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ABSTRACT

This paper proposes that phonics and meaning instruction in beginning reading programs can be designed to be mutually supportive. The first section outlines attempts to modify a commercially available reading program in order to provide useful phonics instruction strategies. Students showed strong gains on achievement tests after implementation of the modified commercial program. An analysis of the reading process delineates the separate kinds of reading competencies, with recommendations for their effective integration in instruction design. Finally, the New Primary Grades Reading System (NRS), the outcome of these experiences, is described. A section dealing with the NRS materials suggests the superiority of its spiral learning structure and of its particular attention to specific blending instruction and to comprehension formats. Data gathered from NRS first-grade classes and control classes show that NRS students obtained significantly higher achievement test scores. (Author/AA)

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COMPREHENSION DURING THE ACQUISITION OF DECODING SKILLS

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The distinction between a code emphasis and a meaning emphasis in beginning reading programs was proposed and used by Chall (1967) to describe differences in the extent to which existing curricula stressed one aspect or the other. This distinction proved very useful in conceptualizing the existing situation in beginning reading instruction, and it enabled Chall to document the important finding that a code-emphasis program produces better results than a meaning-emphasis program. However, it may also have created the serious misunderstanding that a reading program that emphasizes phonics must automatically decrease attention to meaning. This is not necessarily so. A reading program can be well designed in its phonics component and also be well designed in its meaning component. Indeed, it is a thesis of this paper that phonics and meaning should be viewed as instructionally mutually supportive and interdependent. Phonics and meaning must each be carefully designed and sequenced, and close attention must be given to their effective integration.

The point I am trying to make can best be presented by chronicling the work of the Learning Research and Development Center (LRDC) with beginning reading instruction. LRDC's early attempts to individualize reading instruction used a commercially available program. During the course of its use, we sensed limitations in certain aspects of the commercial program which started us on a design-and-patch remedy. Attempts to fill some of the obvious gaps

in the commercial program were successful, but as we began to formalize our knowledge about the requirements of effective reading instruction, we concluded that our experiences would work to best advantage through designing our own reading program. In this paper, I hope to convey what we have learned about the design of effective reading instruction in two ways: (a) through analyses of some specific weaknesses found through our experience with the commercial program, and (b) by a description of our own program that incorporates both phonics and meaning. Finally, some evaluative data will be presented to confirm that we have found some important methods for enhancing reading achievement.

Initial Development Activities

Individualizing Reading Instruction

Ten years ago, when LRDC embarked upon its original mission to individualize elementary school instruction, the architects of Individually Prescribed Instruction (IPI) focused on the design of individualized curricula in reading, mathematics, and science (see Lindvall & Bolvin, 1966). These curricula were designed so that they could be implemented and so that the demands and requirements of individualization could be studied and thus become better understood.

The model to be used for individualization (within this context) was spelled out by Glaser (1965) and, in general, included the following components: (a) sequentially ordered curricular objectives stated in behavioral terms, (b) instruments for monitoring and assessing each student's progress through the curricular sequence, (c) instructional materials for attainment of mastery of the curricular objectives, (d) a system for individually prescribing the learning tasks for each student, and (e) self-improvement of the system through continuous feedback of information and evaluation.

Initially, two decisions were made regarding LRDC's work with individualizing primary grades reading: (a) that the approach to beginning reading would emphasize code breaking, and (b) that LRDC would not develop its own reading program, but would select from among existing commercial materials and adjust them as the Glaser model required.

The Sullivan Associates Programmed Reading Series (Buchanan, 1963)[1] was selected because it emphasized code breaking, it met some of the requirements of the Glaser model, and it was amenable to modification. It was implemented in the primary grades of the Oakleaf School, an elementary school near Pittsburgh, Pennsylvania, which served as LRDC's original developmental school. The core components of the series were student workbooks and teacher manuals. The teacher was responsible for presenting new content to the children (e.g., a grapheme/phoneme correspondence, an irregular function word) using a highly structured dialogue from the teacher's manual. At certain other places, the manual suggested additional stimuli presentations for the teacher to write on the board; at other places, the stimuli for the dialogue were specified pages in the student workbooks. The workbooks also contained pages which the children would complete individually after the new content was presented by the teacher.

It is, of course, very difficult for a group of 25 first-grade children to progress at their own rates if the teacher is the sole source for presenting new content. The teacher can attempt to get around to each child and teach him or her the new content when s/he is ready for it, but this is hardly feasible. Or, the teacher can wait for the

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[1] Throughout this paper, all statements about the Sullivan Associates Programmed Reading Series apply to the 1963 or 1967 editions.

accumulation of a group of children who need the same new content and then present the necessary instruction. But this method will not really permit each child to progress at his or her own rate.

In order to individualize the Sullivan materials, we developed audio lessons to teach some of the new content. The instructional strategies used in these audio lessons were the ones specified in the Sullivan teachers' manuals. Variability of student rate through the program increased greatly with the implementation of these audio lessons, and the teacher was able to spend a greater amount of time "traveling" among the children, monitoring their performance, eliciting oral reading, and reinforcing or enriching individuals rather than groups. Stated more directly, the teacher was freed to teach each child what the teacher perceived the child needed.

Broadening the Reading Experience

Since individualization of instruction does not mean that children always need to work by themselves with self-instructional materials, management schemes were designed to gather children, who were progressing through the curriculum at various rates, together for group reading experiences. These small-group, teacher-led reading experiences featured opportunities for oral reading and discussion of the story line. Regarding story line, Chall (1967) notes that the Sullivan program contained "discrete words and sentences with humorous illustrations but no definite 'storyline'" (p. 44). However, the Sullivan series did provide a short storybook to accompany each of its first 14 workbooks. The vocabulary in each storybook was compatible with the graphemic sequence of its companion workbook. The storybooks were used in the small-group, teacher-led settings in a typical basal reader fashion; that is, the teacher directed the story reading, questioned children, and stimulated discussion about the story.

It is important to emphasize that up to this time in this chronology of our early endeavors, LRDC's objective in beginning reading was to determine and provide the resources and classroom management schemes required for individualization. However, once the mechanics of individualization were under control and the "system" was up and running, the Reading Project staff began to observe, in a direct and detailed manner, the process of learning to read.

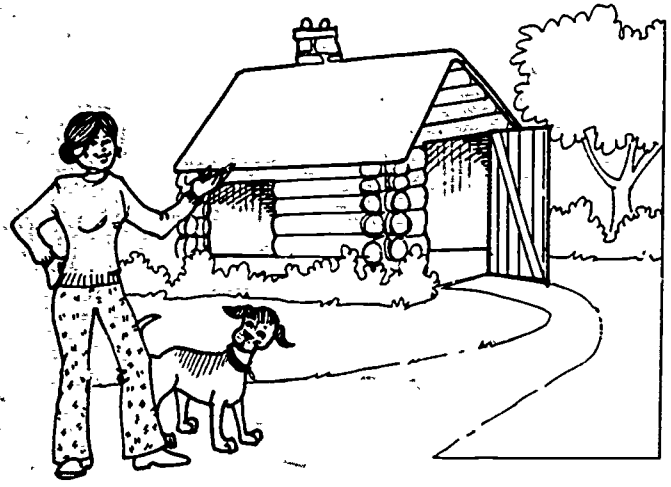
Attending to the Text or Reading for Meaning

In this paper, I will use the terms meaning and comprehension synonymously as meaning simply that the reader can demonstrate that s/he knows what is being communicated in the text. It was in this area that we first detected serious problems with the Sullivan program. Classroom teachers involved with the use of the Sullivan materials directed our attention to the problem by stating that "children aren't comprehending." In turn, we asked them to describe what they meant by this. A teacher who was working with children who were approximately halfway through the program (typically end of first grade, beginning of second grade) characterized her experience with directing the small-group story reading in this way: "When I ask the children to read two pages [i.e., approximately six to ten running sentences] to themselves and then ask easy questions [i.e., questions that are mappable back to the text], a lot of children can't answer the questions until I tell them to reread the pages." During the conversation, the teacher indicated that, for the most part, the children could answer the questions after she had required them to reread. Then she added: "You know, I have a group lesson [with each group] about every two weeks. Each time we start off, I have to make the children reread the first few pages to be able to answer questions. But, by the end of the story, they are able to answer my questions after the first reading."

The same day that I heard this teacher's report, I visited a second-grade classroom and watched some children who were working independently in their workbooks. I immediately noticed the speed with which they were turning the pages! I could see that they were responding correctly even though they were proceeding rapidly. Inspection of the workbooks revealed why this was possible.

Figure 1 is a stereotypic presentation of the kind of lesson page found in the Sullivan series. The page is arranged so that four responses are required. At most, only one of them requires that the child read the five-sentence paragraph under the picture. Supplying the missing a in cabin and the missing d in dog are "copying responses" in that both words appear on the page correctly and all that the child needs to do is to locate a complete model of each word and then copy the missing letter. This "missing letter" format appears very frequently throughout the Sullivan program, and its use is undesirable on a number of grounds: (a) It is insufficient to build skill in decoding since practice in decoding should incorporate an auditory model or auditory feedback (confirmation); (b) it often distracts the child from apprehending the meaning of the text since it requires him or her to stop and write (frequently in the middle of a sentence); and (c) when it is the only response required in the context of connected text (a common occurrence), it is clearly insufficient to insure that children read the text. Children can ignore much of the connected text that surrounds the target word and respond either by supplying the missing letter from memory or by searching for a complete model of the word to find the letter(s) they need.

There are other responses required by the formats in Figure 1 that do not achieve their intended outcomes. The first question, "Is Miss Ring in her cabin?" can be answered from the picture. If the second question, "Is Miss Ring a dog?" should happen to be answered



This is Miss Ring. Miss Ring is a woman. Miss Ring lives in a cabin. Her cabin has a bed and sink in it. Miss Ring's dog lives with her in the c __ bin.

Is Miss Ring in her cabin? yes no

Is Miss Ring a dog? yes no

Miss Ring's pet is a __og.

Figure 1. Representation of the type of workbook page found in the Sullivan Associates Programmed Reading Series.

incorrectly (which I propose would not often happen, given the likelihood that the title Miss would be associated more frequently with a woman than with a dog), it could be corrected from the information found in the last sentence (i.e., Miss Ring's ownership of a pet). In all, this analysis indicates that the sample frame in Figure 1 has a very high blackout ratio. Blackout ratio, as defined by Holland (1967), is the proportion of the text in a frame that does not have to be read in order to answer the questions correctly. In other words, obtaining a correct answer is not contingent upon reading the supposedly related textual matter. A high blackout ratio indicates that very little of the material must be read. The blackout ratio, as obtained empirically by Holland, involves first blacking out any words in a program that are not felt to contribute to a correct answer. The blacked-out version and the normal program are then tested on two groups and the resulting error rates compared. If the error rates are not significantly different, the blackout ratio arrived at is considered valid.

