues of our time: jobs and the economy, the digital divide, health, and our children's well-being" (National Institute for Literacy [NIFL], 2000, p. 1). Yet the National Assessment of Adult Literacy (NAAL) reported that 43% of U.S. adults cannot comprehend more than the most basic prose and document texts (Kutner, Greenberg, Jin, Boyle, Hsu, & Dunleavy, 2007).

Each year approximately 1.4M adults with limited literacy or low educational attainment enroll in adult basic and secondary education (AE) programs in order to improve their basic reading, writing and math skills or to earn a General Educational Development (GED) high school equivalency credential (U.S. Department of Education, Office of Vocational and Adult Education [USDE], 2006). Many of these people do not master the much needed literacy skills for full participation in economic and civic life (Moore & Stavrianos, 1995; NIFL, 2000; Wagner & Venezky, 1999), with only 40% of AE learners gaining one or more educational levels after a year of study (USDE, 2006), and about a quarter of learners separating from their programs before completing even one educational level (Tamassia, Lennon, Yamamoto, & Kirsch, 2007). A lack of research-validated adult reading instructional interventions (Kruidenier, 2002) has been implicated in this failure to produce better reading outcomes through AE programs.

One significant body of research in K-12 reading that has the potential to improve AE instruction is cognitive strategy instruction, more specifically metacognitive monitoring and individual cognitive strategies. Metacognitive monitoring—thinking about what you are thinking or mentally checking to see if something makes sense—is important to reading comprehension (Cromley, 2005). Schumaker and Deshler (2006) suggest that poor readers either have not invented their own metacognitive approaches to comprehension or lack prior instruction in cognitive learning strategies that make explicit some metacognitive processes and prompt action to plan, execute, and evaluate outcomes of a learning task. Pressley (2000) likewise attributes low metacognitive monitoring to not knowing or not knowing when to use comprehension strategies, perhaps because of a lack of opportunity or motivation to develop proficiency in this skill. Pressley also allows for the possibility of interference or strain from other demands on a reader's cognitive capacity (e.g., slow decoding skills, recalling related information), which may be particularly relevant to adults with the very lowest reading abilities. However, several studies confirm that many adolescent and adult literacy learners do not strategically approach reading tasks (Gambrell & Heathington, 1981; Kozminsky & Kozminsky, 2001). Therefore, potential exists to improve reading comprehension among AE learners by explicitly teaching them reading or learning strategies that good readers intuitively use.

Despite this potential for improved reading and learning, few AE programs provide learning strategy instruction. The most prominent form of instruction in AE is individualized group instruction, wherein learners attend a learning center to work independently on individualized assignments and instructors provide help on request (Beder, Tompkins, Medina, Riccioni, & Deng, 2006; Mellard, Scanlon, Kissam, & Woods, 2005; Smith & Hofer, 2003). This approach is based on learning theories that espouse the importance of adults taking responsibility for and directing their own learning experiences (Merriam & Caffarella, 1999).

However, some researchers (e.g., Mellard & Scanlon, 2006; Robinson-Geller, 2007) question the efficacy of individualized, self-directed learning for adults with very low basic reading skills or specific learning disabilities (SLD).

Beder and Medina (2001) studied 20 diverse adult literacy education classrooms and observed in every class, whether individualized or whole-group, instruction based on Mehan's (1979) elicitation sequence—Initiation, Reply, Evaluation (IRE)—with only about 25% of the classes also using other forms of instruction. “Most of these elicitation episodes were what Mehan termed ‘product elicitations,’ a series of questions and answers designed to elicit correct, factual responses” (p. 7). Likewise, 80% of the classes emphasized discrete skills instruction with lessons conveying factual information and requiring literal recall. Strategic instruction in learning strategies was not reported in any of the observed classrooms.

Mellard and Scanlon (2006) demonstrated that learning strategy instruction with an academically diverse group of adult learners is feasible in AE settings. This feasibility study, however, did not assess efficacy of the learning strategies in terms of learner outcomes. Therefore, in the present study we tested the efficacy of using an explicit instruction method to teach AE learners how and when to use learning strategies.

Teaching learning strategies through a strategic instruction method

A significant body of research (Faggella-Luby, Schumaker, & Deshler, 2007; Hughes, Deshler, Ruhl, & Schumaker, 1993; Hughes, Ruhl, Schumaker, & Deshler, 2002; Hughes & Schumaker, 1991; Lenz, Ehren, & Smiley, 1991; Scanlon, Deshler, & Schumaker, 1996; Schumaker & Deshler, 2003; Schumaker & Deshler, 1992; Schumaker, Deshler, Alley, Warner, & Denton, 1982; Schumaker, Deshler, Woodruff, Hock, Bulgren, & Lenz, 2006) demonstrates that the Strategic Instruction Model's (SIM) learning strategies are effective for improving reading and learning among adolescents with SLD. SIM includes multiple learning strategies that help students acquire, express, and store information. Each of these strategies is taught using an explicit instructional methodology that involves eight stages of acquisition and generalization: (a) pretest and commitment, (b) describe, (c) model, (d) verbal practice, (e) controlled practice, (f) advanced practice, (g) posttest, and (h) generalization. This instructional method is very different from the IRE method used in many AE classroom (Beder & Medina, 2001; Mehan, 1979).

