# Video Feedforward for Reading

**Peter W. Dowrick** and **Weol Soon Kim-Rupnow,**
*University of Hawai'i*

**Thomas J. Power,**
*Children's Hospital of Philadelphia, University of Pennsylvania*

Video feedforward can create images of positive futures, as has been shown by researchers using self–modeling methods to teach new skills with carefully planned and edited videos that show the future capability of the individual. As a supplement to tutoring provided by community members, we extended these practices to young children struggling to read. Ten students with special needs participated in a multiple baseline intervention. Each received tutoring only, followed by tutoring plus video feedforward, another phase of tutoring only, and follow-up. Overall, reading fluency improved significantly for all students; in 9 out of 10 cases, rate of improvement was significantly greatest during feedforward. Other measures (e.g., word identification) confirmed student progress from most at-risk to mid-stream status. We conclude that video images of success with challenging materials may enhance the acquisition of reading skills.

Self-modeling has been studied most explicitly in the video medium. Approximately 300 such applications in which the participant is both the model and the observer have been described in print (see review by Dowrick, 1999). Typically, participants watch themselves in brief videos in which they perform successfully in challenging situations (self-modeling terminology defined by Dowrick & Raeburn, 1977, 1995). Many applications have been with school-age children, often in special education and related services (e.g., Bray & Kehle, 1998; Buggey, 1995; Walker & Clement, 1992), but not many applications have addressed academic performance (see Hitchcock, Dowrick, & Prater, 2003). Exceptions include studies in the acquisition of mathematical skills by Schunk and Hanson (1989) and Woltersdorf (1992).

The successes to be observed on video may be selected as exemplars taken out of the context of typical performance, as is often done for classroom on-task behavior. For example, Kehle, Clark, Jenson, and Wampold (1986) recorded hours of unprompted classroom behavior of four elementary school children (boys) who had been identified with behavior disorders, and then they edited a selection of positive examples into relatively short videos. Each student watched his own videotape once a day for 5 days, and the rates of inappropriate behavior declined, on average, from 47% to 11%. This type of self-modeling—to increase adaptive behavior that is currently intermixed with nondesired behaviors—is known as *positive self-review* (PSR). PSR is also used for mood-based disorders, the transferal of role play to the real world, and the maintenance of disused or low-frequency skills (Dowrick, 1999).

All creatures learn from observing their successes, but not usually on video; humans distinguish themselves by being able to learn through observing successes they have *not yet had*. This type of self-modeling is known as *feedforward*, an image of future mastery (a term coined to contrast with *feedback*, which illustrates past or present performance). For example, behavior that occurs only in one setting may be transferred to other settings by video or audio feedforward (Blum et al., 1998). In the classic application to selective mutism (Dowrick & Hood, 1978; also described in Dowrick, 1999; Kratochwill, 1981), two children were never observed to speak at school, although they spoke freely at home. Essentially, videos were made in both locations, and each child's conversation from the home was edited into the context of an adult asking questions and making comments to the same child at school. Both children watched together—first one feedforward video over a period of days, then the other—with the result that each child significantly increased the rate of speech at school in response to the self-model but not to the peer model. These increases in speech were rapid and dramatic, with only a few viewings of the feedforward video.

Other categories of self-modeling for which a feedforward approach is effective include using visually hidden support in the situation of anxiety-impaired performance, such as learning to swim (e.g., for children with spina bifida; Dowrick & Dove, 1980). Another example is the strategy of combining component skills, as in separately performed elements of figure skating (take off, spin, landing), to produce the video image of a routine, such as the triple lutz, that has yet to be

*Address: Peter W. Dowrick, University of Hawai'i at Manoa, 1776 University Ave. UA4-6, Manoa, HI 96822; e-mail: dowrick@hawaii.edu*

mastered (Dowrick, 1989). Thus, video feedforward has demonstrated efficacy in the acquisition of physical skills, social skills, and classroom behavior. Yet, as noted, few studies have addressed the learning of basic academics most essential in special education.

Literacy is fundamental to all education in most schools. In 2002, the national reading scores for fourth-grade students were about the same as in 1992, but the spread of scores was even greater (NCES, 2003). Disadvantaged urban schools most frequently report the worst literacy outcomes. Schools with which we have worked in the past 7 years, in low-income areas of different states, have experienced needs far beyond their resources. About 90% of the children qualified for free or reduced-priced lunch. Over all sites, 80% of the children were from immigrant, African American, or Native Hawaiian families, and they lived in the lowest 10% of housing amenities in their cities (estimate based on housing types/ values and family income); 35% of adults had no high school education (cf. 7.5% nationally; U.S. Census Bureau, 2000). The schools were in the bottom 20% of their districts for achievement in basic academics, and 12% to 25% of students were classified in special education (Hawai‘i Department of Education, 1999; University of Pennsylvania Library, 1998).

With so much of the responsibility falling on special education, broadly sustainable early intervention is needed (Connell, Kubisch, Schorr, & Weiss, 1995). Although one-on-one reading specialists may be effective, they do not address the scope of the problem. We focused, therefore, on building the capacity of the school and its community (Dowrick et al., 2001).

One potential community resource is its people, who may be trained to become low-cost, in-school partners in the endeavor. We therefore began by developing short, effective protocols for community partners to become school-based reading tutors (Power, Dowrick, Ginsburg-Block, & Manz, 2004). We incorporated best practices (verified by the National Reading Panel [NRP], 2000)—such as phonics and phonemic awareness (decoding skills), oral fluency (with repeated readings), reading vocabulary (including sight words), and comprehension—with high levels of praise and support in a system of one-on-one tutoring. These practices have since been widely publicized by the NRP and confirmed by others (e.g., Gersten, Fuchs, Williams, & Baker, 2001). An important feature of our protocols has been the effectiveness for paraprofessionals, as demonstrated by case studies (Power et al., 2004). This tutoring offers high levels of effective practice and mentoring by adults from the neighborhood community.

Research on the topics of Vygotsky’s zone of proximal development (ZPD), Bandura’s self-efficacy, and Dowrick’s self-modeling and feedforward provides elements of a theoretical framework to address the problems of reading difficulties experienced by children with disabilities. According to Vygotsky (1978), learning is most efficient in the zone of proximal development; that is, when information to be learned is just beyond current knowledge but closely related to it. By definition, the ZPD covers experiences between the child’s unaided performance and the performance that is possible with the help of an adult or more capable peer (Hausfather, 1996; Vygotsky, 1978).

Intersecting principles can be found in social–cognitive theory (Bandura, 1986, 1997), especially in self-efficacy. Perceived self-efficacy refers to a person’s belief that he or she can perform an identified task, accounting for different levels of performance under similar teaching/learning conditions (Bandura, 1997). For example, in learning to read, children with disabilities but high self-efficacy will persevere in the face of difficulties, initiate more opportunities to practice reading, and quickly become better readers than other children with the same level of cognitive ability. Thus, it is logical that children with high self-efficacy would be more likely to explore and persist in their ZPD. Very little research has directly examined the link between self-efficacy and ZPDs (exceptions include Clifford & Green, 1996; d’Arripe-Longueville, Gernigon, Huet, Cadopi, & Winnykamen, 2002).

Individuals can acquire self-efficacy through external support and encouragement and, in particular, through the observation of their own success, which is the definition of *self-modeling* (Bandura, 1986, 1997; Dowrick, 1983, 1991, 1999). Self-modeling is most powerful when the successful self-image is selectively screened on a video or computer monitor. This medium supports feedforward, the subcategory of self-modeling in which the observed success is slightly above current capability (Dowrick, 1991, 1997). For example, “Kalani” may see a videotape of herself reading a book of frustration-level text; this video shows Kalani reading with good fluency and occasionally sounding out a difficult word—something she could do with adult help. *Thus, feedforward promotes self-efficacy and creates learning in the ZPD*. We built a supplementary reading support program around the feedforward principle in response to the needs of schools with limited resources (Dowrick et al., 2001).

From the outset, our approach invoked the general principle of feedforward: to promote images of future success where there was previously a history of failure. We then introduced feedforward on video as a supplement to the tutoring. The reading support program began in Philadelphia. It expanded to Hawai‘i in 1998, when we adopted the name of ACE Reading (ACE = Actual Community Empowerment). This article describes the first study in its new location.