Although the sample frame in Figure 1 does not require that the child read the five-sentence paragraph, it does require some reading. The child must read the question, "Is Miss Ring in her cabin?" and must demonstrate that he or she understands what "in the cabin" means; and the child must read the question, "Is Miss Ring a dog?" and must demonstrate his or her understanding that the name Miss Ring is associated with the woman. Requiring children to demonstrate that they comprehend the meaning of printed questions is a good example of a contingency that requires reading in some contexts, even when information needed to respond to the question can be found in the picture. However, why add five sentences of text, most of which is unnecessary for responding correctly? This tends to reinforce ignoring the text rather than attending to it. We applied Holland's construct informally to the

Sullivan texts and found that, in general, they had a very high blackout ratio.[2]

Since few contingencies were set up to require reading of the text, it is conceivable that the following speculation has merit: Perhaps the children who had to be directed to reread sections of a story in the group situation before they could answer a question were really reading for the first time, not rereading. They may have learned from workbook exercises that "you don't need to read the story in order to answer the question." This bit of speculation is supported by the teacher's comment that each time she started the group reading activity, she had to make the children reread the first few pages to enable them to answer questions, but that by the end of the story, they were able to answer her questions after the first reading. Perhaps this is an example of the teacher establishing the contingencies and the children responding appropriately once they had learned what the contingencies were. That the teacher had to require that the children reread at the beginning of each group lesson may have been due to the fact that group lessons occurred only about once every two weeks and, during the interim, the children were relearning (through their interaction with the workbooks) that they did not need to read the story in order to answer the questions.

Developing contingencies that required the children to attend to the connected text i the Sullivan workbooks was the most difficult problem the LRDC reading staff encountered since the problem was so pervasive. Without actually rewriting most of the textual material, there

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[2]Before the decision was made at LRDC to develop our own program, we examined a variety of commercial reading programs. The blackout ratio among these programs varied. We found a number of programs whose workbook exercises had a high blackout ratio and a few that had a generally low blackout ratio. It is suggested that this may be a salient variable for those evaluating reading programs to analyze.

was little we could do. We did request that the teachers, as they interacted with individual children who were working in their workbooks, question portions of the pages the children were working on that were not questioned by the program. For example, in the frame in Figure 1, there is a sentence in the text, "Her cabin has a bed and sink in it." A question such as "What is in the cabin?" is easily formulated and requires that the child read the text since the answer is not apparent from the picture.

It is virtually impossible to evaluate the effect of the questioning strategies on the children. The questions were not implemented in any systematic way, nor was their use quantified. We did observe that teachers varied greatly in their ability to ask useful questions and that there was also great variation among teachers in the number and types of questions asked.

Let me present some achievement data collected before, and then during, the implementation of the questioning strategies. These data are from the first grades of LRDC's second developmental school, an inner-city school, and cover a three-year span. They show a strong trend in increasing achievement on the Reading Subtest of the Metropolitan Achievement Test (Durost, Bixler, Wrightstone, Prescott, & Balow, 1970). The first-grade end-of-year scores move from a mean grade achievement of 1.7 at the end of the first year, to 1.8 at the end of the second year, to 2.1 at the end of the third year. It was during the middle of the second year that we suggested the questioning strategies to the teachers. During the third year, we stressed their importance and kept reminding teachers why the questioning strategies were important. In addition, some LRDC reading staff members spent some time in classrooms demonstrating how the teacher could formulate questions while "traveling" among the children. The achievement trends above are, of course, quite favorable, but there is no way of

attributing a direct link between the implementation of the strategies and the increase in achievement.

Designing Instructional Strategies for Word Attack

In addition to understandings gained about the limitations of the Sullivan program and about some general requirements of effective reading instruction, we also learned, in those early years, some important things about instructional strategies for word attack.

It will facilitate my discussion to clarify the sense in which I use terms associated with word attack. The terms decoding, word attack, word recognition, and phonics are in some contexts used synonymously. In this paper, each term has a specific meaning. Decoding is simply the translation of print to speech. In decoding, there is a continuum of performance from laboriously "sounding out" a word to recognizing words instantly. I will use the phrase word attack to represent the end of the decoding continuum where the reader brings into action (either overtly or covertly) implicit or explicit "rules" of pronunciation to unlock the pronunciation of a word. The term word recognition will be used to describe the end of the decoding continuum where the reader recognizes words instantly. The important point is that both word attack and word recognition are decoding. Phonics are various instructional methods that teach procedures for unlocking word pronunciation.

In the scholarly community at least, the "great debate" has subsided, little of the passion is left, and most people concerned with reading agree that "earlier and more systematic instruction in phonics is essential" (Diederich, 1973, p. 7). But, what kind of phonics? Should it be analytic phonics, which attempt to teach grapheme/phoneme correspondences to the student by having him or her examine displays of words that share and contrast major spelling patterns?

Or, should we teach synthetic phonics, which teach grapheme/phoneme correspondences directly and have the student assemble words from phonemes?

Since the instructional strategies recommended in the teacher's manuals included having the student practice grapheme/phoneme relationships in isolation, the Sullivan program can be characterized as "synthetic." However, there were no instructional strategies in the teacher's manuals that suggested a process for teaching the child how to put the isolated sounds together. Realizing that some children were having difficulty doing something that the Sullivan program made no provision to teach, we searched the teacher's manuals of a variety of synthetic phonics programs looking for the instructional strategies employed to teach children to put sounds together. The results of our search indicated that there was a virtual absence of any such instructional strategies.

The teacher's manuals did contain suggestions to the teacher to present a model of a blending process and have the child imitate the model. Acting on this suggestion, however, merely skims the top of the iceberg; it merely demonstrates what competence is rather than building it up through necessary instructional steps. Indeed, the known difficulty of learning the process of blending is considered a primary objection to synthetic phonics. As it turns out, inability to blend may be a natural consequence of the lack of any provision for instruction in blending.

While we were working with children who were having initial learning difficulties, we developed a successive blending routine that breaks blending into important functional units and enables most children to master blending. Instructional techniques for teaching this routine were developed. These techniques employ models, establishment of a series of prompts, and fading of those prompts. In addition, a blending booklet, which a child manipulates while blending, was

devised to help externalize the process for the child. A detailed discussion and analysis of the blending routine is contained in a paper completed recently by Resnick and Beck (1976). For now, I would like to point out that we attempted to link the successive blending routine to psychological theory, specifically information processing, in such a way that it could be analyzed in terms of theoretical constructs. We were able to demonstrate that since a substantial amount of processing must occur simultaneously during initial decoding, our successive blending routine reduces memory load.

We introduced the successive blending routine at the Oakleaf School in a systematic manner that made it easier for us to assess its effects. Comparison of first-grade end-of-year achievement results obtained when the Sullivan strategies for teacning word attack were used with first-grade end-of-year scores when the new successive blending strategies were used shows strong gains in mean student performance after the introduction of the LRDC strategies. These data are quite extensive and reflect five years of development and evaluation research. These data are reported in several documents (Beck & Mitroff, 1972; Beck, Note 1; Eichelberger, Lee, & Leinhardt, Note 2), so I will not dwell on them except to say that the results of the studies provided evidence to assure us that our strategies for sounding and blending were working to support increased reading achievement.

Deciding to Design a New Program

However, even with positive trends from the implementation of questioning strategies and improved sounding and blending routines, there were still children who were not reading as well as expected, both in terms of their achievement test results and our "clinical" assessment of them. We suspected that we could trace some of the remaining difficulties to a number of not-yet-mentioned deficiencies in the structure and sequence of the Sullivan program. Some of these

deficiencies are that: (a) Portions of the graphemic sequence massed visually similar graphemes rather than distributing them (e.g., early and close introduction of the b and d); (b) at times, not enough examples of words containing the target phonemic element were provided (e.g., only three words with the /f/ phoneme as in phone were provided); (c) phonemic elements were not varied across positions in a word (e.g., in the three words used as exemplars of the /f/ phoneme, the ph appeared only in the medial position); and (d) response formats lacked variety and were overly repetitious.

But, the most pervasive remaining problem was the high blackout ratio. It severely hampered the development of automatic word recognition and shaped attention away from connected text. Faced with these problems in the Sullivan program, we decided to design our own beginning reading program.

Analysis of the reading process. Before starting the actual design, we attempted to deepen our understanding of the nature of reading competence by performing some task analyses. Figure 2 contains a task analysis of the reading comprehension process. It shows the hypothesized flow of behavior for an effective reader reading a moderately difficult text. The reader might be a third grader reading a social studies text about prehistoric animals or a college student reading this paper.