In general, a learning strategy has two key components. First, a learning strategy includes cognitive processes used to complete such tasks as reading texts, writing essays, or taking lecture notes. Second, a learning strategy includes metacognitive processes used to select a strategy for the task at hand, monitor the success of the chosen strategy, and evaluate the outcome of using the strategy (Schumaker & Deshler, 2006). Good readers often use and integrate multiple strategies to handle the complex task of reading comprehension (Hock & Mellard, 2005).

Each learning strategy is presented as a set of short steps sequenced in a manner that leads to successful task completion and a specific outcome. These steps cue learners “to use specific cognitive and metacognitive strategies, to select and use appropriate procedures, skills, and rules, or to engage in observable actions” (Schumaker & Deshler, 2006, p. 5). The strategies incorporate a mnemonic to facilitate learning and recall of the strategy. Each step is described

with a phrase that begins with a verb or key word directly related to the cognitive or physical action that the step is designed to cue and that builds a mnemonic to facilitate learners' memories of the steps. For example, in The Paraphrasing Strategy (Schumaker, Denton, & Deshler, 1984) the mnemonic RAP cues the learner to Read a paragraph, Ask yourself, "What is the main idea and two important details in the paragraph?" and to Put the main idea and details into your own words. Each statement begins with an action word that cues a specific cognitive or metacognitive behavior. In this case, the learner is cued to use a chunking strategy and read only one paragraph. Then the reader uses a self-questioning strategy to find the main idea and two important details. Next, the reader paraphrases the main idea and details. During this process, the reader monitors comprehension and adjusts as needed. Thus, the strategy is systematic, action oriented, short, useful for the task at hand, sequenced logically, and can be generalized to a variety of reading materials and contexts (Deshler & Schumaker, 1986; Schumaker & Deshler).

The Intervention

The present study furthers Mellard and Scanlon's (2006) feasibility study by assessing the efficacy of strategic explicit instruction in learning strategies in AE program settings. Our earlier study modified the SIM instructional method for adult-to-adult interaction and to make the learning strategies' language and examples more relevant to adults. For this study, we also modified the instructional method for adult-to-adult interaction, making it a four-phase model. Further, we used this modified instructional method and the existing SIM strategy template to provide instruction in four learning strategies: The Bridging Strategy, The Building Fluency Strategy, The Prediction Strategy, and The Summarization Strategy.

Instructional model. The detailed descriptions that follow are intended to explicate the theoretically sound and rigorous nature of the SIM learning strategy interventions, which have produced significant results among adolescents with SLD in secondary settings with up to 36 weeks available for instruction. In the present study the SIM instructional method's Phase 1 addresses learning readiness issues, including orientation to the instructional process, learner goal setting and commitment to learn, and an overview of the instructional strategy. The purpose of Phase 2 is to review and build fundamental skills or other learning strategies needed when using the target learning strategy. Phase 3 is the stage during which students are expected to master the target strategy. Phase 4 is intended to be a generalization process.

In both Phases 2 and 3, instructors guide learners through a four-step process for acquisition of a skill or concept: (a) describe, (b) model, (c) scaffolded-practice and feedback, and (d) progress or mastery checks. Instructors describe a learning strategy with the aid of advance organizers and model a learning strategy by vocalizing their own thinking processes as they perform the steps. Learner practice begins with a high level of support, or scaffolding, which is incrementally removed with each practice iteration, beginning with verbal practice, then guided, partner, and independent practice. Instructors monitor and record learner performance on a graph to visually represent progress and keep learners motivated.

During Phase 4, learners start applying the learning strategy to different types of text (e.g., narrative, expository, technical) encountered in academic, employment, and other settings. Research indicates explicit instruction in generalizing or transferring a learning strategy to other

settings or circumstances is important for individuals with learning difficulties (Schumaker & Deshler, 2006).

The Bridging Strategy. The most foundational of this study's four learning strategies is a word-level reading strategy, The Bridging Strategy (Bridging; Brasseur, Hock, Deshler, & Lancaster, 2004). Evidence exists to support word analysis skills as an effective way to improve reading comprehension (National Reading Panel, 2000). Some researchers believe that when expert readers come across an unfamiliar word in a passage, they skip the word and read on, trying to get at the meaning of the word through the use of context clues (e.g., Treiman, 2003). Others (Liversedge & Findlay, 2000; Rayner, 1998; Rayner & Raney, 1996) provide evidence that expert readers, in fact, quickly break down an unfamiliar word into recognizable units, say the word, and read on to check their understanding of it. In order for struggling readers to become more proficient readers, they may need to be taught how to use a word attack strategy that follows the latter process used by expert readers.

The Bridging Strategy is designed to help readers successfully decode and identify unknown words in reading materials based on the premise that most words in the English language can be pronounced by identifying prefixes, suffixes, and stems and by following three short syllabication rules. Bridging uses the mnemonic "PART" to prompt readers through a word analysis process, with a subroutine using the mnemonic "FIND". The four steps of PART direct readers who encounter an unfamiliar word to: (a) pronounce the group of letter sounds within the word, (b) analyze the word for beginning and endings, (c) review the remaining letters using FIND, and (d) try other resources.

