

Teaching Children to
Learn Word Meanings
From Context:
A Synthesis and Some Questions

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This article reviews 14 studies investigating approaches that aimed at teaching children to be more efficient at learning words from context. In nearly all of the studies reviewed, treatments were effective at improving children's skill in learning words from context compared to a no-treatment control. However, in the 4 studies that included a practice-only treatment, no significant differences were found between the strategy treatment and practice-only groups. These findings suggest that the effects of the treatments were due to the practice rather than to the specific strategies taught. Suggestions are made for improving research examining the effects of context-clue strategies.

THE AMOUNT OF WORDS in a person's meaning vocabulary is the best predictor of how well they comprehend text (Anderson & Freebody, 1981). Measures of word meanings correlate highly with measures of reading comprehension in general. In addition, knowledge of specific word meanings in a passage is an excellent predictor of how well a person will read that passage.

One approach for helping children increase their store of word meanings is to teach them to use context clues (or cues) in text more efficiently. Educators have suggested several possibilities for such learning: that children learn taxonomies of context clues (or cues, e.g., Ames, 1966), that they learn specific strategies for deriving word meanings (e.g., Sternberg, 1987), that they learn flexible approaches to deriving word meanings (e.g., Goerss, Beck, & McKeown, 1994), or that they learn to derive word meanings as a general comprehension strategy (Palinscar & Brown, 1984). The purpose of this article is to review the research on teaching people to increase their efficiency in learning new words.

Where Do Children's Vocabularies Come From?

It is generally accepted that people are exposed to roughly 88,700 different word families in school between kindergarten and grade 12 (Nagy & Anderson, 1984). They learn roughly half of these words, about 45,000 on average, or approximately 3,000 new word meanings per year (Graves, 1986; White, Graves, & Slater, 1990).

Given these figures, it seems apparent that the vast majority of words do not become part of a student's reading vocabulary through direct instruction. Under the best instructional scenario, a teacher is likely to present somewhere in the vicinity of 300 to 400 words over the course of a school year (Stahl, 1991). Although this is a fairly significant number, it falls far short of the 3,000-word average mentioned above (Nagy & Anderson, 1984). If students are not taught these words systematically, the only feasible alternative is that learners acquire them through context. That is, they learn the words incidentally, by encountering them in text.

Three thousand word meanings per year would seem to be an impossibly large number. Nagy and Herman (1987) have suggested that it can be accounted for using estimates of children's learning from context and reading volume. If a child reads an hour per day at 100 words a minute for 300 days (ignoring Sunday), that child would encounter 1,800,000 words in text per year. If 5% of those words are unknown (an assumption that this reading is at a reader's instructional level), then that child would encounter roughly 90,000 unknown words. Estimates from several studies suggest that children will learn roughly 5% to 12%

1. D'Anna, Zechmeister, and Hall (1991), using a different dictionary and different sampling techniques, found a significantly lower figure than did Nagy and Anderson (1984). The smaller figure would suggest less of an emphasis on learning from context, because a smaller corpus of words could be learned from direct instruction alone.

of the words they do not know from a single exposure in context (see Nagy & Herman, 1987, for review). This estimate would account for 4,500 new words in a year, comfortably enough above the 3,000-word mark to allow for some failure to meet expectations.

Graves (1986) estimated that the number of words acquired from context throughout the course of a school year is between 1,000 and 5,000, with the exact number dependent on both the amount of text encountered and the reader's ability. He suggested that a 4,000-word difference between the upper and lower estimates of vocabulary learning accrues over the course of a single academic year, and that the gap increases, in absolute terms, as children progress through school.

According to Stanovich (1986), this difficulty can be explained by an interaction between vocabulary knowledge and reading ability.² Children who are good readers encounter greater amounts of text than do poor readers. Thus, better readers are exposed to more words and are able to access a greater number of meanings from context than their classmates who are experiencing reading difficulties. They learn the meanings of a greater number of words incidentally, making further reading easier. On the other hand, struggling readers experience a negative cycle. They begin with a smaller reading vocabulary, are exposed to less text, and encounter fewer words. In addition, it is likely they will be less able to make efficient use of context to derive the meanings of new words, thereby minimizing their ability to expand their reading vocabulary incidentally. This results in an ever-widening gap between good and poor readers. Stanovich has dubbed this process the "Matthew Effects," alluding to the passage from the Book of Matthew that states that the rich get richer and the poor get poorer.