The figure contains two kinds of statements: direction statements (rectangular boxes) and queries (diamonds). The four rectangles in the top line assume ongoing text processing for a reader who encounters no difficulties. The four diamonds in the top row represent the broad categories of "difficulties" readers may encounter that can cause interruption in processing. The first such potential interruption is for an unrecognized word (Query 1). Skilled readers probably do not stop at every unrecognized word; when they do skip a word, they are likely to

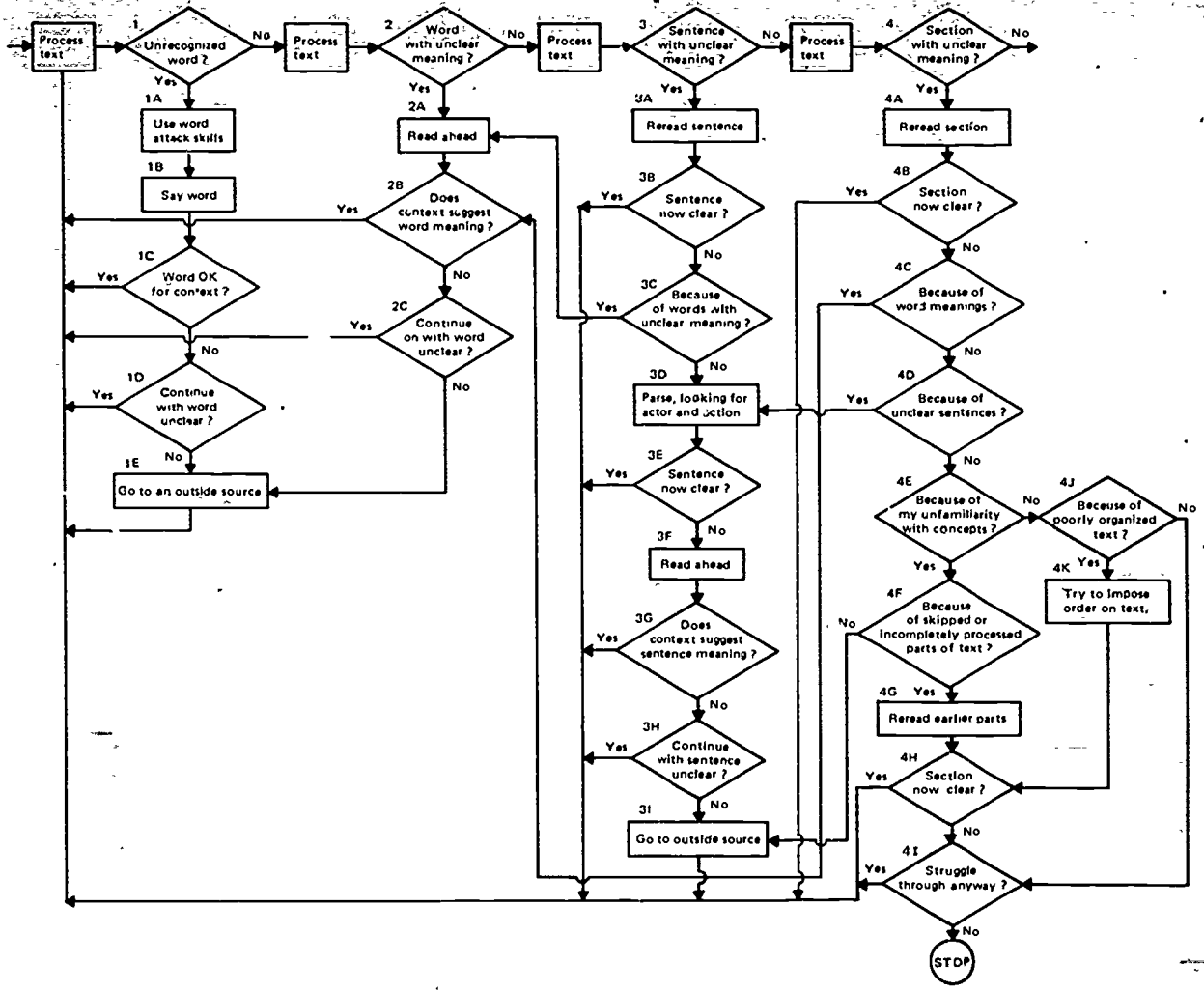

Figure 2 A schematic model of the reading comprehension process. (From Resnick & Beck, 1976.)

realize soon afterwards whether or not it interfered with getting the general meaning of the text. If they determine that the meaning has been restricted, they return to the unrecognized word and resort to word attack skills to attempt to unlock the pronunciation.

Boxes 1A and 1B, as shown under Query 1, are very condensed statements of some detailed decoding analyses which were performed during the early design stages of the New Primary Grades Reading System (NRS). They are discussed in detail in another paper (Resnick & Beck, 1976). Notice, however, Query 1C, where the reader judges whether the sounds s/he has produced form a recognizable word and whether the word "fits" the immediately surrounding text. Even in the process of attacking an unrecognized word, a search for meaning is presumed by the analysis. Word attack and meaning operate for practical purposes more or less in parallel; and, the need for word attack arises when a word has not been recognized. If an acceptable word has been found, the reader returns to the main text-processing flow; otherwise, the reader must decide whether to continue reading with the word still unclear (1D) or to seek information from an outside source (1E). The "outside source" for a pronunciation problem is likely to be another person, although finding the same word in another context sometimes solves the problem.

The second interruption indicated occurs when a word is sounded which has an unclear meaning and which appears important enough to comprehension to warrant further information search (Query 2). We assume that the most frequent first response under these conditions is to read ahead a little, searching for context that will suggest a meaning (2A). The success of this context search is tested at 2B. Success sends the reader back into the main processing strand, while failure gives him or her the same choices as before: to continue reading with the word unclear, or to utilize an outside source. Dictionaires, glossaries, and so on are available as outside sources, as well as are other

people, although other people may remain the preferred "least effort" source. We will see in a moment that the decision to continue with words unclarified may affect subsequent processing. Nevertheless, depending upon the depth of comprehension required for a particular task, and upon the degree of informational redundancy, it is often a good choice in reading.

At Query 3, processing is interrupted by awareness of a sentence whose meaning is not completely clear. The reader's first action is probably to reread the sentence and to test for success in gaining meaning (3A and 3B). If simple rereading fails, a next reasonable test would be to determine whether individual words, perhaps those deliberately left unclear in early decisions, are the source of difficulty (3C); if this is so, then the word meaning strand is entered. If individual words are not the problem, attention must next be focused upon the syntactic and semantic structure of the sentence. The sentence must be parsed to reveal its basic structure (3D). If parsing is successful in revealing meaning (3E), then the reader reenters the main processing strand; if parsing fails, then a set of decisions similar to those for individual words probably occurs. The reader may decide to proceed with the sentence (temporarily) unclear (3H), or s/he may turn to an outside source (3I).

We come finally, at Query 4, to a situation in which an entire section (paragraph, chapter, or whatever) is seen as unclear. As with sentences, the first likely act is rereading (4A). Next, unclear words (4C) or unclear sentences (4D) may be the source of difficulty. If so, the reader returns to the word meaning or sentence meaning strands. If neither of these seems to be the cause of difficulty, an interesting set of further tests may occur. The reader may try to decide whether the present difficulty is due to his or her own unfamiliarity with the concepts discussed in the text (4E). If this seems a likely cause, perhaps it is due to incomplete processing of earlier parts of the text (4F),

in which case rereading the earlier parts (4G) may help. If the difficulties do not appear to reside in the reader's unfamiliarity with the concepts (a "no" answer at 4E), then the skilled reader may begin to wonder whether the text itself is so poorly written that it is the cause of the problem (4J). S/he may then try to impose order on the text (4K). If all of these tests and actions fail to produce clarification (a "no" answer at 4J and 4H), a fundamental decision must finally be made--whether to struggle ahead anyway (4I). We suspect that many children in school do struggle through, with very little comprehension, simply because they have been told to read something. People reading independently will rarely do this, nor would we reasonably expect them to.

The model, as presented in Figure 2, represents only a general mapping of the reading process. It suggests in broad terms the probable major components of the reading process and how these components might interact; it does not attempt to describe the process in detail. Nevertheless, we believe that even in this simplified outline state, the model helps to make evident certain important features of reading, and as a general map of the terrain, it was very useful during the development of our new reading program as it alerted us to the necessity of providing certain reading experiences. Notice, for instance, how complicated the strands are under Query 3 (which is related to difficulty in apprehending the meaning of a sentence) and Query 4 (which is related to difficulty in apprehending the meaning of a section). Suppose that while reading a passage, a reader encounters more than a few words that are not instantly recognized. In this case, his or her attention will necessarily be directed to unlocking the pronunciation of those words, and s/he cannot focus on what is being communicated. Indeed, if word attack is being initiated too frequently and proceeds too laboriously, the reader will probably forget the ideas s/he has recently gathered; s/he will be unable to relate idea units; and, of course, s/he will be unable to perform the self-monitoring strategies implied by the model.

Clearly, skilled reading requires that the reader have a large reservoir of words that s/he instantly recognizes. If rapid word recognition is as important as we believe it is, then instruction must be designed to insure its development. Interestingly, some basic researchers have turned their attention to the importance of automaticity of word recognition, and some useful instructional strategies may eventually be extrapolated as that body of research grows (LaBerge & Samuels, 1974; Perfetti & Hogaboam, 1975; Samuels, Note 3). Building familiarity through repeated encounters may not be the only way to develop automaticity, but it is certainly an important way. Opportunities must be provided for children to encounter newly learned words in meaningful connected materials; that is, recently introduced words should be practiced in connected text. Previously learned words should be maintained in interesting and seductive ways. Both of these must be done with strict adherence to principles of instructional design; that is, attention to the textual materials must be insured by adequate contingencies.

LRDC's Current Development Efforts in Reading

We turn now to the new program itself. The New Primary Grades Reading System (NRS) covers what is traditionally considered the domain of the first three years of reading instruction. NRS is composed of a variety of instructional resources, each with its own function. However, it is termed a system because of the interrelationship among the instructional resources and the integration of these into a management scheme.

The scope of NRS requires a definition of reading in its broadest sense: "the perception and comprehension of written messages in a manner paralleling that of the corresponding spoken messages" (Carroll, 1964. p. 336). The terminal goal of NRS is that upon finishing the program a child be able to read and demonstrate understanding of representative third-grade reading selections. From its inception, NRS has been designed for use in an individualized environment and has incorporated

the components and techniques for individualization (described in the first section of this paper). In an individualized system, while some children may achieve the terminal goal in the middle of the second year, others may not achieve it until the end of three and one-half years. In NRS, we attempt to provide situations that make the child and the teacher aware that learning is taking place. Our aim has been to build a system that allows for individual variation, but not for individual failure.

The system is composed of 14 levels, each containing approximately 10 instructional sequences. The term level was selected over such terms as step, module, or unit to connote a horizontal as well as vertical progression. In other words, not every task the child performs is designed to add new content or skills; some activities maintain content or build fluency, some allow the student to read less demanding material, and some afford the pupil the opportunity for "discovery learning" of upcoming content.

No attempt will be made here to describe the system fully; rather, I will present examples from the program that will help to illustrate how its meaning component is integrated with the phonics component.

The Integration of Phonics and Meaning

NRS is a code-emphasis program because it is organized and sequenced around grapheme/phoneme relationships and spelling patterns, thus producing initial vocabulary that emphasizes the regularities of the coding system. Instructional strategies employ both synthetic and analytic phonics techniques to teach children to respond to letters and to strings of letters; that is, the instructional strategies teach children to use phonics rather than simply learn about phonics. For example verbalized rules of pronunciation and special terms such as short vowel, long vowel, and schwa are not used.