Pronouncing letter sounds from an unfamiliar word can be difficult to do without more specific directions. Bridging teaches readers to begin by dividing up the word into letter groups that look familiar, and underlining each letter group. For example, when the reader sees the word "circumstance," he might underline "circ" because it looks like a familiar word, circle. Next he might underline "um" because he knows words like hum and gum; he would follow that with underlining "stan," leaving only "ces" to work out in the pronunciation. The reader would then say aloud to himself, "circ," "um," "stan", and then blend these sounds together. This sequence may be enough for the reader to recognize the word as circumstance, at which point he would check to see if the word made sense in the sentence; if yes, he would continue reading and not perform any of the remaining steps of the strategy.

If, after pronouncing the letter groups, the reader does not recognize the word, his next step would be analyzing the word for familiar beginnings and endings (that is, prefixes and suffixes he may have previously learned). For example, when the reader cannot pronounce the word "disclosure" using the previous step of the strategy, he may recognize the prefix "dis," leaving him with the remaining letters "closure." He may recognize the word "sure" at the end, leaving him with the three parts "dis" "clo" "sure." He would try to say and blend these three letter groups, perhaps hearing himself say the word "disclosure." He would check to see if the word made sense in the sentence; if yes, he would continue reading and not perform any of the remaining steps of the strategy.

Once again, if the reader still does not recognize the word, he proceeds to the third step in

Bridging: using the subroutine FIND to review the letters remaining after identifying prefixes and suffixes. With the remaining letters the reader: (a) finds and marks vowels and sound units, (b) identifies first two vowel sounds, (c) notes the number of consonants, and (d) divides the letters with syllable formulas vowel-consonant/consonant-vowel (vc/cv), vowel-consonant/vowel (vc/v), and vowel/consonant-vowel (V/cv). For example, when the reader encounters the unfamiliar word “integrity,” he may have recognized the prefix “in” and the suffix “ty,” but is unable to decipher the remaining letters “tegr.” He would use FIND to break down these letters into vowels and consonants, looking for the vowel and consonant patterns to help him pronounce this word part. He would find and mark a “v” over each vowel, and an arc under each consonant or sound unit (blended consonants such as “gr”). In the next step, he would identify the first two vowels, which in this case are “e” and “i.” Next he notes the number of consonants, here the blend “gr” represents one consonant unit. Visually he can see a vowel, consonant, and a vowel; from this he has two options for dividing the pattern: either vc/v or V/cv. Finally, if this analysis process does not produce an understandable word, the reader is taught to try other resources (e.g., ask someone else, look up in a dictionary).

The Building Fluency Strategy. Oral reading fluency has a significant correlation with reading comprehension (Calfee & Piontkowski, 1981; Fuchs, Fuchs, Hosp, & Jenkins, 2001; Pinnell, Pikulski, Wixson, Campbell, Gough, & Beatty, 1995; Stanovich, 1986), therefore a learning strategy that builds quick, accurate, and prosodic reading skills was expected to benefit adult literacy learners. The Building Fluency Strategy (Fluency; Hock, Lancaster, & Deshler, 2004) involves two strategic instruction cycles of repeated reading, first at the word level, and then at the passage level. During the word level cycle, the reader learns to preview a passage and create a list of unfamiliar words; she then uses Bridging to pronounce them correctly. The learner re-reads this list 3 to 7 times until she correctly pronounces each word within a specified time (e.g., 125 words per minute with 100% accuracy) that indicates mastery of the list. The process is repeated with the learner re-reading whole passages rather than just word lists.

The Prediction Strategy. Students’ reading comprehension and retention scores increase in proportion to the quality and quantity of the questions they ask themselves while reading a passage (Clark, Deshler, Schumaker, Alley & Warner, 1984). The Prediction Strategy (Prediction; Hock, & Deshler, 2005) uses the mnemonic “CLUE” to prompt learners to actively engage in the reading process through the use of four steps: (C) check for clues, (L) link to prior knowledge, (U) unveil predictions, and (E) examine the reading.

As a first step before reading a passage, a learner using Prediction checks (C) for clues by visually scanning reading material for information that might activate comprehension. She asks herself: What does the title suggest?, What do I know about the author?, Are there any visual clues?, What do the word clues suggest?, and Are words unfamiliar? For example, in a world history textbook a learner scans a chapter and sees the title “The North Atlantic Treaty” and a picture map of Western Europe and the Atlantic Ocean. She may also notice such word clues to place and time in the text as Washington, DC and April 4, 1949. She might also identify the words “treaty” and “alliance” as unfamiliar to her. She thinks these unfamiliar words may be important to understanding the chapter, so to determine their meanings she employs a vocabulary sub-strategy, such as looking up a word in a dictionary. In this case, she finds that treaty and alliance both mean an agreement between two or more parties or countries.

The second step of Prediction involves the learner thinking about what the clues tell her and linking (L) them with what she already knows. In our example above, the learner might think about Washington, DC as the capital of the U.S.; the date in the text, April 4, 1949, may prompt her to recall that World War II took place in Europe during the 1940's. Linking her prior knowledge to the newly acquired vocabulary—treaty and alliance—she knows that the U.S. was in agreement with some European countries and not in agreement with others.