The critical test of an early reading intervention is whether it can improve the *rate* of skill acquisition. It is widely recognized that oral fluency will generally improve over time for beginning readers in the first grade (see Fuchs, Fuchs, Hosp, & Jenkins, 2001)—after all, a major part of their schooling is for that purpose. The students are even more likely to improve with additional tutoring, even when provided by paraprofessionals (Elbaum, Vaughn, Hughes, & Moody, 2000). The question is whether a specialized reading intervention can improve the rate of skill acquisition, such as increases in words read correctly per minute, in comparison with the rate of improvement otherwise achieved. In this study, the specialized intervention was tutoring plus video feedforward and the comparison intervention was tutoring. Accordingly, our research question was to examine the ability of video feedforward when combined with tutoring to improve the rate of skill (fluency) acquisition in contrast to the rate achieved by providing tutoring alone.

# Method

General methodology descriptions of ACE Reading, described in this section, are also available on the ACE Reading Web site (2004).

## *Setting and Participants*

The children attended the second semester of first grade at an elementary school in urban Honolulu. In first through sixth grades, 50% to 90% of the school's students were reading below grade level, one of the lowest rates in the state of Hawai‘i, whereas the students were near the top in the fine and performing arts. This disparity suggested endemic diverse learning abilities potentially influenced by background developmental opportunities. Schoolwide, 40% of students lived in homes where the first language was not English. Only 5% of students were identified by the school as "English proficient." The community had one of the lowest rates of employment and income in the state; 50% of parents had a high school diploma or equivalent (Hawai‘i Department of Education, 1999).

Ten students (6 girls, 4 boys) were identified by the school's three first-grade teachers as being the "three or four children having the most difficulty in learning to read" in their respective classrooms. Most children had previously attended the kindergarten at the school. Ethnicities were listed in school records as Samoan, Native Hawaiian, Filipino, Japanese, and Mixed (an official Hawai‘i category, even before U.S. Census Bureau, 2000). All the children spoke intelligible English or Pidgin; at least half of them also spoke their native or family language. Their ages ranged from 6 years 3 months to 7 years 2 months. None of the children had discipline records. In the previous semester, days absent ranged from 1 to 22. All these children were classified as "special needs" on the basis of family circumstances, and all were considered at risk for academic failure (Hawai‘i Department of Education, 1999). Such children were predicted to become classified with "specific learning disability" by the end of second grade, following school policy on evaluations and observations for special education. Students' IQs ranged from 54 to 99 (see Table 1 in the results section). Because the school had 13% of students in special education in second through sixth grades and the identified students represented the most struggling 14% of students in Grade 1, the situation presented a prime challenge for immediate intervention.

Three local adults were recruited for tutor training by the school principal. One was currently employed as a lunch monitor, and the other two were welfare recipients. All were women, Samoan immigrants (English was their second language), and residents of a state housing program across the street from the school. Two had graduated high school in American Samoa, one had not. They were assigned to students primarily on the basis of their time availability. Occasionally (about one session in five), a tutor would need to substitute for another who was absent.

## *Measures*

Student demographics were identified for age, gender, and ethnicity, plus school records of absence, tardiness, and disciplinary action. Oral reading fluency was regularly assessed with pairs of 1-min probes as a curriculum-based measure of progress. Passages without illustrations were randomly selected from the beginning books of a basal reading series (Beck et al., 1989) widely adopted in other schools. Each student was asked to read aloud for 1 min. If he or she hesitated for more than 3 s, the child was given the word and encouraged to go on. Probes were scored as the mean number of words read correctly in 1 min on two passages. Probes were administered by one of two graduate research assistants who were trained to criterion (99% agreement with trainer) using standardized procedures; 10% of probes during intervention were independently scored by both assistants for reliability. The interrater reliability of probes proved to be 96% agreement between the two assistants.

Curriculum-based measurement (CBM) was used for three reasons strongly supported by research (Fuchs et al., 2001): (a) it is immediately sensitive to (relatively small) changes in performance, potentially indicating changes associated with varying conditions of instruction; (b) its relationship to the curriculum assures relevance in diverse settings; and (c) it is unaffected by multiple administrations (using multiple probes), thus enabling statistical analysis of *slope,* that is, the rate of improvement (in this case, rate of improvement in fluency) rather than the net improvement. It is also recommended as appropriate for special education and for English language learners (Deno, 2003). If words per minute increase by 10 over 2 months and then by 10 in the next 2 weeks, a statistical comparison can be made if there are sufficient data points in each phase (Busk & Serlin, 1992; Jacobsen & Truax, 1991).

CBM probes are highly reliable. Interrater reliability is usually 95% to 99%, and comparisons between and within subjects are usually more than 85% (Fuchs et al., 2001). To reduce variability of performance (a validity consideration), we administered two probes per session and used the mean as a single data point.

Reading mastery was measured with pre–post administration of the *Woodcock Reading Mastery Tests* (2nd ed.; Woodcock, 1998). This battery has been nationally normed and has shown to have good reliability and validity (Reynolds &

Miller, 2003). Our main measure here was the Word Identification subtest. We also used Letter Identification, but the students all reached near maximum scores by the posttest; without knowing when this mastery was reached, it proved not useful. Other subtests (e.g., Comprehension) were not applicable for pretesting at these students' entry level of reading.

IQ was measured by the *Kaufman Brief Intelligence Test* (K-BIT; Kaufman & Kaufman, 1990). This widely used test includes subscales for verbal and general logic (matrices) intelligence that show good concurrent validity with Wechsler's subtests (.78–.83) but generally score 0 to 5 points higher (Grados & Russo-Garcia, 1999; Prewett, 1995).

A phonological awareness test was given to measure skills in segmentation (isolating the sounds that make up words), based on the *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS; Kaminski & Good, 1996). Reports have indicated interrater reliability at around .90 and concurrent validity (with standardized achievement measures and teacher ratings, etc.) from .60 to .70 (Elliot, Lee, & Tollefson, 2001).

*The Young Children's Academic Intrinsic Motivation Inventory* (Y-CAIMI) is a questionnaire (filled out by a research assistant who asks the student the questions and scores the answers on a 3-pt scale) with subscales for reading and mathematics, as well as a total scale, that we used to get a sense of the child's motivation in classroom learning. These scales are highly reliable, with coefficient alphas .82, .84, and .91, on the basis of cross-sectional and longitudinal samples (Gottfried, 1990). Validity of the scales has been demonstrated through the stability from first grade through late adolescence (Gottfried, Fleming, & Gottfried, 2001).

Protocol integrity was measured in two ways. The ACE Reading Tutoring Checklist, with 25 steps and other items, was used in every session. Each printed step served as a reminder, and tutors circled "yes" or "no" as the session proceeded (see Figure 1). At the end of the checklist, tutors noted "most difficult words" and categorical comments, such as what worked well that day. Sessions were also recorded on audiotape. Randomly selected tapes (about 20%) were later reviewed for integrity and compared with the tutors' checklists to gauge accuracy of self-monitoring.

Structured comments were solicited from the classroom teachers and a research assistant, who was on-site almost every day. Comments were directed toward students' willingness to take academic risks, their attitudes toward reading, and their progress in reading and in class overall.

| | | |
|---|---|---|
| A. Setting up | | |
| 1. I tape recorded the tutoring session, labeling the tape with the date, my name, and the students' names . . . | yes | no |
| B. Passage reading | | |
| 4. The first time through the passage, they read the book in unison with me. | yes | no |
| C. Comprehension | | |
| 6. I helped the children relate something in the story to their experiences. | yes | no |
| D. Support | | |
| 10. I praised or encouraged each child more than once per minute for effort. | yes | no |
| E. Vocabulary | | |
| 11. When the children finished, I reviewed some of the difficult words. | yes | no |
| F. Sight words | | |
| 13. Next, I took last session's flashcards and removed two of the oldest cards. | yes | no |
| G. Phonics | | |
| 20. If the child did not say the word within 3 seconds, I gave the beginning sound. | yes | no |
| H. More learning and enjoyment | | |
| 24. We played the Memory Game as many times as we could until the end of the tutoring session. | yes | no |
| I. Closure | | |
| 25. After I completed this Checklist, I completed the Student Tutoring Records for both children and filed all the forms. | yes | no |

**FIGURE 1.** Key elements of the ACE tutoring protocol. *Note*. ACE (Actual Community Empowerment) protocols vary for solo or group (usually in pairs) tutoring, for different ages, with or without computers, but all protocols cover the same elements in similar ways, in c. 25 min.

