

THE CLOZE PROCEDURE AS A REINFORCEMENT
TECHNIQUE FOR CONTENT VOCABULARY

THESIS

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Abstract

The purpose of this study was to investigate the cloze procedure as a teaching technique for seventh grade science vocabulary. A quasi-experimental, nonrandomized, control group, pretest-posttest design was used for the study. The sample consisted of 41 students (two classes) taught by the same instructor and was equated in terms of reading levels, ages and IQ scores. One class was randomly assigned to control group status and used a variety of vocabulary exercises such as crossword puzzles, word jumbles, acrostics, categorization exercises and word searches to reinforce the content terms. The other class was the experimental group and used a variety of cloze activities to reinforce the same science vocabulary.

The students were pretested on 89 words from the ecology unit in the textbook Interaction of Man and the Biosphere published by the Rand McNally Company. Those words which 85 percent of the students had correct were eliminated from the study. This method left 76 core words to be taught during the treatment period. The 76 core words were organized into eight blocks for ease of instruction.

After the instructor presented the material which included all the Block I words, students practiced using the core vocabulary by working on the Block I vocabulary activities designed by the

experimenter. The control group used a variety of vocabulary tasks while the experimental group used cloze tasks. This procedure was followed for all eight blocks during the treatment period. Upon completion of the five week treatment period, students were posttested.

A t-test and an unweighted means solution of a two-way factorial (nonorthogonal) design were used to analyze the data at a .05 level of significance. The results indicated that overall vocabulary mean gain scores and mean posttest scores were not significantly different between the cloze and vocabulary activities group. However, the cloze group scores were consistently higher in both areas. Vocabulary mean gain scores were not substantially different between males and females but cloze males did perform significantly better than the vocabulary activities males. Females displayed an ability to perform equally well with both instructional methods. Recommendations for classroom use of the cloze procedure as well as suggestions for future research were given.

Chapter I

Statement of the Problem

Purpose

The purpose of this study was to investigate the effectiveness of the cloze procedure as a method of teaching science vocabulary to seventh grade students.

A nonrandomized, pretest-posttest, control group design was used for the investigation. The experimental group used cloze activities while the control group used various types of vocabulary exercises to learn the content terminology.

Need for the Study

Content teachers are becoming increasingly aware of the reading skills students need in order to work effectively. The fact that teachers want to know more about the teaching of reading and the skills that can be incorporated into a content lesson is demonstrated in part by the increased number of reports and studies on reading in various education journals. For example, the March 1978 edition of the Science Teacher reported on the topic of science and reading and the problems therein.

Each content area uses terms that are unique to that area and are often unfamiliar to the student. The student is also confronted with the problem of multiple meanings in which the same

term can assume an entirely different denotation depending upon the subject area in which it is used. This inconsistency is exemplified by the word 'stocks' which refers to an instrument of punishment in social studies while in seventh grade science it can refer to the addition of fish in a lake.

It is important that students master the vocabulary terms in a course of study because these terms are used in conjunction with the concepts to be learned. Not knowing the key content terms hinders one's ability to comprehend the content passage (Burmeister, 1976). When learned, vocabulary terms enhance "reading-learning instruction" (Taschow, 1970, p. 6). Herber's (1970) statement summarizes concisely the need for teaching content vocabulary,

Reinforcement of the technical vocabulary insures understanding of the course content. The language of the subject is learned, vocabulary development skills are learned, and the content of the course is learned. If this is done for each unit studied in a subject, greater success is the result: success in teaching and success in learning. (p. 162)

The literature reveals various methodologies that are useful in the teaching of content vocabulary, many of which incorporate certain aspects of the cloze procedure. One illustration is Robinson's (1975) statement that the use of semantic and syntactic context clues is a useful method for developing vocabulary. The cloze task requires students to use both types of contextual clues to fill in cloze blanks. Herber (1970) stated that, "Students will develop vocabulary when they use words in situations that have meaning in conversations . . . not only with the teacher but with

fellow students" (p. 162). Cloze exercises can be worked on individually and as a result can promote considerable discussion since the pupils' responses will often differ. An explanation of why a certain word is more correct than another or why several words are all equally correct will further clarify the terms and concepts in a meaningful context of study. The cloze procedure could be utilized as a supplemental technique at the junior-senior high school level but, "No one has specifically explored the use of the cloze in teaching reading in the content areas" (Jongsma, 1971, p. 26). He also states that there has been little research in using cloze to develop vocabulary.