The third step in this learning strategy is for the learner to make and unveil (U) a prediction about the passage's main topic. In our example she might predict the chapter is a factual passage about an agreement that the U.S. made with some European countries sometime after World War II. With a prediction in mind to activate comprehension, she reads the chapter, states what she learned, either proving or revising the prediction.

The Summarization Strategy. Reading theory suggests that comprehension improves when a reader better allocates attentional resources to important information (Tierney & Cunningham, 1984). In support of this theory, Brown, Campione and Day (1981) reported that low ability community college students' abilities to detect main ideas, delete trivial information and summarize texts were favorably influenced by providing rules for summarization, and that remedial students needed more explicit training in how to use these rules. The Summarization Strategy (Summarization; Hock, Deshler, & Lancaster, 2004) builds on this concept of explicitly teaching low ability readers how to summarize for improved comprehension, but uses different steps (or rules) than those reported by Brown et al. In Summarization, the reader is taught to look for clues and make predictions about the entire passage. After predicting, he recursively finds main ideas and important details, and paraphrases small chunks of text, usually paragraphs. Lastly, he pulls together all the information from the paragraphs into a passage or document summary.

Summarization relies on a mnemonic device to cue learners to act on each step of the strategy: "READ." The "R" prompts the learner to review the passage before reading it by: (a) saying an affirmation, e.g., "I am going to use The Summarization Strategy and my own good thinking to understand this document;" (b) looking for clues in titles, headings, pictures, etc.; (c) stating what he or she already knows about the subjects mentioned in the passage; and (d) making a prediction of the passage's content or focus. These pre-reading activities activate prior knowledge of the topic, raise interest in the text, and help him to be actively involved in the reading process, each of which should contribute to his increased comprehension.

The learner completes the next two steps of the strategy for each paragraph or chunk of text. The "E" signals him to evaluate the paragraph, or question himself about what he read; the "A" elicits an answer with a paraphrase, or telling about what he read. To evaluate a paragraph, the learner will: (a) read the text, (b) highlight what the paragraph was about, and (c) highlight the most important details. Intentional self-questioning can change the way he relates to a text, generally improving memory and understanding. In answer to his questions, the learner paraphrases, making such statements as, "This paragraph is mainly about..." "One important fact is..." and "Another important fact is..." Putting answers in words that are familiar and sensible

to him, focusing on only the important information, and repetition of the information each may contribute to his improved comprehension.

Lastly, the “D” in the mnemonic device reminds the learner to determine a passage summary. In this final step he reflects on the big ideas that he identified in the earlier steps. He asks himself about the passage topic or focus and what important information was presented. This summarization step is the goal of the whole strategy.

Method

Research Design

The question posed in this study is, Does strategic instruction in learning strategies produce significantly different gains in reading comprehension or reading-related sub-skills compared to typical AE instruction? To investigate, we designed a randomized controlled trial study with random block assignment of adult education learners to experimental and control classes. Learners in experimental classes received strategic instruction in one of four learning strategies. Learners in control classes received instruction in reading-related topics such as social studies, history, and science, via usual methods for each AE program. To measure the effects of instruction in every class, we pre- and post-tested with two standardized reading comprehension assessments. Additionally with Bridging classes we measured word reading skills, and with Fluency classes we measured rapid naming and oral reading rates.

Setting

We conducted the study at several Midwestern AE program sites where experimental and control courses took place in tandem. At the start of each enrollment period at each program, half the participants were randomly assigned to an experimental class and half to a control class (with one exception when a control class did not form) for a total of 39 experimental and 38 control classes over a four-year period. Four AE programs were operated by a community-based organization. A community college, a private college, and a public school district were the settings for 6 Bridging classes with an average beginning class size of 4.8 learners, and, at the same times in the same locations, 6 control classes with an average size of 4.3. At the community and private college programs, 4 Fluency classes averaged 4.5 learners and 4 control classes averaged 3.3. At 3 community college programs, 15 Prediction classes began with an average of 5.2 learners and 14 control classes averaged 4.6. Finally, 14 Summarization classes with an average of 5.1 learners and 14 control classes with an average of 5.3 learners took place in all four AE programs.

In general classes were planned for an 8-week duration, 4 days per week for 50 to 60 minutes per day (i.e., 26 to 32 hours) starting at various times during a year. This schedule was designed to strike a balance among three competing issues: (a) the theoretical position that holds that AE learners require explicit and intensive instruction, (b) the AE programs' established timeframes for instruction (i.e., 8 weeks), and (c) typical AE learner attendance patterns favoring short class durations (Creighton & Hudson, 2002). Specifically, planned hours of instruction

averaged by class: Bridging 27 hours, Fluency 19 hours, Prediction 34 hours, and Summarization 23 hours.

Participants

In order to take part in the study, we required learners to meet the Kansas Board of Regents and U.S. Department of Education's eligibility requirements for enrollment in Adult Education and Family Literacy Act (AEFLA; P.L. 105-220) programs. In summary, participants had to be at least 16 years old; withdrawn from secondary education without earning a secondary credential or without attaining 8th grade equivalency in reading, writing, or math skills; and have U.S. citizenship or authorization to work in the U.S. as a foreign national in order to receive nominal monetary incentive payments.