The difference in the number of words acquired through context is a significant one. Using Graves' (1986) figures, an accomplished reader will learn up to five times as many words through reading than will a struggling reader. For those students who learn nearly 5,000 new words simply through their encounters with text (Graves, 1986), the additional 300 to 400 words they could gain through direct instruction (Stahl, 1991) would have less significant an effect than it would for those students whose incidental learning would normally insure an increase in reading vocabulary of approximately 1,000 words. The question then becomes whether teaching vocabulary makes sensible use of the limited time available for reading instruction. Further, should we decide that vocabulary instruction is indeed a valuable part of the reading curriculum, we must determine

2. It is important to make the distinction between using context to identify words already known (or using context to aid word recognition) and learning new word meanings from context. In the first case, children know the word, but context helps them to identify it. In the second, children do not know the word but learn something about the word from reading it in context. Stanovich (1986) argued that poor readers overrely on context for word identification, because they cannot automatically identify words. He also argued that children learn word meanings from context and that differences in the amount of reading affect the number of word meanings learned. It is the latter argument that is relevant to this paper.

the relative benefit of teaching students individual words directly as opposed to presenting instruction in contextual analysis (Baumann & Kameenui, 1991; Stahl, 1991; Sternberg, 1987).

If most words are learned from context and there are vast individual differences in vocabulary, it would seem that to increase the amount of new words that children learn each year, one would have to (a) increase the volume of reading that children do, (b) increase their efficiency in learning new words, or preferably both. The purpose of this review is to examine studies that have attempted to teach children to be more efficient in learning words from context, through instruction in context clues or instruction in a more general process of learning words from context.

Increasing Students Efficiency in Learning New Words

McKeown (1985) found that struggling readers are significantly less efficient at deriving words from context. They have a more difficult time separating the meaning of the word from the meaning of the context as a whole and have greater difficulty finding overlaps in the information derived from more than one context. One possible implication from this research and others (e.g., Elshout-Mohr & van Daalen-Kapteijns, 1987; Werner & Kaplan, 1952) is that children might be taught procedures for learning words from context, so that they would be more efficient at learning words that they encounter.

The initial approaches to teaching children to use context more efficiently involved the development and direct teaching of taxonomies of context clues. For example, Ames (1966) developed a taxonomy of context clues by having graduate students think aloud while reading texts into which nonsense words had been inserted. This taxonomy was later validated by Quealy (1969) with high school students. Such taxonomies were to be taught to students directly to improve their use of context as a means of deriving word meanings.

Although these taxonomies were developed through observation of what readers do when encountering unknown words, they proved to be too inflexible to be of much use in most situations. As a result, educators and psychologists developed more flexible strategic approaches to derive word meanings. An example is Sternberg's (1987; Sternberg & Powell, 1983) cognitive task analysis. Sternberg suggested that the process of deriving word meanings from context involved three dimensions: text features, task features, and cognitive processes that acted on the text. The cognitive processes were part of his theory of intelligence. Along with Powell, he attempted to teach students and adults to become more efficient at using context as part of a general attempt to train intelligent behavior. Their results were mixed. In one study, the training seemed to improve learning from context; in another, it did not.

Others taught specific strategies that were intended to be deliberately applied when encountering an unknown word. These range from graphic organiz-

ers (Schwartz & Raphael, 1985b) to the use of cloze exercises (Sampson, Valmont, & Allen, 1982). An example is the Jenkins, Matlock, and Slocum (1989) study, which compared the effects of two approaches to vocabulary instruction: individual word meanings and deriving word meaning with varying amounts of instruction and practice. They measured effects of these two approaches both on learning individual words and learning from context. The deriving-meaning group were taught a general strategy for deriving meaning of unfamiliar words that emphasized using context clues. They developed this strategy after talking through the process the authors themselves used. Jenkins et al. described this general strategy with the acronym SCANR (Substitute a word or expression for the unknown word; Check the context for clues that support your idea; Ask if substitution fits all context clues; Need a new idea?; Revise your idea to fit the context). Lessons were taught using a script, with each step taught, assessed, and reinforced. Students received either much practice (270 words over 20 sessions) or little practice (45 words over 9 sessions). A second group received instruction in specific word meanings. Jenkins et al. found significant effects for both treatment and amount of practice on multiple-choice measures as well as measures of words in context, with the group receiving instruction in specific word meanings performing better on measures of knowledge of those words and the group given the strategy instruction performing better on measures of deriving words from context.

Other studies taught more generic strategies, without specific algorithms. Buikema (Buikema & Graves, 1993), a high school teacher, developed a 5-day sequence of whole-class lessons teaching children to use context clues. She began with word riddles and used a riddle metaphor to help her students derive words from context. They found significant effects for the treatment on two measures of deriving words from context and on a measure of incidental learning using an Edgar Allen Poe short story followed by an unexpected vocabulary test.