NRS is a meaning-emphasis program in that after a particular grapheme/phoneme correspondence is introduced, words containing that correspondence appear in context often. The text is constructed with contingencies that require the child to read the text and respond to its meaning. The total design of NRS is conceived as being a spiral rather than a strict hierarchical structure. A strict hierarchical structure implies that many of the important grapheme/phoneme correspondences would be taught to the child before attention would focus on his or her interaction with connected textual materials. In a strict hierarchical structure, the ability to decode (perhaps slowly and laboriously) a good portion of the language is prerequisite to extended reading experiences.

By contrast, in a spiraling structure the emphasis is on concurrent development of decoding and meaning. In a spiraling structure, the child initially learns to decode only a limited number of important correspondences; then many sentences and "story paragraphs" containing words with those decodable elements are made available to him or her in connected text. As the child reads with meaning through the known elements, the next loop in the spiral enlarges and s/he is introduced to new elements. The child continues to read extended meaningful texts that incorporate the new element with previously taught content.

Structure and Content of Levels 1 and 2

Levels 1 and 2 of NRS are structured quite differently from Levels 3 through 14. Levels 1 and 2 are teacher-centered. At this initial stage of learning to read, the teacher instructs children in small groups. Later, in Levels 3 through 14, the bulk of learning occurs through children's interaction with the individualized materials. It is important that the teacher be a central part of instruction in the beginning stages since the relationship between printed and oral language must be firmly established. In order for this to occur, the teacher

must be present to evaluate and confirm many oral productions. The successive blending routine, mentioned earlier in this paper, also requires the teacher's presence since it is taught adaptively: The teacher presents a model, sets up a series of prompts, and through continuous evaluations of a child's performance, deliberately and systematically fades the prompts.

Level 1 consists of twelve 20- to 30-minute lessons that introduce 11 grapheme/phoneme correspondences, including some digraphs in order to prevent the children from becoming locked into "a single letter, single sound misunderstanding." The blending routine is established in Level 1; when the children use their knowledge of correspondences with the blending routine, they learn 38 words. Then children match those words to pictures.

It is important that all the words introduced in the early lessons are in the child's oral/aural vocabulary before they are encountered in print. As the analysis in Figure 2 suggests, a reader searches for meaning even in the process of attacking an unrecognized word. If the sounds uttered do not match a previously known word (i.e., are not in the speaking or hearing vocabulary), the reader does not know whether s/he is right or whether his or her approximation needs to be modified.

It is essential that this ambiguity be eliminated in the beginning stages of learning to read. Correspondences and blending are tools for the learner to use for getting to the meaning of the word. While s/he is still learning this procedure, a high success rate must be maintained in order to strengthen it and to build the child's confidence in his or her ability to get meaning from print. If the child cannot get meaning from proper application of this procedure, then s/he may revert to guessing. As an example, consider the word tam, a word used in NRS, which in isolation appears to be a nonsense syllable to many children. In the case of tam, we observed a number of children who proceeded through

correct phoneme production and correct blending, but who hesitated and tried ten. tin. mat. or some other word that they knew at the time the word was to be pronounced. This did not occur with strongly known words such as man and cat. It appears that when decoding tools do not work, they are replaced by guessing strategies. To guard against guessing and to help insure that decoding strategies are used, we carefully monitored the vocabulary used in the early lessons and explicitly provided prefamiliarization activities with any words that we did not expect children to know. Of course, when sentences begin to be used, as happens in Level 2, context assists the child in deriving meaning. However, throughout the program, word meanings are sometimes taught directly.

Only four new grapheme/phoneme correspondences are introduced in Level 2 because the major emphasis in the level is placed upon moving the words learned in Level 1 (and words which are new combinations of the correspondences learned in Level 1) into the child's recognition vocabulary. Through repeated encounters with the same set of words, children begin to recognize the sound equivalents of larger units (e.g., spelling patterns) and begin to perform word analysis and synthesis covertly. This is, of course, a necessary step in the direction of developing automaticity of word recognition. The blending routine established in Level 1 is faded, but not extinguished, during Level 2. When children encounter difficulties in word recognition, the teacher still asks that they perform some overt blending in order to locate the difficulty and, thus, to be in a position to offer the assistance needed. Even more importantly, we have seen many children who are far along in the program resort to the blending routine on their own initiative when other clues (e.g., context) do not help them. In addition, Level 2

introduces eight sight words[3], sentences, and some of the first comprehension formats. Comprehension formats are so named because the required responses can be made only if the child has read and understood at least some of the textual material.

Comprehension, of course, is a very complex behavior. Many theorists have stated that it is a function of the integration of perceptual, linguistic, cognitive, and knowledge components. While, through NRS, we are adding to the child's general perceptual, linguistic, and knowledge background, it is not clear to me that we teach comprehension: that is, it is not clear that we teach a child to understand things in print that he would not understand from oral language. Rather, we teach the child to attend to textual materials and we provide activities that are likely to enhance automaticity of word recognition.

Figure 3 shows a workbook page with three of the early comprehension formats used in NRS. The particular example in Figure 3 is a page that a child does independently towards the end of Level 2. Throughout Level 2, the teacher introduces each new type of comprehension format prior to its appearance on an independent page. For example, consider the middle frame in Figure 3. This format was first introduced earlier in Level 2. At that time, the highly structured teacher's manual alerted the teacher to tell the children that when they encounter a picture and two sentences, they are to look at the picture, read both sentences, and then make a ring around the sentence that tells about the picture.

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[3]Sight words in NRS are either irregular words or regular words containing graphemic elements not yet introduced. For instance, and, which is regular, is introduced as a whole word before the grapheme/phoneme correspondence for d is introduced. The early introduction of and is considered useful for developing variation in sentences.

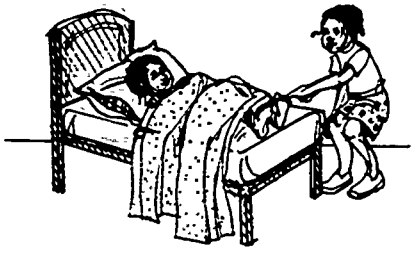
A fish is in a net.
The fish is Sam's.
Sam's fish is fat.

1. Is Sam in a net?

   yes no

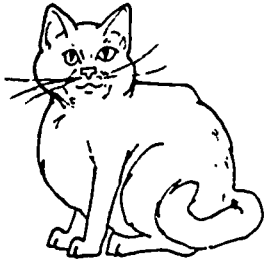
2. Is the fish fat?

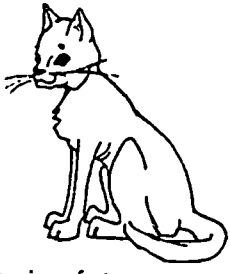
   yes no



Nan is napping.

Nan sees Ben's feet.





Color the cat that is fat.

Figure 3 Examples of three comprehension formats from Level 2 of the New Primary Grades Reading System (NRS).

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A variety of comprehension formats is introduced by the teacher in Level 2. More sophisticated versions of some of these same comprehension formats continue throughout the program, and new types of comprehension formats are introduced by the audio lessons in succeeding levels. Notice the bottom frame in Figure 3, the one with the direction "Color the cat that is fat." This is an early example from a "direction following" strand that has proven to be very successful because the blackout ratio can be kept low in this type of frame.

In this section thus far, I have concentrated upon the instructional design for effective reading instruction in the early levels. The effectiveness also depends upon the care with which the management scheme has been developed. In order for individualization to occur, children must acquire a variety of self-management skills. Just as the skills of reading are taught in a gradual cumulative sequence, NRS also teaches self-management skills in a gradual cumulative sequence. I will not dwell on this important aspect of the program, but I want to indicate that these self-management skills are introduced gradually throughout Levels 1 and 2, so that by the time the child reaches Level 3, s/he has been taught each type of self-management skill needed to progress through subsequent levels.

Instructional Resources in Levels 3 through 14

Figure 4 attempts to suggest how the instructional resources of NRS have been "fit" into an effective management scheme for individualization. The workbook is seen as the central component of NRS because it either contains the resources needed by both teacher and child or it triggers the use of the other resources. I will describe each of the resources very briefly and then focus on the starred components. Examples will be provided from these components that

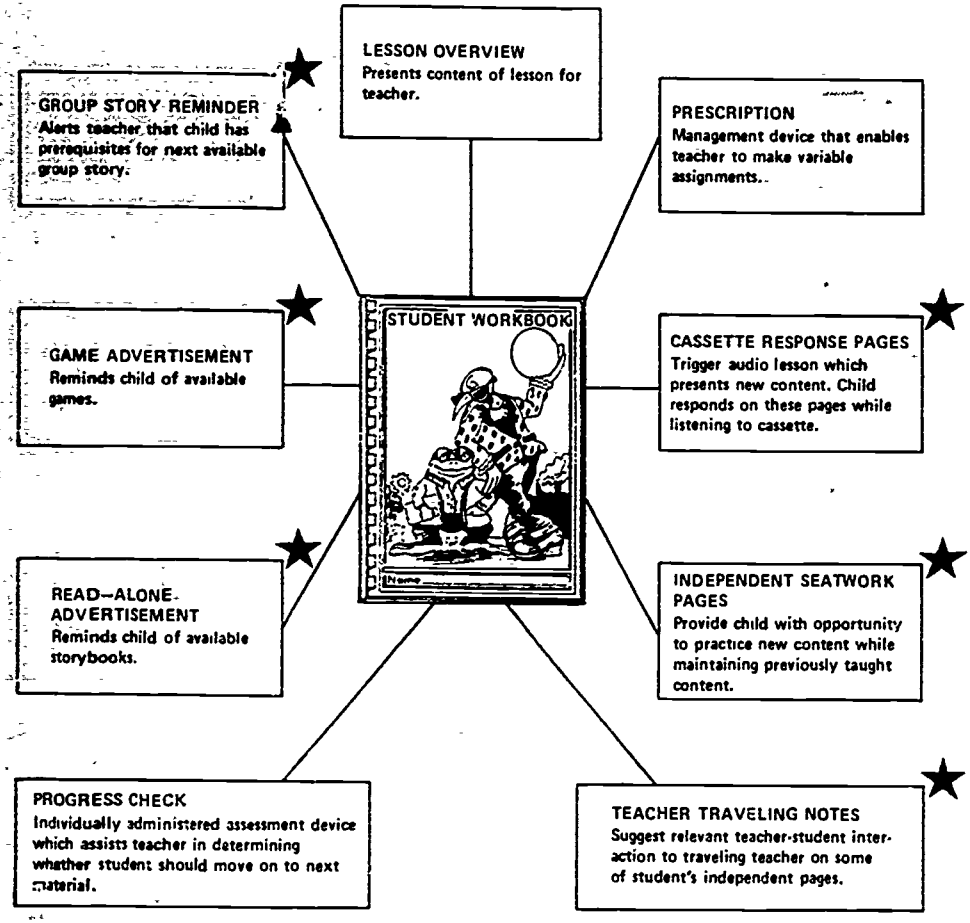


Figure 4 Instructional resources in Levels 3 through 14 of NRS

relate to the major topic of this paper, that is, the role of comprehension during the acquisition of decoding skills.