Research and AE program staff recruited new and returning AE program participants who had independently enrolled in AE educational courses. A recruiting presentation included description of the random assignment of learners to the control and experimental classes, the instructional intervention, researcher confidentiality, and participation incentives. Staff also indicated that the experimental instruction might improve literacy skills more than typical instruction, and thus help learners be more likely to pass the GED exam. Subject to The University of Kansas' human subjects research policy, all individuals who opted to be in the study signed a consent form, information release form for contact information and program-administered pre-test scores indicating their functional reading levels.

Random selection and assignment. Three hundred seventy-five learners volunteered for the study. We randomly assigned these learners to experimental and control classes by location at the beginning of each 8-week cycle (experimental $n = 197$; control $n = 178$). Uneven numbers across conditions are the result of odd numbers of participants in many of the 38 cycles and one additional experimental class without a corresponding control class.

Although we randomly assigned students to experimental and control conditions, instructors were not randomly assigned to conditions. We therefore must allow for the possibility that differences in teachers might have affected the outcomes of this study.

Participant profiles. Table 1 presents the total sample's demographic profile as well as profiles of experimental and control class starters and completers. The sample was 63% female and ranged in age from 16 to 74 years with an average age of 27.7 ($SD = 13.7$). The racial and ethnic distribution of the sample was similar to non-ESL, AE programs in the region: 45% African-American, 33% White non-Hispanic, 5% White Hispanic, and the remainder reporting multi-racial or other racial categories.

Prior educational attainment of the sample ranged from 1st grade to post-secondary education ($M = 9.7$ grade, $SD = 1.6$), and National Reporting System (NRS) educational functional levels ranged from Beginning Basic Education (Level 2) to High Adult Secondary Education (Level 6) ($M = 4.1$ or High Intermediate Basic Education, $SD = 1.0$) at entry into the AE program. We included this broad range of NRS levels in the sample based on empirical evidence that functional reading classification assessments (e.g., CASAS, TABE) do not represent adult literacy learners' instructional needs (Greenberg, Levy, Rasher, Kim, Carter, &

Berbaum, 2010; Mellard & Fall, in press; Mellard, Fall & Mark, 2008; Mellard, Woods, & Fall, in press; MacArthur, Konold, Glutting & Alamprese, submitted), and thus learners at various levels might benefit from the interventions.

Table 1

Demographic Profile in Total and by Condition for Starters and Completers

	Total Sample	Control		Experimental	
		Starters	Completers	Starters	Completers
N	375	178	105	168	100
Age in years					
Mean (<i>SD</i>)	27.7 (13.7)	29.1 (14.8)	31.1 (16.1)	26.5 (12.5)	29.6 (15.2)
Range	16 – 74	16 – 74	16 – 73	16 – 69	16 – 69
% Male	37%	35%	33%	39%	43%
% White, non-Hispanic	33%	35%	37%	30%	32%
Educational attainment					
Mean (<i>SD</i>)	9.7 (1.6)	9.6 (1.6)	9.5 (1.7)	9.7 (1.7)	9.6 (1.8)
Range	1 – 13	3 – 13	3 – 13	1 – 13	1 – 13
Educational functional level					
Mean (<i>SD</i>)	4.1 (1.0)	4.1 (1.1)	4.0 (1.1)	4.2 (1.0)	4.2 (1.0)
Range	2 – 6	2 – 6	2 – 6	2 – 6	2 – 6

Note: Educational attainment refers to K-12 levels, with 13 representing post-secondary education; Educational functional level refers to the National Reporting System levels 1 through 6.

Participant compensation. As incentive for consistent participation in instruction, all participants received up to \$75, conditionally dispersed over the duration of the courses. Each learner could receive \$25 for taking pre-tests before the course started, \$25 for achieving a 75% attendance record after three weeks, and \$25 for taking a post-test at course completion.

Control Class Conditions

AE programs can help learners acquire literacy skills as by-products of content instruction associated with GED exam preparation. In this study, control class methods included whole-group instruction (e.g., lecture), small group activities, and individual tutoring using the IRE method of instruction in most instances. Instructional focus and materials varied based on learner needs. The instructional focus was basic skills or subject matter content (e.g., social studies) rather than learning strategies. The classes used beginning literacy, pre-GED, or GED preparation materials (e.g., McGrawHill/Contemporary, 2002), as well as local newspapers and other instructor-selected materials. Control class instructors were employees or volunteers associated with the AE programs and met each program's minimum instructor qualifications.

Experimental Class Conditions

To deliver experimental instruction, the research project employed 2 instructors who held graduate degrees in education and had prior AE teaching experience. Research staff trained

these instructors in the instructional method and the four learning strategies. Instructors selected reading materials appropriate for adults in their specific classes, such as Townsend novels (e.g., *Someone to Love Me*; Schraff, 2001), Jamestown passages (Spargo, 1998), as well as GED practice passages.