## *Equipment and Design*

We used a Hi-8mm camcorder for video capture and a Draco Casablanca digital editing system. Edited videos were copied onto VHS tapes and played on the school's video equipment (see Kim-Rupnow, Anderson, Galbavy, & Dowrick, 2001; available on the ACE Reading Web site with illustrations). We implemented a multiple-baseline-across-subjects design with 10 participants. Some of the timelines were highly similar, giving essentially six staggered baselines (for video, the condition of central importance) and four replications. Such a design is widely regarded as both powerful and highly applicable to situations, such as this, in which the components of intervention are uniquely packaged (Kazdin, 1982). There was also an A-B-BC-B design within each case, in which A = *no treatment*, B = *tutoring*, and C = *video*. This design, in itself, also is potentially strong, especially with "C" being the condition of most interest and having so many replications to address threats to external validity. The issues of generality and causality are thus addressed by exposing each individual to multiple levels of independent variables (Johnston & Pennypacker, 1980). Overall, this single-case methodology, with intensive data collection providing within and between subject comparisons, is better suited to the current research question than group designs would be (Blampied, 1999).

## *Procedure*

**Initial Assessments and Continued Monitoring.** Once students had been nominated by teachers, they were assessed to verify their appropriateness for the project and to gather other baseline data. Pretests included IQ (K-BIT), reading mastery (Woodcock), phonological awareness, teacher reports, and academic motivation. We also did five to nine probes with each child for oral fluency baselines before beginning tutoring (see Figures 2 and 3).

Curriculum-based measurement of the students' oral reading fluency was assessed with twice weekly probes before, during, and after the interventions. Tutoring integrity was monitored in every session, as previously indicated.

Tutoring was implemented on a staggered timeline, for practical and research design reasons. It allowed tutors to be adequately trained while classroom teachers made gradual adjustments, and it supported our multiple-baseline-across-subjects design. We began in the spring semester, with tutoring taking place from March through June.

Three community members were trained to criterion using videos and materials previously developed and successfully implemented in Philadelphia (ACE Reading, 2004). Over time, students were assigned to tutors, who remained with them, as much as practicable, for the semester. They followed the 25-step ACE protocol as noted (see Figure 1 for key elements). Where tutors deviated from protocol, we actively encouraged them to circle "no" to help us identify situations for procedural improvement.

Tutors were closely monitored in every session, either directly observed (by one of the authors) or tape-recorded. Tutors received coaching on-the-job and at regular staff meetings held at the school. Students were tutored at times when teachers determined students could be pulled out of class.

A typical ACE tutoring session, about 25 min, four times a week, was as follows (see key elements in Figure 1). Teachers would release students from class at a time of their preference. The tutor would walk the student to the library, making use of this time to further their friendship. Together they would choose a book from an appropriate selection available from the Title I program (Rigby Series for beginning readers) for *scaffolded passage reading*. This type of instruction improves reading fluency and comprehension more than traditional instruction (Kuhn & Stahl, 2003). The selected books were at a frustrational level for these students. First, the tutor would read the story slowly and expressively while the child joined in (unison reading; 2 min.). Then the tutor would read a phrase, and the child would read it (echo reading) and repeat. For a minute, they would discuss the story, with simple questions to support comprehension and related skills. Finally, the student would read the story solo.

The tutor was trained how to keep the child engaged in the task (e.g., verbal praise), how to prompt difficult words with phonics, and how not to react to errors at the time (which interrupts fluency; Hasbrouck, Ihnot, & Rogers, 1999) but to write them down and teach the correct response later in the session. Tutors were coached in the "90:10 rule," a concept they readily appreciated; that is, they were made aware that children benefit from practice if 90% is within their grasp and 10% is challenging. The repeated readings with reduced support each time through the story provided scaffolding that was intended to maintain the 90:10 rule, keep learning within the ZPD, and promote a sense of self-efficacy. That is, at each level of support, the child should struggle with about 1 word in 10.

In the second half of the session, flashcards were used to teach vocabulary and sight–word recognition. Intervention began with the 10 words of highest frequency in children's stories (Carroll, 1971) written on 5 inch × 3 inch index cards. In each session, the tutor would replace one or two well-known words with more challenging ones from the day's story (or sometimes a fun/functional word, such as the name of the child's brother). Training for tutors included how to use the 10 items as flashcards, seven times through the pack, with pause, prompt, and praise strategies in common with those used during passage reading (Glynn & McNaughton, 2003). The replacement of known words over time and the daily repetition through the pack were designed for the 90:10 rule. The session would end with high-fives, return to class, and the tutor completing the appropriate records.

**Videotaping for Feedforward.** After 3 or 4 weeks of tutoring, we recorded video footage during a regular session. As with any filmmaking effort, a specific plan and a knowledge of the intended finished product were essential to the success of the recording (Dowrick, 1991). The footage was edited to show fluent passage reading of a challenging text and accurate recognition of sight words on flashcards. Each finished tape was less than 2 min long, beginning with the child's name and an attractive still frame, and finishing with "The End" but no frills or music. Similar tapes can be produced without specialized equipment, with more options available every day from the video industry.

The images of fluent passage reading were achieved mostly by capturing the child's echo reading, editing out the tutor's modeling, and interspersing glimpses of the tutor's face as cutaways. The accurate recognition of sight words was achieved by taking advantage of the improvements that occurred by the sixth or seventh time through the flashcards. On the feedforward principle, it was important to select and repeat the rare successes of individually difficult words rather than make the easier choice of selecting better known words;