The literature suggests that learning the content vocabulary should enhance students' comprehension of the subject matter. The cloze procedure might prove useful in this vocabulary development since it requires the student to produce vocabulary terms in a meaningful context as related to the subject area, through the use of semantic and syntactic context clues. This study sought primarily to investigate the usefulness of the cloze procedure as a teaching technique for content vocabulary.

Definition of Terms

Two definitions of terms are important to this study. They are as follows:

Core Words. Those words that were taught during the treatment period are the core words. Eighty-five percent of the students

had to get the vocabulary item correct on the pretest before the word could be eliminated from the study. Those words that were not deleted were designated as the core words.

Cloze Procedure. A procedure in which words are deleted from the reading passage in a systematic manner. The reader must supply the missing words.

Limitations of the Study

The sample consisted of 41 students at the seventh grade in one junior high school.

The vocabulary words were selected by the experimenter from the book Interaction of Man and the Biosphere published by the Rand McNally Company.

The treatment period was five weeks in duration.

Summary

This study investigated the usefulness of the cloze procedure as a teaching method for content vocabulary with seventh grade science students. Little research has been conducted using the cloze procedure as a teaching technique for content vocabulary.

Chapter II

Review of the Literature

Purpose

The purpose of this study was to investigate the cloze procedure as a method for teaching seventh grade science vocabulary. This investigation dealt with two areas of reading research and the literature surveyed will be divided into the following categories accordingly:

Content area vocabulary learning

The cloze procedure as a teaching technique

Content Area Vocabulary Learning

The literature reviewed in this section will deal with content vocabulary enrichment, content vocabulary as it relates to concept development, and vocabulary research in the content areas.

Content vocabulary enrichment appears to be an important and necessary aspect of content learning. Students' knowledge of content terminology has been a concern of reading authorities for several decades. Cole (1946) reported that, "In all probability, an inadequate vocabulary is the greatest single cause for failure to read with comprehension in either general or technical fields" (p. 40). Two major themes appear continuously throughout the literature stressing the importance of teaching content vocabulary.

The first motif that is repeatedly stressed is that content vocabulary enrichment results in content learning. Dale and Milligan (1970) report that vocabulary improvement is important because it facilitates learning and that the new words selected should be relevant to the content area and the students' experiences. The relationship between content vocabulary and content learning is stated clearly by Herber (1970) when he writes that:

If the words emphasized represent the major ideas teachers want students to acquire for a unit of study, then the reinforcement experience develops not only vocabulary skills but also an understanding of the subject content.
(p. 162)

Taschow (1970) also confirms that new words must be introduced in content areas for greater reading learning instruction. Students will have difficulty understanding the subject area without knowing the key terms (Burmeister, 1976).

Knowledge of content terminology also enhances the students' ability to read their textbook. Strang (1966) contends that in order to read content material effectively, "pupils need a technical vocabulary and special skills in each of the content areas" (p. 301). Allington (1976) also supports the fact that vocabulary instruction improves text processing. An additional benefit of content vocabulary enrichment is that pupils will be able to communicate more effectively about the course content with teachers and peers (Herber, 1970).

A second theme that appears in the literature is that understanding the specialized terms results in better understanding of the course concepts (McKee, 1937; Serra, 1953; Russell, 1961; Dale and Milligan, 1970; Herber, 1970; Taschow, 1970). Content vocabulary learning as it relates to conceptual development in a course of study has been commented on by several reading authorities in addition to those mentioned. Coulter (1972) regards the terms 'vocabulary' and 'concept' as closely related. He defines them in this manner:

A reading vocabulary is that fund of terms which one recognizes in print. The concept is a mental set or idea for the vocabulary term; it is frequently triggered by the recognition of the verbal term. Therefore, the context in which the word is encountered has considerable bearing upon the concept which the reader will evoke. As an example, the word products will suggest one concept in a social studies context and quite another if the student is reading about the process of multiplication. (p. 112)

The problem in all content areas between interrelationships of comprehension, vocabulary, and concepts necessary for understanding are presented by Langer (1967) when he explains that, "The development of vocabulary is an inextricable part of concept development, and difficulty in reading comprehension stems from difficulty in the understanding of words and the concepts they represent" (p. 449). In terms of a specific content area, Tinker (1952) felt that understanding the specialized terms and their representative concepts was one of the greatest difficulties students dealt with in social studies. Words and concepts have a complementary relationship that is observed in the learning process (Sutton, 1963).