Assessment Instruments

Because text comprehension is the goal of reading, we used two assessments of passage comprehension to measure the effect of the instruction. The two standardized assessments we administered were the *Gray Oral Reading Test-4* (GORT-4; Wiederholt & Bryant, 2001) reading comprehension subtest and the *Woodcock Reading Mastery Tests-Revised* passage comprehension subtest (WRMT-R; Woodcock, 1998).

WRMT-R Passage Comprehension subtest measures ability to read and comprehend short passages of two to three sentences using a cloze procedure. The subtest takes an average of 30 to 35 minutes to administer, and contains 68 items arranged in order of difficulty. The instrument has internal reliability of .87 to .98 and concurrent validity of .79 to .92.

The GORT-4 reading comprehension subtest requires reading graded passages orally and responding to comprehension questions, usually requiring about 10 minutes to complete (Wiederholt & Bryant, 2001). Internal consistency reliabilities are in the .80s; alternate form reliabilities are in the .80s and .90s. However, we note construct validity concerns in that the difficulty among passages varied widely from expected patterns, and evidence for passage independent questions have been reported that may skew results based on the reader's prior knowledge (Keenan & Betjmann, 2006).

In addition to the comprehension assessments, for some strategy conditions we administered outcome assessments that related to the more immediate goal of the learning strategy. With Bridging classes we measured word reading skill and efficiency using the WRMT-R subtests of word identification and word attack skills (Woodcock, 1998), as well as the *Test of Word Reading Efficiency* (TOWRE) phonemic decoding and sight word tests (Torgesen, Wagner, & Rashotte, 1999). With Fluency, we administered *Comprehensive Test of Phonemic Processing* (CTOPP) tests of rapid letter naming (Wagner, Torgesen, & Rashotte, 1999), the *Gray Oral Reading Tests-4* (GORT) fluency subtest (Wiederholt & Bryant, 2001). We also assessed passage reading rate and accuracy with two one-minute oral readings of 6th grade level expository texts, drawn from and scored using the Qualitative Reading Inventory (QRI) method (Leslie & Caldwell, 2001).

Examiners and administration. Graduate research assistants from university Psychology and Research in Education and the Speech, Language and Hearing programs administered the assessment instruments. Research staff trained these examiners to criterion on each instrument during 12 hours of training and team practice. Research staff created a procedural notebook as a reference for examiners and a reliability measure during testing. Examiners administered the assessments to experiment and control group participants at the AE program sites without any group membership distinctions. For both groups, pre-tests occurred approximately one week prior to the start of a course; post-tests occurred during the two weeks after the conclusion of a

course or when the learner indicated an intention to leave the program in the near future. Lack of persistence, that is, leaving the program early, is common in AE programs (Creighton & Hudson, 2002), thus we used monetary incentives to encourage learners to participate in post-testing.

Attendance and Minutes of Instruction

Instructors maintained and reported records indicating the attendance and minutes of instruction delivered to each learner in both the control and experimental conditions. Instructors closely monitored attendance and contacted students who were absent in an effort to improve attendance and retention in both the experimental and control conditions.

Fidelity to the Intervention

To ensure the fidelity of the classroom techniques, all class sessions were either audio or video taped. Approximately 20% of the nearly 2500 sessions were randomly selected from the beginning, middle, and ending thirds of the course for fidelity reviews. For experimental classes, reviewers used a checklist to determine whether instructors were teaching according to the scripted strategy. For control classes, reviewers documented the form and content of instruction, and whether an experimental learning strategy had been taught. These reviews confirmed fidelity to the intervention in experimental classes as well as no apparent learning strategy instruction in the control classes.

Results

Our purpose was to determine whether strategic instruction in learning strategies would produce significant gains in reading comprehension or reading-related subskills compared to typical AE instruction. One critical factor in determining the effectiveness of the intervention is one of dosage (see Table 2). The data indicate no significant difference in the overall participant retention rates in experimental (51%) and control (59%) classes ($p = .147$), rates that are typical in AE programs (Beder, 1999). Likewise, t-tests showed no significant differences in the average minutes of instruction delivered to completers under either condition by strategy (Bridging $p = .805$, Fluency $p = .839$, Prediction $p = .145$, Summarization $p = .463$), indicating similar attendance levels. However, this level of participation in instruction was much less than called for in the study design (Table 2) and as indicated by the previously referenced SIM learning strategies literature. Specifically, instruction time for Bridging completers averaged 69% of planned hours, that is, 19 out of a possible 27 hours; Fluency completers averaged 13 out of 19 hours (68%); Prediction completers averaged 30 out of 34 hours (86%); and Summarization completers averaged 17 out of 23 hours of instruction (74%). Prediction was the only course that approached the prescribed dosage.