Let's begin with the box at 12 o'clock in Figure 4, the box entitled "Lesson Overview." In an individualized program in which children in one classroom are working in different stages of the program, perhaps over a range of six or eight levels, the teacher needs information about a particular lesson to be readily accessible. Therefore, preceding each lesson in the child's workbook is a green page addressed to the teacher which provides an outline of the new content and stresses any aspects of the content to which the teacher should be particularly alert. While functioning in the "traveling" role, the teacher can glance at the outline to familiarize himself or herself quickly with the content a particular child is learning.

"Prescriptions" are listings of the instructional resources that are available for each lesson. They are management devices that enable the teacher to make variable assignments.

"Cassette Response Pages" trigger the child to listen to the appropriate cassette as s/he completes these pages by responding to directions given on the cassette. These audio lessons are a key device for individualization with beginning readers because they present new content.

"Independent Seatwork Pages" follow the audio lessons and provide the child with opportunities to read material that contains the new content and that maintains previously taught content.

"Teacher Traveling Notes" are an important aid in an individualized system since part of the teacher's role in such a system is to "travel" among the children, tutoring and reinforcing them as they interact with the materials. The traveling notes appear in reduced type at the bottom of some of the child's independent seatwork

pages and suggest relevant teacher/child interactions concerning the text on a particular page.

"Progress Checks" are individually administered assessment devices. Again, they are located in the workbooks exactly where the teacher needs them. In addition, if the child has not learned the content taught in a lesson well enough to proceed to a new element, additional instructional material is provided following the progress check.

"Read-Alone Advertisements." NRS includes, as an integral part of its design, a variety of storybooks which a child can choose to read. The vocabulary in these stories is correlated with the content the children have learned in instructional settings. Advertisements for these books are placed throughout each workbook.

"Game Advertisements." We also include, as an integral part of NRS, a variety of games which a child can choose to play. The vocabulary in these games is also correlated with the content that the children have learned in instructional settings. Advertisements for the games are placed throughout each workbook.

"Group Story Reminders." Group stories are situations in which the teacher and a group of children read a story together and discuss and share interpretations of that story. Group stories occur at designated places throughout all levels of NRS. The group story reminder is printed in the workbook and is simply a part of a management scheme we have developed to enable the teacher to assemble a group of children.

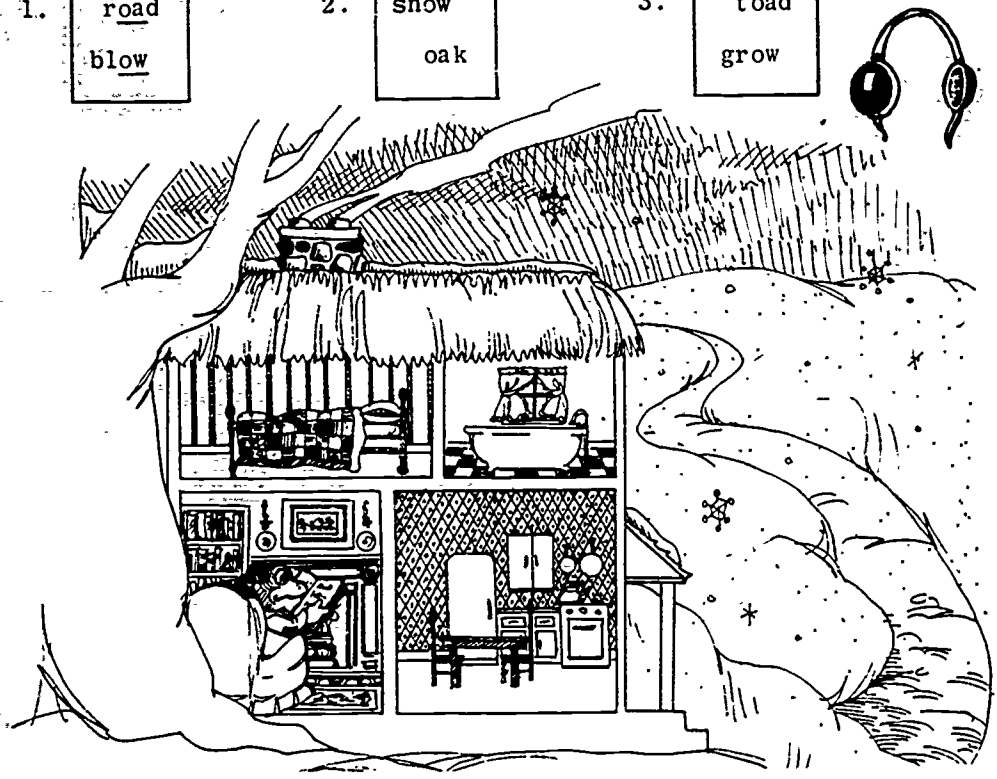
Now we will take a look at some examples of the content in some of the co nents and examine them to see how phonics and comprehension have been designed in harmony.

Cassette introduction for a new grapheme/phoneme correspondence. To present the flavor of how a new grapheme/phoneme correspondence is introduced by cassette, consider the example in Figure 5,

1. road
blow

2. snow
oak

3. toad
grow



Once upon a time, deep in the woods at the end of a road. there lived a Toad. He lived under an old oak tree. It was winter time and sometimes the wind would blow the snow against the door so the Toad couldn't get out of his house. He just sat by the fire and rested. It was quiet and cozy in the Toad's house under the old oak tree.

4. Where does the Toad live?

☐ at the end of a road under an oak tree

☐ at the end of a road under an apple tree

Figure 5. Example of a cassette response page in NRS which introduces the phoneme /ō/ as in road and grow

which is part of an actual cassette response page from Level 8. This lesson introduces the phoneme /ō/ for the graphemes oa and ow.

The narrator on the cassette directs the child to the words next to numeral 1 in Figure 5, reads each word, and asks the child to repeat the words. Then the child is told to point to the underlined letters in road while the narrator makes the sound of the underlined letters. The child then is asked to repeat the sound. The same procedure is followed for the bottom word in box 1.

Moving to numeral 2, the child is prompted that each word in box 2 contains the /ō/ sound and s/he is asked to read the words. After a sufficient pause, the narrator says the words. Then the child is directed to underline the letters in each word that make the /ō/ sound.

In number 3, the child is directed to read the words and to underline the letters in each word that make the /ō/ sound.

Next, the narrator directs the child to the picture and makes some relevant comments about it. The child is told to read the paragraph under the picture out loud with the narrator, but that each time they arrive at an underlined word, the child will be reading that word out loud himself or herself. The narrator pauses for three seconds at each underlined word and continues the text after each pause.

After the paragraph has been read, the child is directed to answer question 4. The purpose of question 4 is to establish the character of the Toad, since this particular cassette lesson continues for three more pages with a story line developed around the Toad. A variety of word analysis frames, such as those at the top of Figure 5, are interspersed with episodes in the story. After interruptions for word analysis, the narrator provides transition back to the story.

The most relevant aspect of the example in Figure 5 is the fact that the introduction of a new grapheme/phoneme correspondence takes place in meaningful connected text.

Independent seatwork pages. We now move to examples of workbook pages that the child completes independently. Figures 6 and 7 are from a sequence of workbook pages that follows the cassette instruction for the /ō/ phoneme as in road and grow. In Figure 6, each sentence contains the word Toad and at least one other word that contains the new element. Close examination of the sentences will indicate that the child must read at least some of the target words in order to match the sentences with the correct pictures. Notice the reduced print at the bottom of Figure 6; this is a "teacher traveling note." As defined earlier in this paper, teacher traveling notes suggest relevant teacher/student interactions. Since the page in Figure 6 is the first independent seatwork page to follow the cassette introduction of the new correspondence, the traveling note directs the teacher to check the child's oral reading of the words that contain the target element.

Figure 7 is an example drawn from the "direction following" strand that began in Level 2. This strand has gradually evolved to the kind of complex activity shown in Figure 7. The traveling note, which suggests helping the child who has made an error to "extract the relevant information," is a cue to the teacher to have the child read each sentence and to ask the child leading questions about the sentence. For example, using the text next to numeral 4, after the child had read the first sentence, the teacher would ask, "Who always takes a bath with yellow soap?" After the second sentence had been read, the teacher would ask, "Who is drinking tea now?" and would explicitly establish that the He in the second sentence is the crow that always takes a bath with yellow soap.

1. The Toad is sleeping on a big pillow.

2. The Toad is putting on his coat.

3. The Toad is hopping down the road.

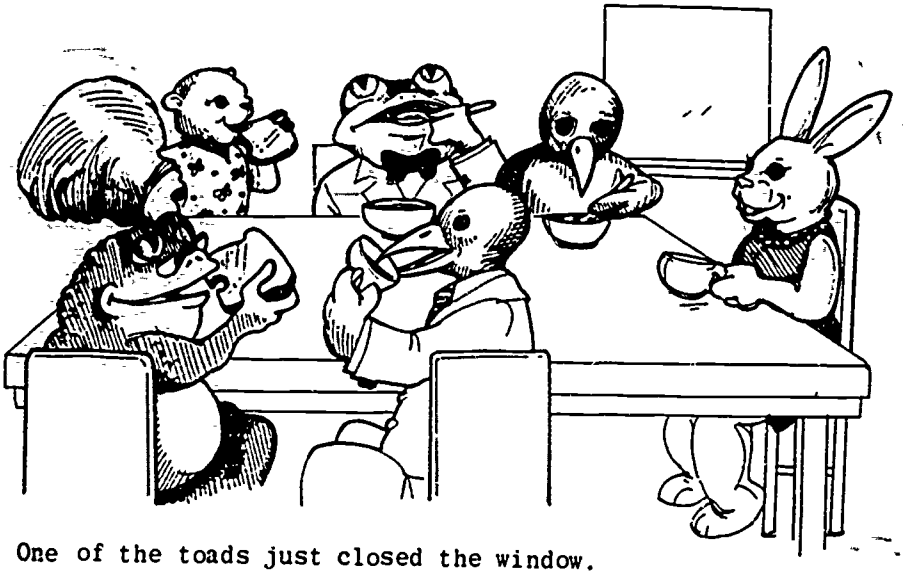
4. The Toad is rowing his boat across the lake.