Since content vocabulary and content concepts are intertwined, "the content areas are probably the most fertile grounds for vocabulary development" (Rauch, 1969, p. 191). The literature abounds with articles advocating the teaching of vocabulary in math (Mahan, 1943; Willmon, 1971), science (Fay, 1965; Hafner, 1965; Smith, 1965; Lucas and Brulando, 1975), and social studies (Tinker, 1952; Smith, 1965). Research in these fields points out the relationships between content vocabulary and content learning. This review briefly surveys past studies in science in math.

In 1938, Curtis investigated the vocabulary load of science textbooks of that era and found that the technical and nontechnical terms were beyond the students' vocabulary levels. He also reported that the nontechnical terms caused students difficulties as often as the scientific terms. Overall, it was concluded that the vocabulary in science textbooks was too difficult for the intended audience. Gray (1940) cited the above study when he stated that vocabulary difficulties are one of the contributing factors to reading problems in science.

Another study explored the vocabulary terms in arithmetic, health, history, geography, literature and science textbooks of fifth grade students (Johnson, 1952). Her results indicated that vocabulary enrichment is needed to enable students to read with comprehension and ease. Once again, students appeared to have the most difficulty in the area of science.

The relationship of fundamental skills as measured by the National Merit Scholarship Qualifying Test to natural science reading ability were studied by Aldridge and Anderson (1960). They determined that of the four skill areas, English usage, math usage, social studies reading, and word usage, "ability in word usage contributed the most to Natural Sciences Reading ability" (p. 444).

Later investigations identified the reading skills used in math and studied the effect of direct vocabulary instruction on students' abilities with arithmetic problem solving. Corle and Coulter (1964) attempted to identify the reading skills intermediate grade pupils needed to solve verbal arithmetic problems. They concluded that the skills which exert the greatest influence on children's abilities to solve verbal problems are vocabulary development, literal interpretation of the statement, and the ability to select the correct solution process. Vanderlinde (1964) focused his study on arithmetic vocabulary development as it related to quantitative problem solving abilities. He found that classes that received direct instruction in mathematical vocabulary achieved significantly better scores on problem solving and arithmetical concept tests. A similar study was conducted by Lyda and Duncan (1967). Once again the group that received direct vocabulary instruction showed significant gains in their problem solving abilities. Both studies support the research of Gray and Holmes (cited in Gray) which showed the value of direct teaching of vocabulary. The authors of both studies recommended that vocabulary instruction be part of content instruction.

There are many different methodologies to teach and reinforce vocabulary. Manzo (1973) lists the following possibilities:

1. Etymological
2. Wide reading
3. Prepared word list
4. Word derivation
5. Context
6. Theme studies
7. Content class strategy
8. Teacher teaming
9. Dictionary method
10. Word manipulation games

There are other methodologies such as audio-visual aids or structural overviews. Herber (1970) reports that the variety of vocabulary reinforcement exercises is limited only by the imagination. Petty, Herold and Stoll (1967) searched the vocabulary literature for studies that dealt specifically with the teaching of vocabulary. Approximately 565 titles were identified and examined. On the basis of this investigation, Petty et al. concluded that no particular method has been proven more effective over any other method. However, some vocabulary instruction increases learning more than does no vocabulary instruction.

In choosing an appropriate methodology one might consider the fact that words must be used many times before they become a usable part of one's vocabulary (Herber, 1970). Dale (1972) describes four

stages necessary to vocabulary development. During stage one, one has not seen or heard the word previously. The second stage is known as the "twilight zone." At this point, the word is vaguely familiar to the student. At stage three, one knows the words in one form but not in another. Dale uses the example of remedy and remedial. In stage four, one knows the word and can use it in new situations. Repeated rehearsals are necessary to bring students out of the twilight zone of learning. In addition, when students are given meaningful contexts to use new vocabulary greater retention is the result (Herber, 1970). In conclusion, teachers should choose a method of vocabulary instruction with which they feel comfortable.