Table 2
Retention Rates and Minutes of Classroom Instruction for Completers

	Bridging	Fluency	Prediction	Summarization	Total
	Intervention classes				
Starters	29	18	78	72	197
Completers	15	12	31	42	100
Retention rate	51%	67%	40%	58%	51%
Mean planned instructional minutes (Range)	1,618 (1450–2160)	1163 (900–1500)	2075 (2040–2160)	1385 (900–1860)	1607
Mean actual instructional minutes (SD)	1,115 (271)	791 (208)	1,781 (304)	1,032 (284)	1248
Percent of planned instruction time	69%	68%	86%	74%	78%
	Control classes				
Starters	26	13	65	74	178
Completers	11	11	40	43	105
Retention rate	42%	85%	62%	58%	59%
Mean planned instructional minutes (Range)	1,485 (1400–1577)	1155 (822–1493)	2082 (2040–2160)	1395 (900–1860)	1641
Mean actual instructional minutes (SD)	1,142 (289)	766 (353)	1,883 (268)	1,075 (264)	1357
Percent of planned instruction time	77%	66%	90%	77%	83%

Reading outcomes. T-tests showed no significant differences between experimental and control classes pre- to post-test gains by learning strategy for both reading comprehension assessments (Table 3). Construct validity concerns arose with the GORT-4 in that the difficulty among passages varies as opposed to increasing difficulty across passages. In addition, many passage-independent questions may have skewed results based upon a learner's prior knowledge (Keenan & Betjmann, 2006).

Table 3
Reading comprehension scores by condition and strategy

	Control completers			Experimental completers			<i>p</i>
	Pre-test <i>M (SD)</i>	Post-test <i>M (SD)</i>	Gain/ loss	Pre-test <i>M (SD)</i>	Post-test <i>M (SD)</i>	Gain/ loss	
Bridging							
WRMT-R passage comp.	60.3 (22.3)	67.9 (18.4)	7.6	72.5 (20.0)	80.4 (17.5)	7.9	.965
GORT-4 comp.	3.1 (2.0)	3.6 (2.1)	0.4	5.4 (3.3)	4.9 (3.0)	-0.5	.550
Fluency							
WRMT-R passage comp.	89.0 (14.3)	93.0 (16.8)	4.0	87.3 (6.7)	90.5 (6.3)	3.1	.101
GORT-4 comp.	6.9 (2.7)	6.5 (3.5)	-0.5	5.8 (1.8)	6.4 (2.7)	0.6	.193
Prediction							
WRMT-R passage comp.	79.4 (16.2)	79.2 (18.8)	-0.2	80.0 (15.3)	82.2 (13.7)	2.2	.230
GORT-4 comp.	4.7 (2.5)	4.1 (2.1)	-0.6	4.7 (3.0)	5.2 (2.8)	0.5	.145
Summarization							
WRMT-R passage comp.	77.1 (18.7)	79.3 (17.5)	2.2	82.2 (13.0)	83.8 (15.1)	1.6	.494
GORT-4 comp.	5.1 (2.6)	5.0 (2.7)	-0.2	5.9 (2.4)	5.3 (2.7)	-0.6	.366

Note: Standard scores are presented.

For Bridging and the parallel control classes, t-tests showed no significant differences in gains in word reading subskills (Table 4). For Fluency classes and the parallel control classes, t-tests showed no significant differences in rapid naming ability nor in measures of fluency reading connected texts (Table 4).

Table 4
Reading subskill scores by condition for The Bridging Strategy and The Building Fluency Strategy

	Control completers			Experimental completers			<i>p</i>
	Pre-test M (SD)	Post-test M (SD)	Gain/ loss	Pre-test M (SD)	Post-test M (SD)	Gain/ loss	
The Bridging Strategy							
WRMT-R	65.2	65.7	0.5	77.5	78.6	1.2	.462
Word Identification	(22.3)	(20.1)		(14.8)	(14.5)		
WRMT-R	72.6	75.8	3.2	81.1	82.4	1.3	.485
Word Attack	(17.8)	(19.8)		(11.6)	(11.8)		
TOWRE Sight	72.4	70.6	-1.7	73.5	76.0	2.5	.102
Word Efficiency	(13.2)	(15.7)		(11.4)	(13.0)		
TOWRE	68.9	66.8	-2.1	67.8	68.6	0.8	.473
Phonemic Decoding Efficiency	(13.2)	(14.3)		(14.2)	(13.6)		
The Building Fluency Strategy							
CTOPP Rapid	7.3	7.5	0.3	8.6	8.3	-0.3	.377
Letter Naming	(3.0)	(2.6)		(2.1)	(2.0)		
GORT-4	4.4	4.8	0.5	3.5	4.5	1.0	.522
Fluency	(4.1)	(4.3)		(2.3)	(2.8)		
QRI Correct	139.0	144.5	5.6	135.3	156.4	21.0	.095
words per minute	(41.7)	(42.7)		(27.1)	(37.2)		

Note: Standard scores are presented with the exception of the QRI raw score.

Discussion

Our research question was “Does strategic instruction in learning strategies produce significantly different gains in reading comprehension or reading-related sub-skills compared to typical AE instruction?” Under the described conditions with these learners, the answer was no. We believe our non-significant results can inform readers about what does not work, under what conditions, and with which learners, and contribute to future studies testing or evaluating alternative interventions addressing low adult literacy.

We hypothesized significantly greater gains from the interventions because they were validated with adolescents with SLD, and the SIM learning strategy method was shown to be feasible in AE settings. We speculate that differences between this study and previous SIM learning strategy studies could shed light on factors that may be altered for a different outcome.