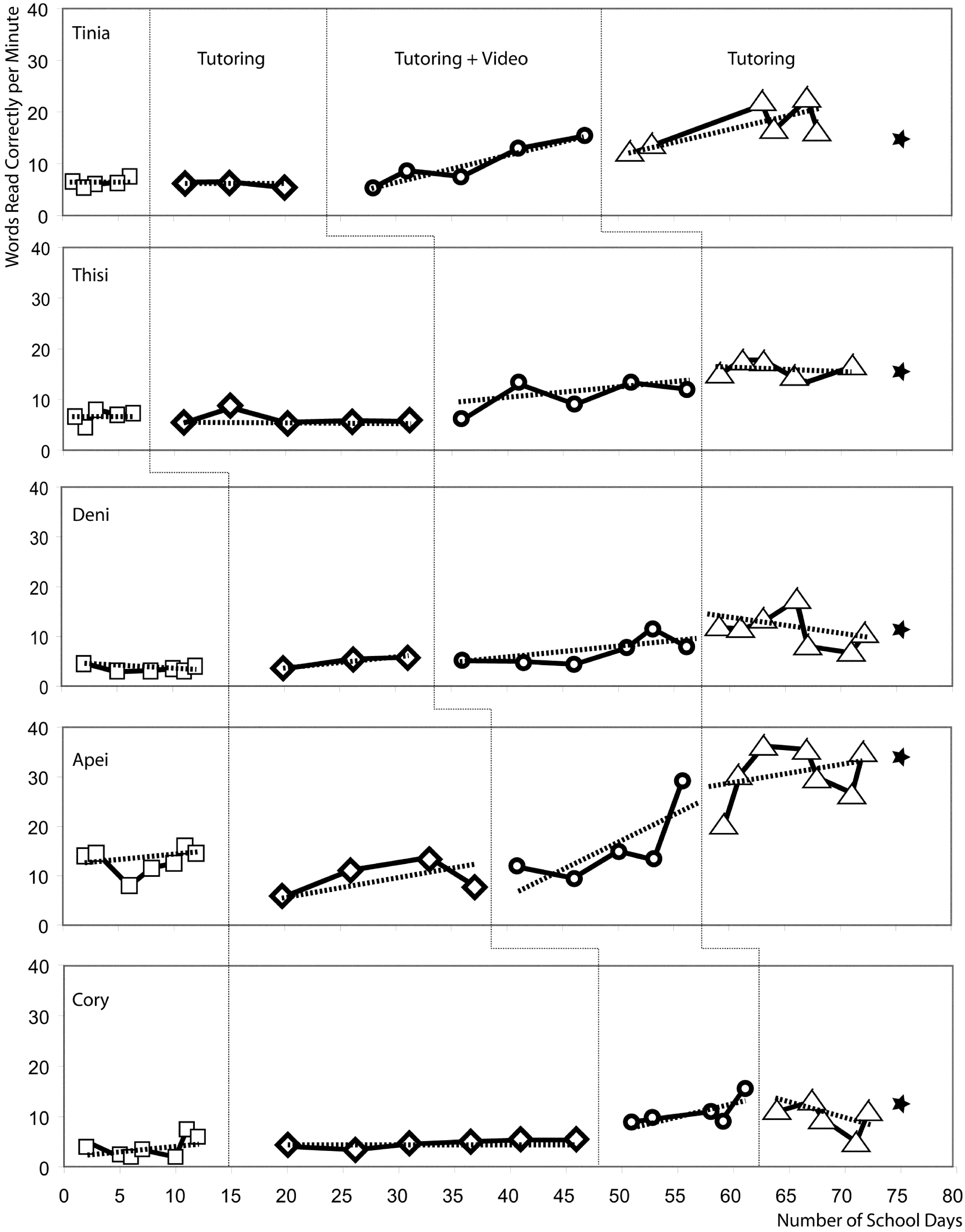


**FIGURE 2.** Oral fluency (words read correctly per minute) plotted over time (schools days): Students 1 to 5. Slopes are illustrated with dotted lines. The first phase (unlabeled) is no-treatment baseline. The last data point ★ is an early follow up, the average of four pairs of probes taken over 2 weeks in August. Other phases are as labeled.

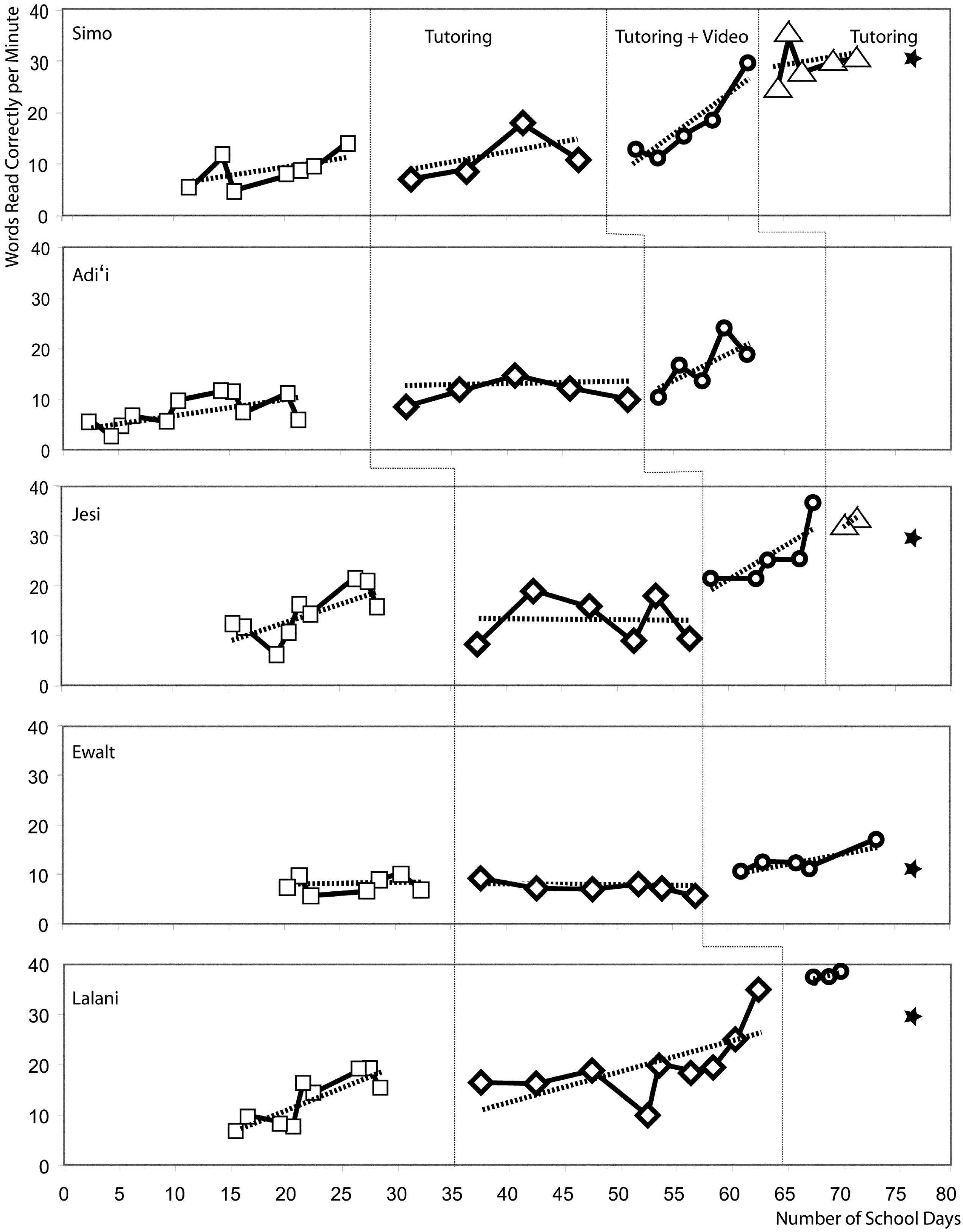


**FIGURE 3.** Oral fluency (words read correctly per minute) plotted over time (schools days): Students 6 to 10. Slopes are illustrated with dotted lines. The first phase (unlabeled) is no-treatment baseline. The last data point ★ is an early follow up, the average of four pairs of probes taken over 2 weeks in August; Adi'i had left the district and was unavailable. Other phases are as labeled.

thus, we sought to produce images of potential future mastery. These feedforward videos took about an hour to make: videotaping during a 25 min tutoring session plus editing time of 30 min or less.

Some time between the 5th and 8th week of tutoring, we began showing the students their videos at the start of each tutoring session. No comments were made during screening except to encourage attention to the screen and generally support the impression of becoming a capable reader. This routine was designed to continue for 2 weeks, after which time the student could choose whether to continue watching the video. All students except three returned to the tutoring-only condition for 2 to 3 weeks.

At the end of the semester, the progress of each student was reviewed. Students reading more than 30 words per min (wpm) were "graduated" from the program and were expected to continue to make effective progress in the mainstream classroom. Those achieving less fluency but making some progress were provided additional tutoring. If students made no progress, they would be recommended for alternative, specialized services. We monitored all students for another year.

**Posttesting.** At the end of the semester, posttest assessments were done for all students. These tests included the Woodcock, phonological awareness, motivation inventory, and teacher reports, as well as continuing probes of oral fluency. We obtained structured comments from teachers and a research assistant.

**Follow Up.** At the beginning of second grade, we provided further tutoring for five students, with twice weekly probes and monitoring (fortnightly probes) of the others, except for one student who left the area. All students met criterion within 1 to 3 months; some continued with tutoring at the teacher's request to attain even higher proficiency.

## Results

All students improved their reading overall, with fluency scores improving on average from 7.2 words read correctly per minute (wpm) to 21.2 wpm (see Table 1). Individual intervention was provided for half an hour almost daily over the course of 35 to 55 school days, depending on start date and time available in the semester. The children benefited demonstrably from the interventions, most markedly during the tutoring-plus-video feedforward phase, in which the slope, or rate of gains in fluency per day, was greatest for 9 in 10 students (and a close second for the 10th student; see Table 2).

The slopes, calculated from probe scores (number of words read correctly per minute) and the number of days elapsed, are used because students are expected to improve at this age with regular classroom instruction (Fuchs et al., 2001). Indeed, the probable national average for first graders is to improve at a rate of 1 wpm per week (consistent for active schooling over a year in "moderately accomplished" schools; Taylor, Pearson, Clark, & Walpole, 2002). The mean slope for tutoring plus video was 3.5; that is, reading improvement averaged an increase each week in the video phase, of 3.5 words read correctly per minute.