5. The Toad is soaking in his bathtub.

6. The Toad is watching the snow falling.

[Point to a word containing oa and a word containing ow. Have the child read the words and underline the letters that make the /ō/ sound in each word.]

Figure 6. First NRS independent seatwork page following cassette introduction of the /ō/ phoneme as in road and grow



1. One of the toads just closed the window. He has on a yellow coat. Make an X on the animal that just closed the window.

2. One of the crows loves to ride on railroad trains. He is eating a bowl of oatmeal. Make a ring around the animal that loves to ride on railroad trains.

3. One of the toads likes to play in the snow in the winter. He is eating some toast. Make a line over the animal that likes to play in the snow.

4. One of the crows always takes a bath with yellow soap. He is drinking tea now. Make a star on the animal that takes a bath with yellow soap.

[If there are errors, help the child extract the relevant information]

Figure 7 Example of a later independent seatwork page in NRS following cassette instruction of /ō/ phoneme as in road and grow

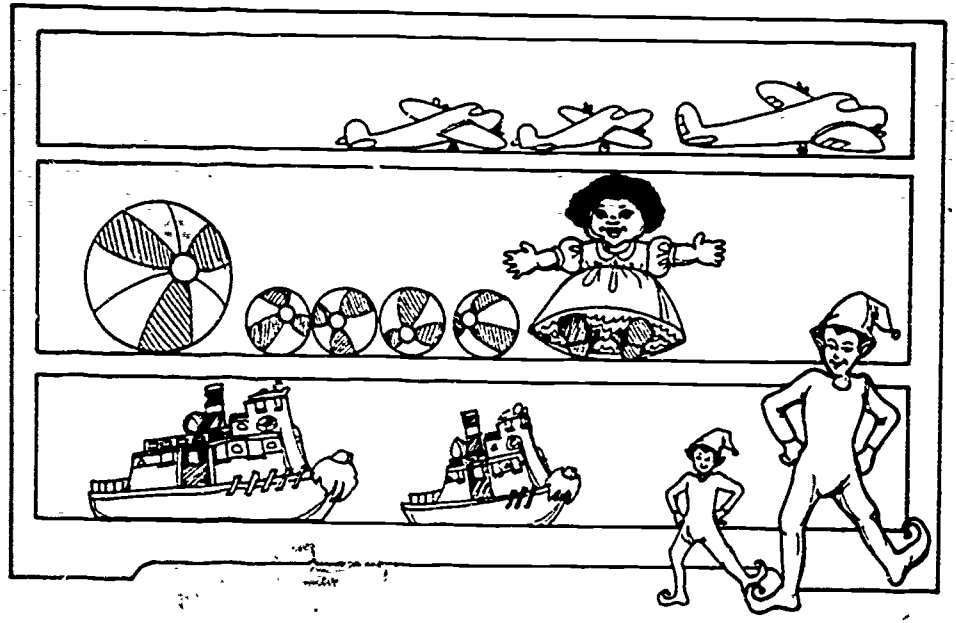
Figures 6 and 7 are examples of independent seatwork pages that contain short textual material. It is very important to point out that longer texts with story lines are contained in every sequence of independent pages. For instance, the sequence that follows the introduction of the /ō/ phoneme (as in road and grow) includes a two-page story about a toad and a squirrel who are planning a party. There is also a factual story about real toads that explains some of the differences between toads and frogs. While I have not presented examples of these longer selections, I want to emphasize that a great number of extended stories are included in the child's workbooks in order to try to motivate the child to read through interesting text.

Figures 8 through 13 are other samples of comprehension formats from various sequences. Figure 8 is another example of the "direction following" strand. In this particular example, the target element is the /ôl/ pattern as in ball. Notice the low blackout ratio; the child has to read the target words in order to make the correct responses.

In Figure 9, the target element is the word would. Notice that each even-numbered direction requires the child to confirm his or her response to the preceding odd-numbered question.

Figure 10 presents a page that focuses on the words above and below as concepts. Even though these concepts were introduced in the cassette instruction, the independent frames are sequenced to help "shape" the concept.

In Figure 11, questions 1 and 3 are the key features. Unlike traditional who, what, where, when, and why questions about textual material, question 1 and 3 require the child to determine whether or not certain information is contained in the text. One reason for including this type of question is to attempt to establish the important understanding that a particular text does not necessarily tell every-



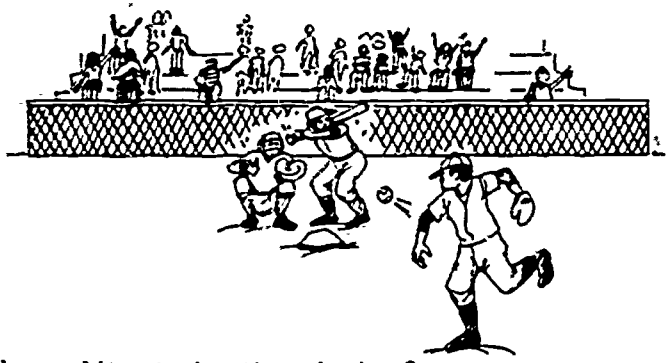
1. Color all the plānęs red.

2. Mākę a ring around the big ball.

3. Mākę an X on each of the small balls.

4. Color the tall elf.

Figure 8 Example of NRS independent seatwork page containing comprehension format from the "direction following" strand



1. Would you like to be the pitcher?

   yes - no

2. If you would like to be the pitcher.
   make an X on the pitcher.

3. Would you like to be the catcher?

   yes no

4. If you would like to be the catcher.
   make an X on the catcher.

5. Would you like to be the batter?

   yes no

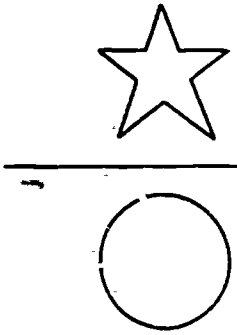
6. If you would like to be the batter.
   make a ring around the batter.

7. Would you like to see the children playing
   this game?

   yes no

[Question 1 Ask the child to draw a ring around the word Would. Then have him read the question out loud. Discuss with child reasons why he would or would not like to be some of the things suggested on the page]

Figure 9 Another example of NRS independent seatwork page containing comprehension format from the "direction following" strand



The star is above the line.
The circle is below the line.

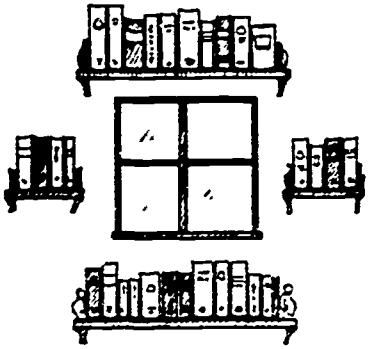
1. Is the star below the line?

yes no

2. The circle is [above / below] the line.

1. The picture is hanging [above / below] the clock.

2. The box is [above / below] the clock.



1. Make an X on the books that are above the window.

2. Make a ring around the books that are below the window.

[Too Frame Have the child find and read a sentence containing the word above and a sentence containing the word below If necessary, clarify the meaning of the words]

Figure 10 Example of independent seatwork page in NRS establishing the words above and below as concepts

Ben and Pete were camping in Ben's tent. The tent was next to Pete's house. Just as the boys were about to go to sleep, something went "bump, bump" outside the tent. Then it went "bump. bump" again. The boys got frightened. They wanted to run into the house.

Then Ben took the flashlight and shined it on the grass outside the tent. The light flashed on a turtle trying to climb over the bag of snacks the boys had left on the grass.

"Pete." said Ben, "look at the turtle. I think he wants to sleep in the tent. too."

1. Does the story tell you who was in the tent?

   yes no

2. When did the boys hear the "bump. bump?"

   ☐ just as they were about to eat their snacks

   ☐ just as they were about to go to sleep

3. Does the story tell you what kind of snacks the boys had in their snack bag?

   yes no

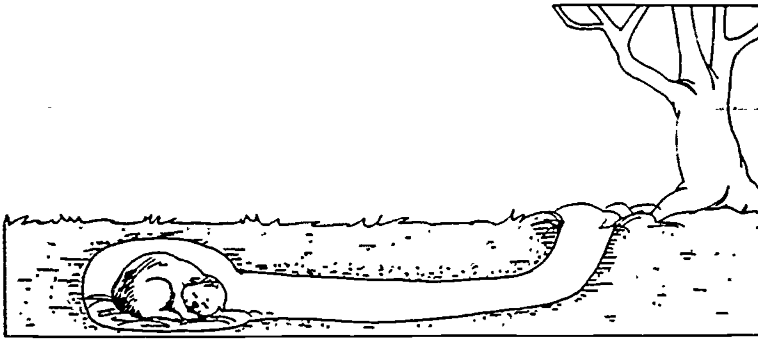
Figure 11 Example of independent seatwork page in NRS containing comprehension format requiring child to decide whether certain information is contained in text

thing about a given topic. How often in the intermediate grades do we see children "researching" a topic by going to the encyclopedia and assuming that all relevant information has been included in the encyclopedia? Indeed, we introduce this type of question in a cassette lesson that specifically tells the child that "a story tells you some things about a subject, but one story cannot usually tell you everything about a subject."

In Figure 12, directions 1 and 4 require the child to underline specific sentences in the text. The purpose of this format is to give the child experience in searching a text for specific information, a behavior performed by many adult readers. Directions 2 and 3 extend the notion that a single text contains limited information. In addition, in order to follow the directions, it is likely that children will have to reread sections to respond correctly to directions 2 and 3. The notion of occasionally providing activities that require a child to reread is based on the analysis of the reading process in Figure 2 which suggests that effective readers do sometimes reread sections of text.

It would be, of course, a huge leap (based on faith alone) to assume that the particular responses required in directions 2 and 3 of Figure 12 would transfer to the child monitoring his or her own comprehension and rereading when he or she determines that a section is unclear. What we can say with assurance is that the directions in Figure 12 do set up contingencies that require the child to attend to the text.