More recent approaches have moved away from specific lists of processes to a more general modeling of learning words from context. An example is Goerss et al.'s (1994) training program, in which students were given general guidelines on how to derive word meanings from context and were told to think aloud while reading texts with nonsense words inserted in a one-on-one tutoring session. The instruction involved general sensitivity to unknown words and the use of both knowledge of the overall context and specific cues within the text. They taught their students that it was not necessary to derive full definitions, but to get whatever information was available about a word from that context. They found growth in learning from context among the students with which they worked, but they did not use a control group. It is not possible to evaluate whether students would have made similar progress with unguided practice alone.

Thus, the trend in this area of research has moved from providing explicit taxonomies of context clues, to providing cognitive strategies and instructing students in how to use them flexibly, and finally, to providing more general guidelines and modeling. But, are any of these approaches effective in teaching

children to become more efficient at using context? The remainder of this article addresses that question.

Method

Selecting studies for review. To determine whether teaching students contextual analysis strategies provides effective vocabulary instruction, we examined studies investigating such an instructional approach. We searched through both the ERIC and PsycLIT databases, following up references in articles that we found. We used a number of different terms in the search, including "context clues (cues)," "learning from context," and so on, in conjunction with limiters such as "instruction" and "reading." In addition, we checked references and accumulated papers from conferences and other unpublished sources.

We were looking for studies that instructed children, directly or indirectly, in the use of a set of general heuristics or flexible strategies to derive the meanings of words from context. We did not review lists of suggestions for such instruction unless some data was collected regarding the efficiency of those suggestions. We also did not include studies of direct vocabulary teaching methods that included the words presented in sentence context (e.g., Gipe, 1979; see Stahl & Fairbanks, 1986, for review). We wanted to make a distinction between studies that taught a finite number of words presented in context and studies that taught students more general strategies applicable to learning any words encountered in a meaningful context.

Thus, this review includes only those studies that taught students a generalized strategy or list of context clues with the intention of improving their efficiency in using context to learn word meanings.

Results and Discussion

As shown in Table 1, we found 12 papers reporting a total of 14 studies. In spite of the numerous suggestions to teach children to use context, this does not constitute a large amount of research. These studies are summarized in Table 1 and reviewed in chronological order below.

To examine commonalities among studies, we grouped their results by type of measure used. We divided the measures into three general categories - deriving new words from not previously seen contexts, knowledge of specific words taught in the lessons, and incidental word learning. Incidental word learning would be assessed by providing students with texts, but without specific instruction to learn words from that text, and later assessing their word knowledge (see Nagy, Herman, & Anderson, 1985, for examples). This analysis is shown in Table 2.

TABLE 1. Studies and Results

| Study | Date | Treatment | Measures | Type of measure | Results |
|----------------------------|------|--|---|---|---|
| Askov & Kamm | 1976 | Participants systematically taught contextual analysis using direct description, contrast, and cause-and-effect clues (based on Wisconsin Design for Reading Development) vs. controls | 1. Criterion-referenced multiple-choice test (part of Wisconsin Design for Reading Development) in which vocabulary item that best fits one/two sentence context is selected 2. Gates vocabulary test 3. Gates comprehension test 4. Quasi-cloze comprehension measure 5. Quasi-cloze divergent production | 1. Deriving words | Participants in treatment group outperformed controls on measure that assessed what had been taught (two forms were used as a posttest and as a delayed posttest) |
| Sampson, Valmont, & Allen | 1982 | Participants taught to use cloze procedure and talk through the strategy used vs. controls who received regular reading instruction | 1. Multiple-choice test of words taught 2. Multiple-choice test of words determined from synonym and contrast clues 3. Multiple-choice test of words determined from a single 394-word passage 4. Quasi-choice transfer test (unknown words embedded in passages) 5. Multiple-choice embedded passage test (unknown words included in a 394-word narrative story) | 1. Other 2. Other 3. Deriving words 4. Deriving words | No significant differences between groups on measure 1; significant increase for treatment group on measure 2; significant increase for treatment group (on taught procedure) on measure 3; significant differences in favor of treatment group (on taught procedure) for measure 4 |
| Parberg, Graves, & Stubbe | 1984 | Three conditions: active instruction in contextual analysis vs. presentation of guidelines and practice without active instruction vs. control group | 1. Multiple-choice test of words taught 2. Multiple-choice test of words determined from a single 394-word passage | 1. Specific words 2. Deriving meaning 3. Deriving meaning | Both training groups outperformed controls on words taught to them on measure 1; both training groups outperformed controls (on process taught) on measure 2; no significant differences between the groups on measure of connected text |
| Carmine, Kameenui, & Coyle | 1984 | Three conditions (Participants were instructed individually): 1. Rule-plus-systematic practice 2. Practice only 3. Control group | 1. Multiple-choice transfer test (unknown words embedded in passages) 2. Multiple-choice embedded passage test (unknown words included in a 394-word narrative story) | 1. Deriving words 2. Deriving words | Participants in both treatments significantly outperformed the controls, but there was no significant difference between participants in either of the two treatment |