### *Multiple Baseline Across Participants*

Graphs in Figures 2 and 3 provide a visual analysis of the intervention effects (Parsonson & Baer, 1992). All names are pseudonyms. Half the initial baselines are almost flat, indi-

**TABLE 1.** Participant Data From the Study

| | | | | | Fluency (wpm) | | Word Id. (*SD*) | |
|---|---|---|---|---|---|---|---|---|
| Student[a] | Gender | Ethnicity | IQ (V) | YCAMI | March | June | Before | After |
| Tinia | f | Mixed | 91 | 20 | 6.0 | 18.0 | 81 | 82 |
| Thisi | f | Samoan | 83 | 25 | 5.5 | 15.8 | 82 | 81 |
| Deni | f | Samoan | 83 | 25 | 3.8 | 11.0 | 74 | 74 |
| Apei | m | Mixed | 73 | 28 | 14.3 | 32.3 | 91 | 94 |
| Cory | m | Filipino | 99 | n/a | 3.2 | 11.4 | 71 | 84 |
| Simo | m | Samoan | 58 | 31 | 8.0 | 29.4 | 83 | 88 |
| Adi‘i | f | Samoan | 59 | n/a | 4.0 | 18.3 | 79 | 85 |
| Ewalt | m | Mixed | 62 | 27 | 6.7 | 12.6 | 79 | 81 |
| Jesi | f | Japanese | 87 | 28 | 12.2 | 31.9 | 80 | 91 |
| Lalani | f | Hawaiian | 54 | 30 | 8.5 | 31.7 | 83 | 88 |
| Avg. | | | 75 | 27 | 7.2 | 21.2 | 80 | 85 |

*Note*. IQ (V) = Verbal Intelligence Quotient on the *Kaufman Brief Intelligence Test* (Kaufman & Kaufman, 1990); YCAMI = *Young Children's Academic (Intrinsic) Motivation Inventory* (Reading subscale); wpm = words read correctly per minute; Word Id. (*SD*) = standard scores on *Woodcock Reading Mastery Tests* Word Identification subtest (Woodcock, 1998; *M* = 100, *SD* = 15, on national sample at grade level); f = female; m = male.
[a]Age range = 6.3–7.2 yrs.

cating that these children may not have progressed at all under regularly available classroom instruction. Overall progress is substantial in terms of words read correctly per minute. Most progress was made during the tutoring-plus-video intervention phase, independent of the length of the preceding baselines, and these gains were subsequently maintained.

## *Within-Subject Analyses*

Effect sizes, known as Reliable Change Indices (RCIs), were calculated for each child to compare rates of progress (slopes) in different conditions of intervention. The RCI compares the slopes of data points across time as a ratio of two conditions (e.g., video/tutoring) adjusted by the reliability coefficient of repeated measures and divided by the standard error of measurement in the "denominator" condition (formula provided by Jacobsen & Truax, 1991, p. 14). Thus, the RCI provides a statistic analogous to the effect size in group studies (Cohen, 1988). Scores outside the range ±1.96 are significant ($p < .05$; see Table 2). Nine out of ten students improved with statistical significance during the video feedforward phase, versus the prior tutoring phase, on this basis of individual analysis. Visual inspection of the data (see Figures 2 & 3) suggests that all those students with data available had lower slopes upon their return to tutoring only, indicating a partial reversal of the main intervention effect. Statistically significant differences were obtained for two of the six students (see Table 2). Nevertheless, it appears that the rates of progress slowed, even though there continued to be net increases in most cases.

## *Oral Fluency*

All students improved during the intervention: The smallest range was from 7 wpm to 13 wpm; the greatest being 9 wpm to 32 wpm (see Table 1, Figures 2 & 3). There was some "noise" in the data, typical of CBM—that is, fluctuations in wpm outside reasonable confidence intervals. This noise was partly compensated for by administering two probes at a time and averaging them.

Rate of progress is more important than net gains (mean differences), given that ACE is supplementary to ongoing instruction and these students needed to catch up. We calculated slope for each phase of intervention and made statistical comparisons (based on the RCI), as previously noted (see Table 2). Reading fluency increased the most in the tutoring-plus-video phase, with a range of 1.2 to 7.8 wpm increase per week. The words per minute continued to increase in the postvideo phases, but the rate of increase diminished. The overall rate for all students in all conditions, including the no-tutoring baseline, was about a 1.5 wpm per week increase, with a 3.5 wpm increase per week during intervention with both tutoring and video.

K-BIT scores for Verbal IQ ranged from 54 to 99 (see Table 1). These scores (and the Matrices, range 69–102) were intended simply to contribute to the picture of the children in the study sample. The IQ scores were negatively, but nonsignificantly, correlated with oral fluency scores in June, at the end of one semester of ACE ($r = -.39$, $p = .26$).

## *Reading Mastery, Woodcock*

Eight students increased their standard scores relative to grade level for Word Identification; the other two held their ground. Five improved one third or more of a standard deviation in 4 months, during which they received 6 to 12 weeks of active intervention. Overall, Word Identification standard scores improved from 80 to 85 (matched pairs $t = 2.3937$, $df = 9$, $p = .04$; see Table 1 Note that standard scores of 80 and 85 place students at the 9th and 20th percentiles, respectively, in comparison with other students at that grade level in a national sample).

**TABLE 2.** Oral Fluency Data and Statistics

| | Slopes | | | | Reliable Change Index | | | |
|---|---|---|---|---|---|---|---|---|
| **Student** | **Baseline** | **Tutor:1** | **Video** | **Tutor:2** | **Tut:1/Bas** | **Vid/Bas** | **Vid/Tut:1** | **Vid/Tut:2** |
| Tinia | 1.20 | –0.55 | 2.55 | 2.10 | –1.68 | 1.25 | 3.88* | 0.24 |
| Thisi | 1.25 | –0.30 | 1.85 | 0.85 | –1.47 | 0.56 | 2.70* | 0.66 |
| Deni | –0.25 | 1.15 | 1.20 | –1.30 | 1.33 | 1.37 | 0.03 | 1.59 |
| Apei | 0.55 | 0.75 | 4.85 | 2.05 | 0.16 | 4.02* | 5.13* | 1.40 |
| Cory | 1.50 | 0.40 | 2.30 | –0.30 | –1.04 | 0.75 | 2.38* | 2.65* |
| Simo | 1.95 | 2.05 | 7.80 | 2.15 | 0.12 | 5.55* | 7.15* | 3.22* |
| Adi'i | 1.45 | 1.35 | 5.85 | n/a | –0.08 | 4.14* | 5.60* | n/a |
| Ewalt | 2.65 | –0.60 | 2.40 | 2.35 | –0.95 | 1.84 | 3.70* | 0.06 |
| Jesi | 3.65 | –0.10 | 6.50 | n/a | –3.51* | 2.77* | 8.34* | n/a |
| Lalani | 4.35 | 2.40 | 7.05 | n/a | –1.83 | 1.60 | 4.55* | n/a |

*Note*. Slopes = increase in words correct per minute per week; n/a = not available; Reliable Change Index (RCI) reflects the ratio of two slopes, divided by the mean square error of the "denominator" slope (Jacobsen & Truax, 1991). That is, it provided individual effect sizes. Bas = (no tutoring) baseline; Tut:1 = first phase of tutoring-only; Tut:2 = post-video, tutoring-only; Vid = video + tutoring condition.
*$p < .05$.

### Phonological Awareness

Fully one half of the students (Deni, Apei, Cory, Ewalt, Lalani) were unable to produce any segmentation sounds in pretesting and thus scored zero on the phonological awareness test. Pre–post scores for the others, based on correct segments out of 29 possible and an average on three tests, were as follows: Tinia 11.7, 21; Thisi 8.7, 9.7; Adi‘i 8, 15; Simo 11.7, 29; Jesi 21.7, 27.7. Posttest segmentation scores correlated nonsignificantly with end of semester fluency, $r = .47$, $p = .19$.

### Academic Motivation

Scores on the Reading subscale ranged from 20 to 31, with data missing for two students (see Table 1). According to Gottfried et al. (2001), such scores predict moderate to good academic progress. A point biserial correlation between our students' scores and their fluency scores at the end of the semester yielded $r = .63$, falling short of significance ($p = .09$).

### Protocol Integrity

Tutors returned checklists for every session in which they were not directly supervised. These self–reports indicated 85% to 100% compliance with protocol. These sessions were also audiotaped. Of 159 tapes, 34 (21%) were reviewed by a research assistant. Of the 714 items on the checklists, 659 were verified, indicating at least 92% accuracy (range across tutors, 87%–98%) on the part of the tutors in completing their protocol checklists.

Structured comments were collected for all students at the end of the semester from classroom teachers and an onsite research assistant (a total of 19 one-paragraph comments). All comments except three made positive reference to “willing to take risks,” “more confident,” and/or “participate” in reading-related activities. A similar number referred specifically to improvements in reading. There were five references to making “efforts to focus,” in a positive sense, and one “drastically improved.”