Figure 13 presents an example of a type of syntactical analysis. This format was suggested by the part of the analysis of the reading process in Figure 2, which hypothesizes that a reader who is having difficulty with a sentence may reread the sentence to simplify it by isolating the actor and the action. Therefore, it seemed useful to provide opportunities for the child to isolate the actor, action, and the object of the action in a sentence. Notice that grammatical terms



This animal is called a ground hog because it digs deep, long holes in the ground. In the spring and summer. the ground hog finds plants to eat in meadows and farmlands. The ground hog eats a lot and gets very, very fat.

By the beginning of fall. the ground hog is ready to go underground. It goes underground long before the cold weather arrives. The ground hog sleeps underground for part of the fall and almost all of the winter. Then the ground hog comes out again when winter is almost over.

1. Make a line under the sentence in the story that tells you what a ground hog finds to eat.

2. If there is a sentence in the story that tells you what color a ground hog is. make a line under that sentence.

3. If there is a sentence in the story that tells you when the ground hog is ready to go underground. make a line under that sentence.

4. Make a line under the sentence in the story that tells you when the ground hog comes out from underground.

[illegible]

Figure 12 Example of independent seatwork page in NRS containing comprehension formats requiring child to underline sentence in text and demonstrate understanding of contingent "If" statement

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Once a week, the woman gives lectures about different jungle animals.

1. Who does something in this sentence?
   - ☐ woman
   - ☐ week
   - ☐ jungle

2. What does the woman do in the sentence?
   - ☐ runs
   - ☐ gives
   - ☐ different

3. What does the woman give in the sentence?
   - ☐ animals
   - ☐ lectures
   - ☐ jungle

4. What are the three important words in the sentence?

   _____

The brown and white cows eat green grass in the pasture.

1. What are the three important words in this sentence?
   - ☐ pasture eats cows
   - ☐ cows eat grass
   - ☐ grass grows green

[Bottom Frame - This is the first frame where the child directly identifies the three important words in a sentence. If necessary, go through the logic involved in identifying the important words with him (i.e., the first important word tells who eats in the sentence, the second important word tells what the cows do, and the third important word tells what the cows eat).]

Figure 13 Example of independent seatwork page in NRS containing syntactical analysis format.

are avoided in the use of this format. When we introduce this format in the cassette. we establish the notion of "important words" in a sentence rather than using grammatical terms such as subject, verb, and object.

While the examples in Figures 6 through 13 contain limited textual material, it was noted earlier that workbooks also include longer selections with more developed story lines. These longer selections have a far higher blackout ratio. Indeed, if all the reading material had a low blackout ratio, children might be shaped to attend too thoroughly to all texts. Whereas the high blackout ratio throughout the Sullivan series may have taught children that "you don't have to read the story to answer the questions," a low blackout ratio in all textual material could teach them that "you have to read everything all the time." Neither is true for effective reading. Effective reading requires a diversity in levels of attention. In addition to the extended stories in the workbooks. NRS contains two other resources featuring extended stories. these are the Read-Alone Storybooks and the Group Story Books.

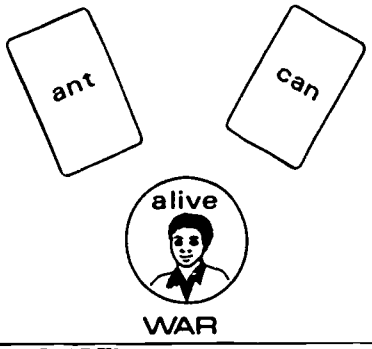
Read-Alone Storybooks. Beginning with Level 2, each NRS level includes eight to twelve separate story booklets that children may elect to read. As instructional designers, we have attempted to provide varied and lively reading materials whose vocabulary is compatible with the correspondences children know at any given level of the program. The Read-Alone stories exhibit variety in terms of topic, style, length. degree of difficulty, and treatment of subject matter. They also provide children with reading "books," composed of decodable content. during the interim period between their earliest attempts to read and their development of the decoding skills necessary to read commercial storybooks with less restricted vocabulary.

Group Story Books. As noted in the discussion of the NRS components in Figure 4, each child's workbooks contain "Group Story

Reminders," which are part of the management scheme that enables the teacher to assemble a group of children who have the appropriate requisites for reading and discussing a particular story under the teacher's direction. Since the teacher is available to provide assistance in a group story situation, the stories tend to contain more complicated syntax, more sophisticated vocabulary, and more thoroughly developed plots than appear in the workbook stories or Read-Alone stories. Some group stories integrate the situation of "children reading" with the situation of "children being read to." In the teacher's editions of the group stories, suggestions are made to the teacher to read a few of the more complicated passages of a given story to the children. Through a discussion of those passages, the notions that are important for understanding subsequent passages are established. Then the children read portions themselves and discuss those passages. In general, the instructional purposes for groups stories are for the teacher to assist children with increasingly complex syntax, polysyllabic words, word meanings, and story line development. The group story situations are also important for social reasons in that they provide an opportunity for sustained peer contact and teacher-student contact. In an individualized environment, children are in frequent short-term contact with the teacher when they receive their prescriptions, when they take tests, and when the teacher briefly stops during the "traveling" to reinforce and tutor. Children are, of course, in touch with each other in many informal ways, such as when they get materials and when they compare what they are doing. They interact especially in the "choice" area (to be described later) where they select among games that are designed for more than one child to play. The group story situation adds yet another environment for more sustained peer contact and teacher-student contact. This situation would be beneficial if it were based on social reasons alone. However, the strong instructional benefits mentioned above also exist in the small-group, teacher-led environments.

Games. Each level of NRS contains a variety of games with vocabulary emphasizing the correspondences taught in that level while also utilizing previously taught content. In order to provide a sense of how the games contribute to reading fluency, I will briefly describe three of them. The first picture in Figure 14 is a representation of the "War" game. "War" is introduced in Level 2 and is an adaptation of a game played with regular playing cards. A category (in this case, either "alive" or "not alive," established by flipping the disc) determines the rank of printed word cards in the deck (e.g., if "alive" were the category chosen, the word card man would outrank the card cape). Two children read cards that are turned over one at a time. If the pair man and cape were turned up, the child who had the word card man would take both the man card and the cape card. War is declared when both players turn up cards from the same category (e.g., if cab and can appeared). When war is declared, each player puts one card face down. Then the next of each child's cards is turned over. As soon as one of the players turns up an example of something "alive" and the other player turns up a "not alive" example (e.g., Sam and can), the player who has the "alive" card takes the whole pile. The winner is the child who collects the most cards during a round.

I propose that this kind of game enhances automaticity. We have observed children who were reading slowly in their workbooks begin to call out the words on the cards not only rapidly, but loudly! The "War" game described above is introduced in Level 2; that is, the teacher teaches a group of children the rules of the game, using a deck containing Level 2 words. As children proceed through the levels, "War" games using words from subsequent levels become available. Categories in the games change (e.g., names of animals and names of vegetables, things usually found inside a house and things usually found outside a house, etc.).



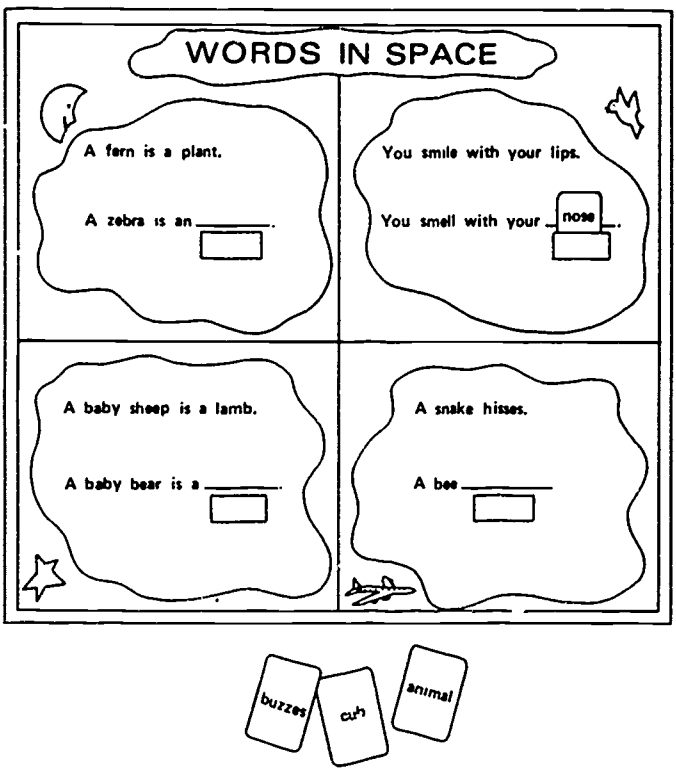
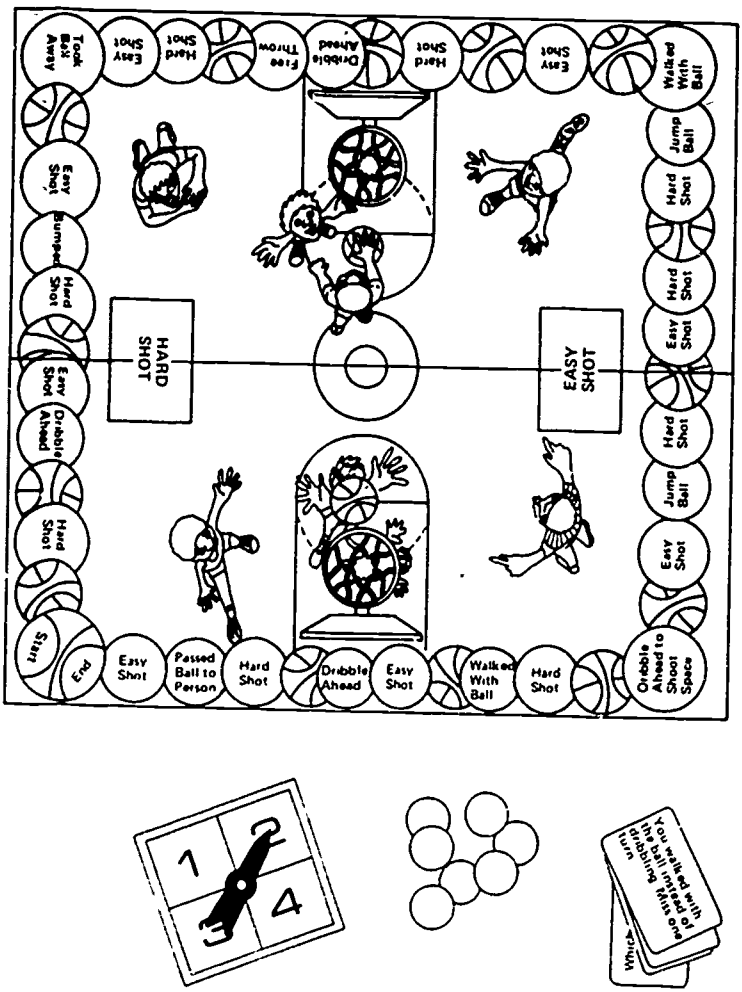


Figure 14 Pictorial representation of three NRS games



BASKETBALL

Figure 14 (Cont'd)

The second game pictured in Figure 14, "Words in Space," is introduced in Level 7. It consists of four game boards with fill-in-the-blank sentences on them (e.g., "Mittens go on your hands; socks go on your _____."} and 16 printed cards with the words that complete the sentences. Players simultaneously attempt to complete their boards by selecting cards from the 16 word cards that have been placed face down and rejecting the cards that have inappropriate words. The player who first completes his or her board correctly is the winner. "Words in Space" is a fast-paced game that encourages rapid sentence processing through the use of a kind of "contrast/parallel structure" context clue. In subsequent levels, the "Words in Space" games feature use of other context clues (e.g., synonyms, common expressions, etc.).