TABLE 1. continued

| Study | Date | Treatment | Measures | Type of measure | Results |
|----------------------------|-------|--|--|--|---|
| Schwartz & Raphael | 1985b | Study 1. Participants taught to use contextual analysis strategies vs. controls Study 2. Participants taught to use contextual analysis strategies vs. practice only group vs. controls | Study 1. a. define 8 unknown vocabulary words from partial context passages b. define 4 high-frequency words with no context clues c. complete questionnaire explaining process for determining word meanings Study 2. Participants determined meaning of 10 vocabulary words from a 2-3 sentence partial context | Study 1. a. Deriving words b. Specific words c. Other Study 2. Deriving words | Study 1. Treatment group significantly outperformed controls (on what they had been taught) Study 2. Both treatment groups significantly outperformed controls, no significant differences between the two treatment groups |
| Sternberg | 1987 | Study 1. Participants trained in using contextual cues vs. participants not trained Study 2. Three training groups (process training, contextual cue training, moderating variable training) and two control conditions (memorization and context-practice without instruction) | Study 1. Tested on nonwords or cloze procedure within sentence context Study 2. Tested on skill in figuring out word meanings | Study 1. Deriving words Study 2. Deriving words | Study 1. Participants trained did better than participants not trained Study 2. Participants in all training groups did significantly better than either control group; practice controls did significantly better than controls who memorized definitions |
| Carr & Mazur-Stewart | 1988 | Vocabulary overview group (guide to contextual analysis) vs. list group (similar procedures without a guide to assist in contextual analysis) | 1. Vocabulary posttest (100 words taken from passages) 2. Metacognitive posttest 3. Delayed vocabulary posttest | 1. Specific words 2. Other 3. Specific words | Treatment group significantly outperformed list group on all three measures |
| Jenkins, Madlock, & Stocum | 1989 | Definitions taught vs. teaching contextual analysis strategies | 1. Words in isolation 2. Words in context 3 a. b. Two multiple-choice tests 4 a. b. Two context tests (basal and constructed) | 1 & 3 a. b. Specific words 2 & 4 a. b. Deriving words | Participants taught individual vocabulary did best on measures testing this, participants taught contextual analysis did marginally better on these measures |

TABLE 1. continued

| Study | Date | Treatment | Measures | Type of measure | Results |
|--|------|--|---|--|--|
| Buitema & Graves | 1993 | Participants taught to identify and use descriptive context clues vs. participants receiving no training | 1. Tested on words taught using multiple-choice test 2. Identified meanings of words in context in "The Black Cat" 3. Short-answer definition task for words within a constructed context 4. Multiple-choice test for words within a constructed passage | 1. Specific words 2. Deriving words 3. Deriving words 4. Deriving words | Context group significantly outperformed controls on all four measures |
| Goerss, Beck, & McKelown | 1994 | 5 participants with reading difficulties were taught in one-on-one sessions to derive meanings of 103 words and 20 passwords | 1. Word acquisition task 2. Evaluation transcriptions of instructional sessions | 1. Deriving words 2. Deriving words | Participants were able to apply the skills they were taught |
| Miller | 1995 | Participants taught to identify unknown word using sentence context and activating prior knowledge vs. controls who looked up words in dictionary | 1. Matching test using vocabulary words from story | 1. Specific words | No significant differences between the two groups |
| de Glopper, van Daalen-Kapteijns, & Schouten-van Parrerens | 1996 | Participants were taught to use both text-driven and schema driven processes in deriving word meanings. They were taught to ask a series of questions about the word (similar to those used by Sternberg) and then to use a definition schema to organize information about the word. In addition, they attempted to develop metacognitive awareness of whether a word was known or not. | 1. Contextual learning test in Dutch 2. Contextual learning test in English 3. Reading comprehension test in Dutch 4. Reading comprehension test in English | 1. Deriving words 2. Deriving words 3. Other 4. Other | Treatment group significantly outperformed controls on four measures. |

Thirteen of the 14 studies reviewed had some measure of children's ability to derive word meanings from context. These measures involved specifically telling children that they were expected to derive the meanings of unknown words. In all of the studies that used a control group, the treatment produced significantly greater learning than did the control treatment. In the Goerss et al. (1994) study, which did not have a control, students learned to improve their ability to derive words from context as a result of the treatment.