### Follow Up

Most students were interested in continuing ACE tutoring. These children received parental endorsement for further support through the short summer vacation. In August, all students were followed up in their Grade 2 classrooms, except Adi‘i, who had left the school district. Four students were “graduated” from ACE—reading well enough to benefit from classroom instruction without extra support; they were monitored with fortnightly probes. One of the other students was provided with daily tutoring, and four received twice weekly tutoring. As previously noted, they all reached criterion in 1 to 3 months. Average fluency scores were 41 wpm on higher level probes, the equivalent of about 60 wpm on the original probes.

## Discussion

The strategy of putting positive personal images of future competencies on videotape, in general, has been greatly underused in more than 25 years of study (Hitchcock et al., 2003). The results of this study should encourage special educators and psychologists to adopt or adapt the use of such strategies in the context of literacy development. The combination of video and tutoring clearly was a support for these children. The net increases in oral reading fluency and rates of increase among such struggling readers are unusual. The number of individual outcomes registering significance is equally salient. The strength of these findings and the variability of individual response raise important questions yet to be answered: Who benefits most and under what circumstances?

The main dependent variable, oral reading fluency, showed worthwhile gains over the 6 to 12 weeks of active intervention. All students improved to the extent of being able to benefit fully from second-grade classroom instruction. Many factors may have contributed to these overall gains because the children were maturing, settling into school, and receiving general reading instruction and experiences as part of their regular schooling. However, the staggered timing and regular probing of different, carefully controlled interventions allow us to draw some confident conclusions: namely, a significant remedial effect of ACE tutoring plus video feedforward; the gains achieved in less than a semester, sufficient to graduate half the students from the program, provided momentum sufficient to produce continuing progress the following school year.

As noted in the Results section, the RCI for the rate of improvement in fluency was statistically significant in 9 out of 10 cases for video plus tutoring (vs. tutoring only). These statistics are useful in confirming the indications of progress from raw data and visual analysis; that is, the magnitude and direction of the RCIs are well matched with the slopes, variance, and other data. Note that we calculated individual effect sizes using Busk and Serlin's (1992) “no assumptions” formulas (pp. 197–198). But the results were highly inconsistent with the data (e.g., some large effect sizes for small gains). These discrepancies are likely to occur because the Busk and Serlin formulas are based on means (of oral reading fluency, in this case) rather than slopes. We therefore conclude the RCI to be more useful in an analysis of this type of study, in our case giving effect sizes highly consistent with the outcomes.

On a cautionary note, for some conditions only three or four data points, rather than a preferred six or seven, were used to estimate slope (Hintze, Shapiro, Conte, & Basile, 1997). Repeating the tutoring alone condition and replicating the within-subject design across 10 cases, however, addresses this limitation. Large-scale studies of fluency by Taylor et al. (2002) have indicated that typical first-grade students in moderately accomplished schools improve their fluency by 20 wpm for every 20 weeks of active schooling (i.e., 1 wpm/wk). Thus, on an optimistic note, all children in this study were catching up to the national norms during the video phase (from Deni at 1.2 wpm to Simo at 7.8 wpm), and on average they were catching up over the 4 months of data gathering (1.5 wpm).

Reading fluency scores did not return to previous levels after the withdrawal of videos, although in seven cases there were immediate, short-term decreases in probed fluency. We expected, indeed hoped for, this result for two good reasons: First, it would be unethical to withdraw a cost-efficient intervention at a time when it would undermine the educational progress of special needs students at risk. Second, it would be developmentally nonsensical for an acquired skill, such as oral fluency involving word recognition, to be suddenly lost because the means of teaching that skill had been withdrawn. In Simo's case, for example, would it make sense that he would suddenly revert from 32 wpm to 10 wpm under these circumstances? A beneficial prop whose support disappears when it is removed (cf. reading glasses) should not be confused with the effect of acquiring a skill that becomes part of the repertoire.

Visual inspection generally supports the finding that slopes were greater during the video phase than during any other. For example, the probes for the six children in the postvideo tutoring phase produced slopes that are visibly less than in the video phase. The RCIs are statistically different in only two of these comparisons (and two others are close; see the Vid/Tut:2 column in Table 2). Therefore, a hypothesis for future research is that students may learn over time, or with the help of video feedforward, to benefit more from tutoring. Objectives of ACE Reading include the child "catching on to learning" (enjoying reading rather than avoiding it) and bringing the students who are struggling the most to a level at which they will benefit from classroom instruction.

Note that feedforward videos are time-limited in their teaching effect. If a student improves threefold in fluency and learns all the words on his or her video, that video no longer provides feedforward (i.e., the images on screen are of capabilities the child now exhibits because of improvements). If a student does not improve, he or she is likely to become bored. As previously noted, the students are in a presumed learning environment where education goals include literacy and for which ACE is supplementary. Accordingly, our objective is to speed up the acquisition of literacy skills to a point where the learning environment (the classroom) takes over. Video feedforward can be successively reapplied (Dowrick, 1999), but the eventual outcomes in this case suggest it was not necessary. We asked the children 6 months later about their videos. We were interested to find that six of them still watched their videos, most often with family members present. Two videos were lost, one family did not have a VCR, and one family had moved away.

Visual inspection of the graphs may suggest that in some cases, the tutoring-plus-video phase could be seen as an accelerated extension of the preceding tutoring-only phase. We acknowledge that the causal relationship between self-modeling and reading fluency should be cautiously interpreted at this time. On the other hand, our research question was specifically to examine the accelerating effect of the videos combined with tutoring, versus tutoring alone. That has been demonstrated by the 9 out of 10 cases in which there are statistically significant differences in the rates of improvement for these two conditions also evident by visual comparison of slopes.

We did not include a video-only phase because it did not address our research question. The issue of a component analysis, given that video plus tutoring was distinctly superior to tutoring only in this sample, is an important topic for further research. We made our choice because we considered the place to begin research as being with the most practical applications. It has been our experience in working with videos in busy schools (see Dowrick, Tallman, & Connor, 2005) that staff would rather provide 4 hr of tutoring than spend 1 hr making a video. As a result, we expect video feedforward to be chosen as a supplement for use in selected circumstances, even though the cost versus benefit may warrant its more frequent use.

These results are corroborated by the related dependent variables of reading mastery; the Woodcock Word Identification standard scores ($M$ = 100, $SD$ = 15; based on grade level) increased on average from 80 to 85, matched-pairs $t = 2.3437$, $p = .04$. As noted, a score of 80 places a student at the ninth percentile nationally—higher than we would expect from the students' and the school's ratings. Although these scores moved significantly in the right direction, they remained relatively insensitive to the changes observed for individual students. The data do confirm that the students gained some ground; at posttesting, five students were within 1 $SD$ versus just one student at pretesting. No students reached the average word identification for their grade level; however, four of the students had progressed from the bottom to the middle of their classes, readily benefiting from classroom instruction in literacy and other subjects. Changes in phonological awareness were also substantial, although imperfectly correlated with other improvements. Two children remained apparently mystified by the nature of the task, but we raise the possibility of a test administration problem for children still learning English as a second language. More important, we believe, all the students achieved literacy capabilities that placed them in the mainstream of their classes.

Much literature lays claim to the idea that phonemic and phonological awareness not only predict but also causally contribute to the early learning of reading (from Adams, 1990, to Fuchs, Fuchs, Thompson, Otaiba, & Yang, 2002, for example), although that position is not without its detractors (see Hammill, 2004). Initial phonological awareness (segmentation scores) in our study did not predict reading improvements. Half the students were unable to produce responses to the test, but two such children (Apei and Lalani) were stars of the program. The number of students with pretest scores is too small to make a statistical comparison, but there are some glaring examples of noncorrelation. For example, Jesi had the highest pretest score on segmentation; although she improved very well in reading fluency, three other students did just as well, including Simo, who initially had half Jesi's score, and two students who did not score at all. Our data do not indicate a clear relationship even between posttest segmentation scores and reading outcomes ($r$ = .47, $p$ = .19). The motivation (Y-CAIMI) pretest was more highly correlated with reading outcomes ($r$ = .63, $p$ = .09) but still not statistically significant. Additional comments from the teachers and the on-site research assistant indicated nearly all ACE students were "more likely to take risks" and "to volunteer/participate" in classroom reading-related activities. Note that none of these pre- and postmeasures are specifically tied to video feedforward. Further studies may elucidate the interrelationships in the overall ACE Reading program, with or without video.