Differences are apparent on multiple dimensions, including settings (secondary schools vs. AE programs), populations (adolescents with SLD vs. adults with low literacy or limited educational attainment), and learner differences within the adult population (lack of proficiency vs. lack of capacity). These dimensional differences appear to us to influence learners' engagement, persistence, and outcomes.

Settings. Secondary school attendance is compulsory and penalties occur for absenteeism. Classes usually meet for 5 days a week for an 18-week semester. In contrast, AE enrollment is generally voluntary and penalties for absenteeism are limited or non-existent. AE classes meet at most 4 days per week with shorter cycles (e.g., 8-week units). The net result is that secondary schools have more time to deliver greater doses of instruction with more consistency than can most AE programs. The issue of dosage is critical for a reading-related learning strategy intervention, as learners must acquire a new way to read that is often in stark contrast to their current approach to reading. The process of learning and becoming automatic with new strategies for reading can be lengthy for adults who, when in school, struggled learning to read. Research indicates that adolescents require a significant amount of instruction, sometimes as high as 90 hours, to reach mastery of a new reading strategy and the fluency necessary to apply a reading strategy to authentic materials and tasks (Torgesen, Rashotte, Alexander, Alexander, & MacPhee, 2003; Vaughn, Gersten, & Chard, 2000).

To accommodate participating AE programs' established timeframes for instruction we shortened the planned instruction to a range of 19 to 34 hours in recognition of the realities of conducting field research with AE program and learners. Also in the design were the four supports to combat lack of persistence in AE programs as suggested by Comings, Parrella and Soricone (2000): (a) awareness and management of forces that help and hinder persistence; (b) self-efficacy; (c) student's learning goal; and (d) measuring progress toward the goal. Our Phase 1 learner readiness, goal and commitment activities addressed the first and third of these supports. Phase 2 included measuring progress toward the learners' goals. Finally, the entire instructional method was designed to create mastery experiences that allow the learner to be successful in learning and thus contribute to self-efficacy. Nevertheless, these supports were not sufficient to overcome the adult personal and social responsibilities, such as parenting, employment, and civic duties, which likely underlie the levels of engagement and persistence (i.e., high attrition and low attendance). This high attrition rate reduced statistical power; post hoc assessment of power indicates insufficient sensitivity to detect important effects of the intervention. A larger more varied sample might have produced a different result.

Populations. Because learning strategy instruction has been shown to be effective with adolescent learners with SLD, we speculate that our lack of significant outcomes could also relate to physiological and cognitive differences among the validation studies' and this study's populations. Adolescents with SLD may have more malleable thinking and behavior patterns than adults. Likewise, adults over 35 years old have been found to experience diminishing processing speeds (Kail & Salthouse, 1994), and approximately 30% of our sample was 35 or older.

Learner characteristics. From our experience with AE learners, we speculate that some lack proficiency while others lack capacity to benefit from learning strategy instruction. Learners who lack capacity do not possess the underlying cognitive processing abilities to be able to

perform the task. Learners who simply lack proficiency never learned or invented their own metacognitive strategies. For those adults who have the cognitive potential, a learning strategy may indeed be a valuable compensating strategy that provides a means to reading and learning if delivered in sufficient dosage and in settings that work with adult lifestyles.

For adults who have underlying cognitive difficulties, we speculate that different compensating strategies are needed. All learners may benefit from such common features of strategic instruction as describing, modeling, controlled practicing, and a feedback cycle, but learners with underlying cognitive difficulties may need a variety of unique features (e.g., more practice repetitions, smaller information blocks to reduce cognitive load).

Summary. Transferring an intervention from one population (adolescents with SLD) to another (adults with low literacy or limited educational attainment), and from one setting (secondary schools) to another (adult education programs) is a complex problem. Our randomized controlled trial of learning strategies instruction in AE programs did not find any significant differences from typical instruction. We speculate that differences among our study's and the validating studies' (Faggella-Luby et al., 2007; Hughes et al., 1993; Hughes et al., 2002; Hughes & Schumaker, 1991; Lenz et al., 1991; Scanlon et al., 1996; Schumaker & Deshler, 2003; Schumaker & Deshler, 1992; Schumaker et al., 1982; Schumaker et al., 2006) settings, populations, and individual learner characteristics contributed to our lack of positive results. However, after reflecting on the data and our observations, our judgment is that insufficient instructional intensity (dosage) was the primary factor affecting study outcomes. Strategic instruction is explicit and intensive by design, and these principles proved to be elusive in the AE setting with AE learners. Our design included intentional efforts to address retention and attendance issues, including a bare minimum dosage, monetary incentives, phone calls to absent learners, and learner persistence support incorporated into the instructional method. Even so, learners sporadically participated in only a portion of planned instruction. Thus, by the end of our study period, the non-significant results were disappointing but did not surprise us.

The previous research indicates that in order for strategy instruction to significantly impact learner achievement with large effects, instruction must be delivered in an explicit, intensive, and systematic fashion. This study calls into question whether such instruction can be delivered in traditional AE settings. The achievement gap for this population is wide and creative solutions may be needed to overcome the conflict between the theoretically and empirically justified need for more instructional dosage and the contextual and cognitive realities of adult literacy education.

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