The success of these treatments could be due to one of two factors. Either the treatment taught specific strategies that allowed the students to become bet-

ter at deriving word meanings from context, or they gained practice in using already-known strategies for deriving word meanings. In the first interpretation, the results could be seen as validating the particular taxonomy or strategies used in the training. In the second interpretation, merely practicing deriving words from context would be enough to make students better at deriving words from context. We tend to favor the latter interpretation, because, in the four studies using a practice-only treatment, there were no statistically significant differences between the treatment and the practice-only treatment. In all four studies, the practice-only treatment significantly outperformed a control group. This finding suggests that it is the practice in deriving words that makes a difference in vocabulary development, rather than any specific strategies that are taught.

Tests of specific words taught to the students as assessment measures were used in six of the studies. These measures were themselves highly varied and may not be amenable to grouping. For example, Jenkins et al. (1989) directly taught specific words to the "control" group (which, more properly, should have been termed an alternative-treatment group). It is not surprising that those words were learned better by the control group than by the group that had to derive the same information from context. In the remaining studies, the target words were derived from passages that were used by the training group, whereas the control-group students did not have specific exposure to them. Again, it is not surprising that these control-group students did not do as well as the treatment-group students when their knowledge of these words were assessed.

Only one study used measures that we would classify as an assessment of incidental learning. In the Pathberg, Graves, and Stibbe (1984) study, the students read Edgar Allen Poe's story "The Black Cat" and answered multiple-choice items about some of the higher level vocabulary words found in the text. All three groups - treatment, practice-only, and control - performed similarly on this measure.

In summary, these studies have found that students taught to use context to derive word meanings generally do better on measures that assess that skill. This finding indicates that students learn what they are taught. However, in the four studies where a practice-only treatment was used, the treatment and practice-only groups did not differ significantly on the outcome measures. Additionally, in the only study where a measure of incidental learning was used, the treatment groups' results did not differ from those of the control group. This pattern suggests that, based on the best available evidence, it is likely that students benefit as much from practice in deriving words from context as they would from instruction in either a specific set of strategies or a list of clues. There is no evidence, however, that these treatments result in an overall improvement in the incidental learning of word meanings.

We wish to emphasize that these results are tentative, dependent on the 14 studies we reviewed. Given the frequent recommendations that children be taught the use of context clues, the paucity of research evidence is disappointing. Further, given the few studies we found that examined this question, the quality

TABLE 2. Study Results by Measures Used

| Study | Measures | | |
|--|-------------------------|----------------|--------------------------|
| | Deriving words | Specific words | Incidental word learning |
| Askov & Kamm (1976) | T > C | | |
| Sampson, Valmont, & Allen (1982) | T > C T > C | | |
| Patberg, Graves, & Stibbe (1984) | T = P > C | T = P > C | T = P = C |
| Carnine, Kameenui, & Coyle (1984) | T = P > C T = P > C | | |
| Schwartz & Raphael (1985b, Study 1) | T > C | T > C | |
| Schwartz & Raphael (1985b, Study 2) | T = P > C | T = P > C | |
| Sternberg (1987, Study 1) | T > C | | |
| Sternberg (1987, Study 2) | T = P > C | | |
| Carr & Mazur-Stewart (1988) | T > C | T > C | |
| Jenkins, Matlock, & Slocum (1989) | T > C T > C | C > T C > T | |
| Buikema & Graves (1993) | T > C T > C T > C | T > C | |
| Goerss, Beck, & McKeown (1994) | No Control Group | | |
| Miller (1995) | | T = C | |
| de Gloppe, van Daalen-Kapteijns, & Schouten-van Parrerens (1996) | T > C T > C | | T > C T > C |

Note. T > C means that the context-clue strategy treatment produced a significantly greater effect than the control; T = C means that the differences were not statistically significant, although there certainly were actual differences. P refers to a "practice-only" treatment.

of the research in pinpointing the effects of teaching children to use context is likewise disappointing.

Conducting Research on Teaching Children to Learn From Context

There are several major flaws common to the research. First is the identification of a control group. Studies compared students who were taught a general strategy for using context clues with students learning specific words or with students who received no treatment in this area. There are problems with both types of comparisons, which we outline below. Rather than continuing with this type of design, we suggest that a practice-only treatment in addition to a no-treatment control is likely to provide the most useful comparison. A second flaw is the measures used to assess children's knowledge of word meanings. For example, metalinguistic measures, such as verbalizations of the process of deriving word meanings or using definitions, may not be useful as measures of implicit knowledge, such as recognition measures or even checklists, would be. These are discussed in turn.