A number of issues could be explored in further research. The findings of our study point to two major avenues. One is the practical aspect of implementation: What system of making the videos is most feasible, how should viewing and tutoring be organized, and so forth? Another is the scientific aspect of cause and effect. Perhaps video feedforward can be routinely offered, making its contribution without tutoring an important question. Can peers learn from these videos? If videos are to be selectively offered, what are the predisposing conditions? None of the students in this program became classified with "specific learning disability," which teachers had predicted on the basis of early first-grade performance and comparisons with historical records. The most acceptable research, to avoid withholding beneficial services from children with special needs, would be longitudinal studies, perhaps with comparable schools as the unit of analysis.

One of the driving considerations for ACE Reading and the feedforward research has been self-efficacy, as indicated in the introduction. The assessment of self-efficacy has been difficult, however, because very few 6-year-olds can make reliable expectation estimates on a Likert scale. We attempted to develop such a measure of students' outcome expectations to passage reading (Dowrick et al., 2000). Even with simple 3-point scales (*very easy*, *a bit easy*, *not easy to read*), results were erratic, pre and post, and seldom predicted performance. We have put aside attempts related to self-report measures for this age group, as have others before us (D. H. Schunk, personal communication, 13 April 1996). A topic for future research is to develop an observational measure that could be reported by teachers and other significant adults. As noted, the teachers described the children as more likely to persist, to take academic risks, and to generalize their reading skills. These behaviors are all evidence of self-efficacy (Bandura, 1997).

A question not addressed by the design of this study concerns the role of the self-image on video. The procedure was inspired by the success of self-modeling in other skills-training and related clinical interventions (Dowrick, 1999), but it could be proposed that a video of another, similar child could produce a comparable effect. One of our studies addressing this issue is currently under analysis. As portrayed in this study's videos, it appears that images of future success may make powerful contributions to learning.

The results of IQ measures are curious because the correlation with outcomes in the overall tutoring program is negative ($r$ = -.39), although not statistically significant ($p$ = .26). The data are far from clear on this relationship. Studies with Pacific region cultures and more participants are needed to elucidate better research questions. For example, would different home-language backgrounds or different levels of experience with English confound common measures in ways yet to be appreciated? Here, too, is fertile ground for further study.

Finally, it is important to discuss the issue of implementation. We used a specialized video editing system, now commonly mimicked on new computers by major manufacturers. In-the-trenches school personnel have made it clear they seldom have the time and inclination to pursue additional technology, even when the empirical evidence is clear that it will help their students in leaps and bounds. We believe that may change. Interest in video feedforward in education continues to grow, with increasing publications, dissertations, and requested workshops and materials (see Salyers, 2001). Not only have digital video and better hard drives made editing much easier, it is also possible to create feedforward reading images on computer slide shows using software such as KidPix and HyperStudio (Kim-Rupnow & Dowrick, 2001). High school students have been trained as ACE tutors (e.g., for Service Learning credit) and are an admirable resource for the technology. After-school programs have more flexibility and may offer ACE with video more consistently than day programs can (as occurs on Moloka'i Island; Kalani, 2003). The low-tech (or no-tech) approach is also an option: Forty schools have successfully adopted ACE Reading in tutor-only or computer-based versions, from kindergarten through high school (Yuen, Dowrick, & Alaimaleata, in press).

We are positive about the future—with or without electronically created images. Whereas video and other technology have supported the explicit study of self-modeling and feedforward, the latter are better regarded as strategies or principles of teaching and learning in their own right, independent of any medium. Capturing or creating an image of the future electronically enables it to be measured, observed, and analyzed, making it suited to scientific study. Thus, explicit discussions of self-modeling have benefited from the use of video, audio recordings, and computers. In consultations with special educators and community partners, we have increasingly emphasized ways of instructing, planning, training, or just conversing, in which effective images of future success can be created, beyond the use of technology. As well as empirically investigating explicit feedforward applications, it is time to explore, and perhaps formalize, the general principles at work independently of the medium.

## AUTHORS' NOTES

1. Preparation of this article was partially supported by grants from U.S. Department of Education, Office of Special Education Programs (e.g., H180G-60031/70001), although no endorsement is implied.
2. We thank all the participants: community partners, students, school

principal and teachers, and research assistants, especially Julie Holmes for her persistence in extensive data analysis.

3. Some of the concepts and findings have been presented at national conferences, including the National Association of School Psychologists, April 1999, and the 11th World Congress, International Association for the Scientific Study of Intellectual Disabilities, August 2000.

## REFERENCES

ACE Reading. (2004). Retrieved August 29, 2004, from http://www.cds.hawaii.edu/reading/

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press. (ERIC Document Reproduction Service No. ED 315 740)

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Beck, I., Armbruster, B., Rafael, K., McKeown, M., Ringler, L., & Ogle, D. (1989). *Reading today and tomorrow.* Austin, TX: Holt, Rinehart and Winston.

Blampied, N. M. (1999). A legacy neglected: Restating the case for single-case research in cognitive-behaviour therapy. *Behaviour Change, 16,* 89–104.

Blum, N. J., Kell, R., Starr, H. L., Lloyds-Lender, W., Bradley, K., Osborne, M., et al. (1998). Audio feedforward treatment of selective mutism. *Journal of the American Academy of Child and Adolescent Psychiatry, 37,* 40–43.

Bray, M. A., & Kehle, T. J. (1998). Self-modeling as an intervention for stuttering. *School Psychology Review, 27,* 587–598.

Buggey, T. (1995). An examination of the effectiveness of videotaped self - modeling in teaching specific linguistic structures to preschoolers. *Topics in Early Childhood Special Education, 15,* 434–458.

Busk, P. L., & Serlin, R. C. (1992). Meta-analysis for single-case research. In T. R. Kratochwill & J. R. Levin (Eds.), *Single-case research design and analysis: New directions for psychology and education* (pp. 187–212). Hillsdale, NJ: Erlbaum.

Carroll, J. B. (1971). *The American Heritage word frequency book.* Boston: Houghton Mifflin.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Connell, J. P., Kubisch, A. C., Schorr, L.B., & Weiss, C. (1995). *New approaches to evaluating community initiatives.* Washington, DC: Aspen Institute.

Clifford, E. F., & Green, V. P. (1996). The mentor-protege relationship as a factor in preservice teacher education: A review of the literature. *Early Child Development and Care, 125,* 73–83.

d'Arripe-Longueville, F., Gernigon, C., Huet, M.-L., Cadopi, M., & Winnykamen, F. (2002). Peer tutoring in a physical education setting: Influence of tutor skill level on novice learners' motivation and performance. *Journal of Teaching in Physical Education, 22,* 105–123.

Deno, S. (2003). Developments in curriculum-based measurement. *The Journal of Special Education, 37,* 184–192.

Dowrick, P. W. (1983). Self-modelling. In P. W. Dowrick & S. J. Biggs (Eds.), *Using video: Psychological and social applications* (pp. 105–124). Chichester, UK: Wiley.

Dowrick, P. W. (1989). Videotraining strategies for beginners, champions, and injured athletes. In A. A. Turner (Ed.), *Proceedings of American College of Sports Medicine, Alaska regional conference 1987* (pp.1–9). Anchorage: University of Alaska.

Dowrick, P. W. (1991). *Practical guide to using video in the behavioral sciences.* New York: Wiley Interscience.

Dowrick, P. W. (1997, June). Video feedforward. *Northwest Healthcare Management*, pp. 6–9.

Dowrick, P. W. (1999). A review of self modeling and related interventions. *Applied & Preventive Psychology, 8,* 23–39.

Dowrick, P. W., & Dove, C. (1980). The use of self-modeling to improve the swimming performance of spina bifida children. *Journal of Applied Behavior Analysis, 13,* 51–56.

Dowrick, P. W., & Hood, M. (1978). Transfer of talking behaviours across settings. In T. L. Glynn & S. S. McNaughton (Eds.), *Proceedings of conference on behaviour modification* (pp.78–87). Auckland: Auckland University Press.