The third game pictured in Figure 14 is "Basketball," which is introduced in Level 9. Players read aloud directions printed on various spaces on the board (e.g., "You walked with the ball instead of dribbling. Miss one turn."). On some spaces, they must select a card with a multiple choice question on it (e.g., "Which one of these things would a king put on his head? a crown/a gown"). Players receive chips for correctly answering questions, and the winner of the game is the player who collects the most chips by the time any player has completed a circuit of the board. The game is a very popular one and its purpose is to provide children with an occasion to read in a way that is fun for them. As with other games, "Basketball" becomes available in subsequent levels employing words from the correspondences taught in those levels.

Through this brief description of the components of NRS and through specific examples of some of the content, I have attempted to illustrate some of the concepts that I think are important in the design of effective reading instruction. Therefore, the remaining question is: Is NRS effective?

Preliminary Evaluation Data

There are two sets of data that bear on the effectiveness of NRS. One set comes from the two LRDC developmental schools, the other from a school that had no previous relationship with LRDC programs prior to the implementation of NRS. The latter school has many characteristics of an urban school.

In 1973-1974, NRS was implemented in the first grades of the LRDC developmental schools. Comparisons of end-of-year achievement of NRS students with students from the previous year under the "patched" Sullivan program showed slight gains in favor of NRS. These data were encouraging but, as might be expected, the amount of gain due to NRS was small, primarily because the comparison group was already achieving fairly well since it had had the advantage of LRDC's individualized Sullivan program. In addition, the reading achievement data from LRDC's developmental schools were confounded by the fact that during the years we worked with the Sullivan program, LRDC Reading Project personnel spent time in the classrooms working with individual children. This was done in order to better understand the instructional processes, however, it also provided "clinical" assistance to a number of children. It should be noted that, during the 1973-1974 implementation of NRS in the developmental schools, this clinical support was removed. Therefore, we feel the small gains with NRS are quite encouraging.

A better measure of the success of NRS comes from the school that had no previous relationship with LRDC. The data were gathered from first-grade classrooms where implementation of our program was initiated during the 1974-1975 school year. Prior to implementation of NRS, first graders in this school were taught to read through a basal program that contained a rather heavy phonics component.

The data in Table 1 are reported on five subtests of the Stanford Achievement Test (SAT, Kelley, Madden, Gardner, & Rudman, 1964).

Table 1

Mean Grade Equivalent Comparisons on Five SAT Subtests of First Grade End of-Year Achievement Between 1973 1974 Classes Using a Basal Program and 1974-1975 Classes Using NRS

SAT Subtest	*N*	$\bar{X}$ (Grade Equivalent)	*SD*	*t*	*df*	*P*
Word Reading						
Basal	43	1.66	.42			
				3 44	81	< 001
NRS	40	2 05	61			
Paragraph Meaning						
Basal	43	1 66	.41			
				2 62	81	< .02
NRS	40	1 96	63			
Word Study Skills						
Basal	43	1 80	48			
				1.06	81	N.S.
NRS	40	1.93	58			
Spelling						
Basal	43	1 64	51			
				1 07	81	N S.
NRS	40	1 50	67			
Vocabulary						
Basal	43	2 03	71			
				1.39	81	N.S
NRS	40	2 23	60			

The table shows comparisons between first-grade achievement in the spring of the 1973-1974 school year when children were using the basal program and first-grade achievement in the spring of the 1974-1975 school year when children were using NRS. In both groups, only those students who were enrolled in the school from the beginning to the end of their first-grade year (40 in the NRS group and 43 in the basal group) are compared. The NRS group and the basal

group had mean IQs, as derived from the Pintner-Cunningham Primary Test (Pintner, Cunningham, & Durost, 1966), of 108.24 and 108.98, respectively.

Table 1 shows student achievement on the five language arts subtests, expressed in mean grade equivalents, as well as the values of the corresponding t statistics, for the students in the basal program and NRS. The first three subtests in the table, Word Reading, Paragraph Meaning, and Word Study Skills, are classified by the authors of the SAT as measures of reading skills. All comparisons on these reading-related subtests favored NRS students over those in the basal program, with significant differences between the two groups in the Word Reading and Paragraph Meaning subtests. The authors of the SAT do not classify their Vocabulary subtest as one that directly measures reading skills since the items on this subtest are read to the child; hence, this particular subtest measures pupils' vocabulary knowledge independent of their reading skills. Spelling was taught in neither the basal program nor in NRS. The Vocabulary and Spelling subtests are included in this analysis of the effects of NRS to illustrate that the comparison and NRS groups appear similar in other skills that may be related to the acquisition of reading skills. These data strengthen our belief that differences in achievement in the reading subtests are due to differences in instructional treatment rather than to differences in groups characteristics. Further analysis of the above data and additional descriptive data are available in McCaslin (Note 4).

Conclusions

I have undertaken to describe some of the factors that need to be considered for the design of effective instruction in beginning reading. One important factor is adherence to principles of instructional design. Application of principles of instructional design must

be complemented by some understanding of the nature of the reading process itself. This understanding can be fostered through the use of analytic devices such as the task analysis of the reading process shown in Figure 2. The resultant "map" of the reading process enabled us to view the integration of separate kinds of reading competencies and led to the conclusion that instruction must be provided for the effective integration, rather than sequential mastery, of several separate components. Indeed, it was this that led us to the position that phonics and meaning are most sensibly viewed as mutually supportive and interdependent.

However, curriculum design is not only a matter of the application of instruction principles and the use of available knowledge about the reading process itself. Curriculum development also requires the integration of science and intuition with structure and playfulness. The curriculum designer must have a strong sense of child development, of the variety of social systems operating in various classrooms, and of the busy primary grades teacher attending to so many needs unrelated to reading. Each time a design decision is made, multiple considerations are necessary.

In the design and development of NRS, we used notions from both theory and practice. As we study NRS in operation in various classrooms and analyze data from those classrooms, we should learn more about principles of instruction and the learning-to-read process itself. In turn, what we learn may contribute to both theory and practice.

Reference Notes

1. Beck, I. L. The New Primary Grades Reading System: Preview of an adaptive reading system. Paper presented at the meeting of the American Educational Research Association, New Orleans, March 1973.

2. Eichelberger, R. T., Lee, J. B., & Leinhardt, G. LRDC adaptive educational programs and academic achievement results obtained at two developmental schools. Unpublished manuscript. University of Pittsburgh, Learning Research and Development Center, 1974.

3. Samuels, S. J. Automatic decoding and its role in reading comprehension. Paper presented at the meeting of the American Educational Research Association, New Orleans, March 1973.

4. McCaslin, E. S. A first year implementation of the New Primary Grades Reading System. Unpublished manuscript, University of Pittsburgh, Learning Research and Development Center, 1975.

References

Beck, I. L., & Mitroff, D. D. The rationale and design of a primary grades reading system for an individualized classroom. Pittsburgh: University of Pittsburgh, Learning Research and Development Center, 1972. (LRDC Publication 1972/4; ERIC Document Reproduction Service No. ED 063 100)

Buchanan, C. D. Sullivan Associates programmed reading. St. Louis: McGraw-Hill, 1963.

Carroll, J. B. The analysis of reading instruction: Perspectives from psychology and linguistics. In E. R. Hilgard (Ed.), Theories of learning and instruction. The Sixty-Third Yearbook of the National Society for the Study of Education (Part 1). Chicago: University of Chicago Press, 1964.

Chall, J. C. Learning to read, the great debate. New York: McGraw-Hill, 1967.

Diederich, P. B., II. Research 1960-70 on methods and materials in reading. TM Report 22. ERIC Clearinghouse on Tests, Measurement, and Evaluation. Princeton: Educational Testing Service, January 1973.

Durost, W. N., Bixler, H. H., Wrightstone, J. W., Prescott, G. A., & Balow, I. H. Metropolitan achievement tests. New York: Harcourt, Brace, Jovanovich, 1970.

Glaser, R. Toward a behavioral science base for instructional design. In R. Glaser (Ed.), Teaching machines and programmed learning, II: Data and directions. Washington, D. C.: National Education Association, 1965.

Holland, J. G. A quantitative measure for programmed instruction. American Educational Research Journal, 1967, 4, 87-101.

Kelley, T. L., Madden, R., Gardner, E. F., & Rudman, H. C. Stanford achievement test. New York: Harcourt, Brace and World, 1964.

LaBerge, D., & Samuels, S. J. Toward a theory of automatic information processing in reading. Cognitive Psychology, 1974, 6, 293-323.

Lindvall, C. M., & Bolvin, J. O. The project for Individually Prescribed Instruction (The Oakleaf project). Pittsburgh: University of Pittsburgh, Learning Research and Development Center, 1966. (Working Paper 8)

Perfetti, C. A., & Hogaboam, T. The relationship between single word decoding and reading comprehension skill. Journal of Educational Psychology, 1975, 67, 461-469.

Pintner, R., Cunningham, B. V., & Durost, W. Pintner-Cunningham primary test. New York: Harcourt, Brace and World, 1966.

Resnick, L. B., & Beck, I. L. Designing instruction in reading: Interaction of theory and practice. In J. T. Guthrie (Ed.), Aspects of reading acquisition. Baltimore: Johns Hopkins University Press, 1976.