What Should Learning From Context Be Compared To?

One major problem in conducting research on the effects of a cognitive strategy designed to teach children to derive the meanings of words from context is how to judge its efficacy. Researchers have generally compared learning-from-context treatments to so-called "control" participants who learned a list of specific words, or to "control" participants who received an unrelated treatment. There are problems with both types of groups against which treatments are compared.

Teaching specific word meanings versus learning from context. Comparing the teaching of a general strategy for learning from context to teaching specific words does not represent a fair comparison. Contextual analysis is not meant to teach specific words. Instead it is meant to be a general strategy aimed at helping students contend with unfamiliar words in a wide variety of texts. The goal of teaching strategies to improve the learning of word meanings from context is to help students learn more words incidentally as they are encountered in everyday reading. Doing so should, in turn, lead to a larger vocabulary over time, as students read texts containing unknown words. If one reads a given number of words and encounters 50,000 unknown words over the course of the year, the difference between learning the meanings of, say, 5% of them and 7% of them will be the difference between 2,500 new words learned and 3,500 new words learned. If an instructor can teach roughly 300 to 400 words per year using direct

instruction (e.g., Nagy, 1989), the 1,000 additional words is 2½ times as many words as could be taught directly. These estimates suggest that the effects of context-clue strategy training might be powerful, but only over relatively extended periods of reading.

On the other hand, if one teaches 10 words in a lesson and 8 of these are learned, then a student will know those 8 better than if we measured their gain in reading from a single passage. So, for a single passage or a series of passages, it is likely that direct teaching of a set of words will be more efficient than a generalizable set of strategies for learning from context. These were the findings of Jenkins et al. (1989). However, over time, the 2% gain in learning efficiency, which might not be visible in a single passage, should lead to larger long-term gains than teaching specific words.

Direct instruction of vocabulary does have demonstrable effects on students' vocabulary learning and comprehension. Stahl and Fairbanks (1986), in their meta-analysis of vocabulary studies, found that vocabulary instruction did significantly improve not only comprehension of passages containing the words taught, but also comprehension in general.

"No treatment controls?" Another problem identified in much of the research is that groups receiving instruction in the use of context clues were often paired with a control group that underwent no instruction or practice (e.g., Askov & Kamm, 1976; Buikema & Graves, 1993; Sternberg, 1987, study 1; Schwartz & Raphael, 1985a, study 1) or were not paired with a control group of any sort (Goerss et al., 1994). Any learning-from-context strategy has at least two components to it: (a) children must be made aware of the importance of focusing on unknown words, and (b) they must be taught specific strategies to learn the meaning of those words from context. A "no-treatment control" (actually, children are doing some unrelated treatment) would not include the reminders to examine context, nor would it entail the specific strategies taught. Therefore, with a no-treatment control group, we cannot determine whether the effects of the treatment are due to advisement about the importance of learning words from context, to a greater sensitivity to unknown words in context, or to the effects of the strategy taught.

To examine the difference between teaching specific strategies or sets of context clues and simply making children more metacognitively aware of the need to pay attention to unknown words, one needs to contrast an active-strategy treatment with a practice-only treatment, in which students are simply asked to derive word meanings from context without any specific instruction in the process. As we noted previously in this article, when studies included such a contrast (Carnine, Kameenui, & Coyle, 1984; Pathberg et al., 1984; Sampson et al., 1982; Schwartz & Raphael, 1985a; Sternberg, 1987, study 2), researchers failed to find a difference between the strategy group and the practice-only groups. Sternberg (1987, study 2) found that both the strategy training and the practice-only controls did significantly better than the controls who memorized definitions. This

finding strongly suggests that the effects of context-clue training may largely be due to making children more aware of unknown words in their reading, rather than as the result of the specific strategies being taught.

Linguistic Versus Metalinguistic Skill

Child language researchers know the difficulty in separating children's knowledge of language, including vocabulary, from their metalinguistic knowledge or the ability to talk about what they know. The goal of teaching children more efficient means of learning from context is to increase their store of vocabulary words. This knowledge is often implicit and subconscious (Durso & Shore, 1991; Schwanenflugel, Stahl, & McFalls, 1997). When we ask children to verbalize how they learn from context or attempt to judge the quality of their learning by their production of a conventionalized form, such as a definition, we may be assessing students on how well they can use language (either the verbalization of processes involved in learning words or the use of definitions or other school-based ways of talking about meanings) rather than on how much they have actually learned about word meaning. This is a problem in virtually all vocabulary research (see Anderson & Freebody, 1981), but is especially apparent concerning the use of context.