Dowrick, P. W., Power, T. J., Ginsburg-Block, M., Kim-Rupnow, S., & Manz, P. H. (2000). *ACE Reading: Feedforward to promote reading, communication, and problem solving for students with disabilities.* Final report to U.S. Department of Education, award H180G-60031/70001, Washington, DC.

Dowrick, P. W., Power, T. J., Manz, P. H., Ginsburg-Block, M., Leff, S. S., & Kim-Rupnow, S. (2001). Community responsiveness: Examples from under-resourced urban schools. *Journal of Prevention & Intervention in the Community, 21*(2), 71–90.

Dowrick, P. W., & Raeburn, J. M. (1977). Video-editing and medication to produce a therapeutic self model. *Journal of Consulting and Clinical Psychology, 45,* 1156–1158.

Dowrick, P. W., & Raeburn, J. M. (1995). Self-modeling: Rapid skill training for children with physical disabilities. *Journal of Developmental and Physical Disabilities, 7,* 25–37.

Dowrick, P. W., Tallman, B. I., & Connor, M. E. (2005). Constructing better futures via video. *Journal of Prevention & Intervention in the Community, 29,* 131–144.

Elbaum, B., Vaughn, S., Hughes, M. T., & Moody, S. W. (2000). How effective are one-to-one tutoring programs in reading for elementary students at risk for reading failure? A meta-analysis of the intervention research. *Journal of Educational Psychology, 92,* 605–619.

Elliott, J., Lee, S. W., & Tollefson, N. (2001). A reliability and validity study of the Dynamic Indicators of Basic Early Literacy Skills–Modified. *School Psychology Review, 30,* 33–49.

Fuchs, L. S., Fuchs, D., Hosp, M. K., & Jenkins, J. R. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading, 3,* 239–256.

Fuchs, D., Fuchs, L. S., Thompson, A., Otaiba, S., & Yang, N. J. (2002). Exploring the importance of reading programs for kindergartners with disabilities in mainstream classrooms. *Exceptional Children, 68,* 295–311.

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of Educational Research, 71,* 279–320.

Glynn, T., & McNaughton, S. (2003). Trust your own observations: Assessment of reader and tutor behaviour in learning to read in English and Maori. *International Journal of Disability Development and Education, Special Issue: The slow learning child: 25 years on, 49,* 161–173.

Gottfried, A. E. (1990). Academic intrinsic motivation in young elementary school children. *Journal of Educational Psychology, 82,* 525–538.

Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (2001). Continuity of academic intrinsic motivation from childhood through late adolescence. *Journal of Educational Psychology, 93,* 3–13.

Grados, J. J., & Russo-Garcia, K. A. (1999). Comparison of the Kaufman Brief Intelligence Test and the Wechsler Intelligence Scale for Children-Third Edition in economically disadvantaged African American youth. *Journal of Clinical Psychology, 55,* 1063–1071.

Hammill, D. D. (2004). What we know about correlates of reading. *Exceptional Children, 70,* 453–468.

Hasbrouck, J. E., Ihnot, C., & Rogers, G. H. (1999). Reading naturally: A strategy to increase oral reading fluency. *Reading Research and Instruction, 39*(1), 27–38.

Hausfather, S. J. (1996). Vygotsky and schooling: Creating a social context for learning. *Action in Teacher Education, 18*(2), 1–10.

Hawai'i Department of Education. (1999). *School status and improvement reports.* Honolulu: Author.

Hintze, J. M., Shapiro, E. S., Conte, K. L., & Basile, I. M. (1997). Oral reading fluency and authentic reading material: Criterion validity of the technical features of CBM survey-level assessment. *School Psychology Review, 26,* 535–553.

Hitchcock, C. H., Dowrick, P. W., & Prater, M. A. (2003). Video self-modeling intervention in school-based settings: A review. *Remedial and Special Education, 24,* 36–45, 56.

Howell, D. C. (1992). *Statistical methods for psychology.* Belmont, CA: Duxbury.

Jacobsen, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful changes in psychotherapy research. *Journal of Consulting and Clinical Psychology, 59,* 12–19.

Johnston, J. M., & Pennypacker, H. S. (1980). *Strategies and tactics of human behavioral research.* Hillsdale, NJ: Erlbaum.

Kalani, S. (2003). *Annual performance report, 21st century community learning centers: Moloka'i.* Washington, DC: U.S. Department of Education, Office of Elementary and Secondary Education.

Kaminski, R. A., & Good, R. H. (1996). Toward a technology for assessing basic early literacy skills. *School Psychology Review, 25,* 215–227.

Kaufman, A. S., & Kaufman, N. L. (1990). *Kaufman brief intelligence test.* Circle Pines, MN: American Guidance Service.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Kehle, T. J., Clark, E., Jenson, W. R., & Wampold, B. E. (1986). Effectiveness of self-observation with behavior disordered elementary school children. *School Psychology Review, 15,* 289–295.

Kim-Rupnow, W. S., & Dowrick, P. W. (2001). Computer-enhanced tutoring and self monitoring for early reading acquisition. *Journal of Asia-Pacific Special Education, 1*(2), 13–18.

Kim-Rupnow, W. S., Anderson, J., Galbavy, R., & Dowrick, P. W. (2001). *I CAN READ! Self modeling to help young children with reading difficulties.* ACE Reading Web site, University of Hawaii. Retrieved September 2004, from http://www.cds.hawaii.edu/reading/

Kratochwill, T. R. (1981). *Selective mutism: Implications for treatment and research.* Hillsdale, NJ: Erlbaum.

Kuhn, M. R., & Stahl, S. A. (2003). Fluency: A review of developmental and remedial practices. *Journal of Educational Psychology, 95,* 3–21.

National Center for Education Statistics. (2003). *2001–2002 National assessment of educational progress.* Washington, DC: U.S. Department of Education.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Pub. No. 00-4754). Bethesda, MD: National Institute of Child Health and Human Development.

Parsonson, B., & Baer, D. (1992). The visual analysis of data, and current research into the stimuli controlling it. In T. R. Kratochwill & J. R. Levin (Eds.), *Single-case research design and analysis: New directions for psychology and education.* Hillsdale, NJ: Erlbaum.

Power, T. J., Dowrick, P. W., Ginsburg-Block, M., & Manz, P. H. (2004). Partnership-based community-assisted early intervention for literacy: An application of the participatory intervention model. *Journal of Behavioral Education, 13,* 93–115.

Prewett, P. N. (1995). A comparison of two screening tests (the Matrix Analogies Test–Short Form and the Kaufman Brief Intelligence Test) with the WISC-III. *Psychological Assessment, 7,* 69–72.

Reynolds, W. M., & Miller, G. E. (Eds). (2003). *Handbook of psychology: Educational psychology* (Vol. 7). New York: Wiley.

Salyers, F. (2001, August). When feedback doesn't work, try feedforward! Help students learn needed skills and desirable behaviors by making them the stars in videos that show their future performance. *Kentucky Teacher,* pp. 6–7.

Schunk, D. H., & Hanson, A. R. (1989). Self-modeling and children's cognitive skill learning. *Journal of Educational Psychology, 81,* 155–163.

Taylor, B. M., Pearson, P. D., Clark, K., & Walpole, S. (2002). Effective schools and accomplished teachers: Lessons about primary-grade reading instruction in low-income schools. In B. M. Taylor & P. D. Pearson (Eds.), *Teaching reading: Effective schools, accomplished teachers.* Mahwah, NJ: Erlbaum.

University of Pennsylvania Library. (1998). *Philadelphia schools.* Retrieved October 31, 1998, from http://www.library.upenn.edu/census/philschl/

U.S. Census Bureau. (2000). *Census of population.* Washington, DC: U.S. Government Printing Office.

Vygotsky, L. S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Walker, C. J., & Clement, P. W. (1992). Treating inattentive, impulsive, hyperactive children with self-modeling and stress inoculation training. *Child & Family Behavior Therapy, 14,* 75–85.

Woltersdorf, M. A. (1992). Videotape self modeling in the treatment of attention-deficit hyperactivity disorder. *Child & Family Behavior Therapy, 14,* 53–73.

Woodcock, R. W. (1998). *Woodcock reading mastery tests–Revised: Examiners manual.* Circle Pines, MN: American Guidance Service.

Yuen, J. W. L., Dowrick, P. W., & Alaimaleata, E. T. (in press). Using a community response model in literacy education. *Research on the Education of Asian and Pacific-Americans.*