Deriving words versus incidental learning. Nearly all of the studies have also examined the effect of various contextual strategies on deriving word meanings. On such a task, a student is given a passage and asked to derive the meaning of a word or words identified. Being asked to derive word meanings is a different task from using context to acquire the meaning of unfamiliar words during free reading. In a derivation task, the participant is told that the word is unknown or a nonsense word is substituted. In the more incidental learning of word meanings during free reading, readers are often unaware that they do not know certain words in the text (e.g., Erickson, Stahl, & Rinehart, 1985), and thus they do not apply special attention to those words. Instead, Stahl (1991) speculated that incidental learning may be explained using a connectionist metaphor. In this metaphor, a newly encountered word is weakly connected to both an orthographic representation and other concepts which occurred with it in the passage in which it was encountered. As the word is encountered repeatedly, some links to related concepts are strengthened and others weakened, until the person gains a functional knowledge of the meaning of the word. This meaning may not be a dictionary definition, nor does a person who knows a word need to produce such a definition. Intentionally deriving word meanings from context requires attentional processes which may or may not distort this natural learning. In other words, people who are able to deliberately derive the meaning of a word from a specific context may not actually do so when reading outside of the experimental context.

The difficulty with using a derivation task is that such a task may simply be

tapping an ability that students already have. Because learning from context is a natural process, as well as the way in which we have learned most of what we know (Nagy, 1989), teaching children to derive words from context may be superfluous, that is, teaching them something they already know how to do. Because children already do have some prowess in learning words from context and must have implicit strategies to do so, it is possible that this learning from context strategies may merely allow children to verbalize better what it is that they are already doing. If so, these children may do better on a measure that requires verbalization of this ability, but may not show any overall improvement in the skill. In other words, they may be better able to talk about what they are doing but may not be able to do it better.

Using definitions. Often the criteria for assessing whether a word is learned in these studies is the students' ability to produce a definition. This ability is assumed to represent knowledge of the word in many of these studies. However, evidence from both linguistics (e.g., Fodor, Garrett, Walter, & Parkes, 1980) and psychometrics (e.g., Curtis, 1987) suggests that one does not need the knowledge necessary to produce a dictionary definition in order to understand a word in context. It is this understanding that should be our goal. In addition, even children with good verbal abilities have difficulties articulating definitions. For example, Snow (1990) found that children's ability to produce definitions, using the traditional Aristotelian form, was more closely related to their exposure to definitional forms in school than to their general comprehension ability. Several of the studies we discuss subsequently here used explicit criteria for assessing definitions, all variants of the Aristotelian form. These criteria are not "natural" but instead are learned through schooling. If one group is taught these criteria, they have an inherent advantage over another group not taught specific criteria for defining words.

This limitation is especially pronounced in studies such as Schwartz and Raphael (1985a, 1985b) and Askov and Kamm (1976). Both studies evaluated children's ability to derive definitions from context based on a set of criteria that were taught to the strategy group but not to the control group or groups. The differences found may have been due to the strategy group's knowledge of appropriate responses, rather than to greater learning efficiency.

An alternative to such comparisons would be to combine metalinguistic measures with measures that might be sensitive to implicit knowledge. One example is the multiple-choice measure used by Nagy et al. (1985). They constructed measures in which each word was assessed using three multiple-choice questions. Each question type represented a more fine-grained distinction between the correct answer and its distractors. In the first level, the correct answer was as dissimilar to the distractors as possible, even differing in part of speech. In the second level, all items were of the same part of speech, but distractors differed markedly in terms of meaning. In the third level, all items were taken from the same semantic domain, and the student needed to make a fine distinction between the correct answer and the distractors. These measures were sensitive to

gains in word knowledge because of learning from context (see Schwanenflugel et al., 1997). The researchers further combined these measures with an interview designed to detect subtle increases in knowledge about the meaning of a word.

The basic task for measuring incidental learning from context is that used by Nagy and his colleagues (e.g., Nagy et al., 1985). In their studies, they had students read various passages "for comprehension," but assessed knowledge of words from the passages. They compared students who read the target passage with those who read another passage to infer the amount of learning from context. They estimated that learning at between 5% and 20% of previously unknown words.

Studying How to Teach Children to Learn From Context

Thus, an ideal study for examining the effects of learning from context would examine incidental word learning. It would not use a measure of derivation of word meanings, because such a measure might reflect children's understanding of the conventions of the deriving task rather than their ability to learn word meanings. It would not use a measure that involves producing a dictionary definition, because such a formal mode of response might similarly reflect an understanding of the form of the response rather than the use of the word. It would also not compare the effects of the strategy treatment to a treatment that taught specific words, because small effects from a strategy treatment might translate to significant long-term gains. An ideal study would need to be long term, because the effects of increased efficiency in learning from context could best be studied in the long term and would likely need to include multiple and highly sensitive measures. We found no such study.

Given the findings we have reviewed and the limitations listed, it appears that specific strategy instruction in deriving words from context does not have any advantage over merely providing children with practice in deriving word meanings. This suggests that the effects of context-clue training, if any, are metacognitive and may merely sensitize students to the need to look at unknown words.

Finally, only one of the studies tested incidental learning. As we have noted, the true test of a method of teaching children to learn words from context is how well they transfer any gains in efficiency to their ordinary reading. Without a long-term examination of the effects of context-clue training on incidental learning, we cannot assess whether such a treatment does what it was intended to do, that is, increase students' efficiency in learning word meanings. Tests that measure a student's ability to derive word meanings from specific passages may or may not measure how efficient that student will be in learning words from context in ordinary reading.

Although he did not teach any strategies for learning from context, Sachs' (1943) study might be an example of long-term assessment of learning from

context. Sachs examined the standard texts used in Louisiana high schools for frequency of selected words. He then correlated college students' performance on his measure with the frequency of words in texts, presumably a measure of students' exposure to the words. Although there are many flaws in this study, the basic methods might be adapted to measure the long-term effects of context strategy training.

Guiding Instructional Practice

Beyond the specific recommendations about how to conduct research in teaching children to derive word meanings from context, this review points out several general problems in the use of research to guide educational practice. First, although one can find recommendations for teaching children procedures for learning word meanings from context in both articles and textbooks, we found very few studies actually examining the effects of such instruction. This is unfortunately a common situation in education. Pedagogical principles are often derived from intuition or one teacher's experience. Both intuition and experience are to be valued as sources of knowledge. If we are to have a science of education, however, we need to take the information from intuition and experience and validate it by well-designed research. In the case of teaching strategies for children to learn word meanings from context, we do not have research-validated practices, as yet.

Second, the measures used in the studies were predominantly measures of deriving words from context, measures that mirrored the treatment. Thus, we know that students will learn what they are taught. In this area, however, the target behavior is not deliberate derivation of words, but incidental learning of word meanings. Incidental word learning was measured in only two studies. By choosing measures that are close to the treatment, researchers are more likely to find effects. We need to know, however, whether a treatment will transfer to ordinary learning. Measures of transfer are hard to find in educational research, possibly because it is more difficult to find effects on such measures. Such measures are not difficult to construct, but measures of transfer are necessary to understand the effects of treatments on ordinary learning.

If these studies represent where the field is now, then we cannot recommend instruction in context clues. Future research may change that recommendation. It is important to know what not to teach, so that one can concentrate instructional time on activities that will effectively enable children to read more complex and engaging texts.

The best recommendation that we can make to teachers who want to increase the amount of vocabulary learning through context is to have them encourage their students to read more text of a level sufficiently challenging or containing words that might be learned from context. Anderson, Wilson, and Fielding (1988) found that increasing the amount of reading that children did

outside of school, using a "Book Flood" approach, did significantly improve children's vocabulary. Ultimately, increasing the amount of reading that children do seems to be the most reliable approach to improving their knowledge of word meanings, with or without additional training in learning words from context. Increasing the volume of reading is a recommendation with which both advocates of specific strategy instruction and educators with more holistic viewpoints can agree.

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Critical Issues

Bringing Scholarly Dialogue to the Surface: A View of the JLR Review Process in Progress

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In many respects, the production of a scholarly journal such as JLR is the proverbial iceberg. Above the waterline is the clearly visible, final published product which typically arrives in the mail, is read wholly or in part, and then is archived for future reference. Below the waterline is a much less visible but remarkably extensive and intensive range of activities that support the visible product and that are an integral part of it. In fact, to extend the metaphor, this less visible activity in the production of a journal, particularly the review process (and particularly for new scholars), represents all the mystery and navigational hazards that icebergs do to inexperienced sailors traveling in uncharted waters.

In addition, as new arctic explorations have revealed, the icy waters under icebergs are teaming with complex and varied forms of life. So too, hovering under the visible surface of a published academic journal, is an incredibly rich diversity of scholarly dialogue that is rarely glimpsed in its entirety by most researchers in the field, not to mention the complex social "ecologies" that characterize a community of researchers. The opportunity to observe and to participate regularly in these rich sub-surface dialogues is clearly one of our greatest rewards as editors (mentoring inexperienced scholars is a close second). Our participation takes many