The Cloze Procedure as a Teaching Technique

Researchers, teachers and administrators are continually discovering new uses for the cloze procedure in classrooms. In the past, much of the cloze research centered on the areas of readability, comprehension and language variables. Hafner (1966) noted the paucity of research in which cloze was used as a teaching technique. Jongma (1971) also observed that few studies were conducted in this area. This survey will review chronologically the studies Jongma cited as well as more recent investigations in which cloze is used as a teaching method but will exclude those studies that deal with the bilingual or the English as a second language student.

Jongma (1971) reported Roossinck's 1962 study in which 18 sixth grade students were given a programmed learning package which consisted of 200 cloze tasks that become progressively difficult

according to summation, classification, abstraction, and grammatical complexity. Selections were based upon social studies and science textbooks, and deletions were made selectively. Jongasma (1971) believed the results of this study were exploratory due to the small sample, lack of randomization and the lack of clarity as to what was being evaluated, cloze or programmed learning. But, Roossinck's was one of the first studies to use the cloze procedure in a teaching situation.

The cloze procedure was tried as a remedial reading teaching technique with college students (Bloomer, 1962). The experimental group was given a series of cloze tasks with every tenth word deleted. Cloze exercises were corrected by the students first and then by the teacher who had a key with possible synonyms. A good performance permitted a student to progress to the next level of difficulty, much like a criterion referenced program. The control group students used a workbook type program meant to improve speed and comprehension in reading. The cloze group demonstrated a significant increase in comprehension.

Schneyer (1965) investigated the effect cloze tasks would have on the reading comprehension of sixth graders. The cloze students worked on one exercise a day, alternating between tenth word deletion patterns and noun-verb deletion patterns, in addition to their regular basal program. The cloze tasks were scored by the teacher and returned to the pupils within one day. The control group received only their basal instruction. The results indicated

that there were no significant differences between the experimental and control groups. Schneyer suggested that no significant differences were demonstrated due to the lack of discussion after the cloze tasks were completed. He stated that, "The reasons for appropriate responses must be verbalized" (p. 178).

An unique investigation by Blumenfield and Miller (1966) sought to determine what aspects of grammar good students knew and were able to apply to reading that poor students did not know. Students filled in cloze exercises with every fifth word deleted. The tasks were analyzed according to word class (nouns, verbs, adjectives and so on) to determine differences between the two groups. Blumenfield and Miller discovered that good and poor readers are capable of filling a cloze blank with the appropriate word class.

Ninth graders were used by Heitzman and Bloomer (1967) to study the effect of non-overtly reinforced cloze exercises on reading comprehension. This investigation demonstrated that filling in a cloze blank is not intrinsically reinforcing. When non-overt reinforcement is used, the cloze procedure does not affect reading comprehension any differently than traditional reading methods. The researchers elaborated further that cloze plus reinforcement for a correct response or synonym in addition to a motivational situation, where one progresses through cloze tasks on the basis of the quality of responses, would increase the effectiveness of the cloze procedure.

Martin (1968) compared the effect of generative grammar instruction and cloze instruction on the listening, writing, and

reading skills of college freshmen. One group studied transformational grammar, a second group received cloze tasks, and the control group took the freshman composition course. The cloze exercises, once completed, were followed by a teacher-led discussion so that students could verbalize the reasons for their choices. Both experimental groups performed significantly better than the control group on the silent reading test although there were no significant differences between the experimental groups.

Giuce (1969) also used the cloze procedure with college students in an effort to improve their reading comprehension. The students were enrolled in a reading and study course. The control group received their regular course instruction while the experimental group had regular instruction plus practice with cloze tasks. Cloze students received two points for an exact replacement and one point for a synonym. Analysis of the data did not indicate a significant difference between the two groups.

More recent studies have used the cloze procedure in conjunction with other methods. Jongsma (1971) reported Kingston and Weaver's 1970 study in which the cloze procedure was used in combination with the language experience approach to teach beginning reading to culturally disadvantaged first graders. Items were deleted from the children's own experience stories and students had to provide as many words as possible that would make sense in the blank. All suggestions were discussed. This study demonstrated that cloze tasks could be used with younger children.

Lopardo (1975) also combined the language experience approach with cloze instruction but with disabled readers. The advantages of language experience are that there are no mismatches between the child's oral and written language; secondly, the student is motivated to read his own or peers' stories. By using cloze in combination with the children's stories, the teacher can develop the students' use of contextual clues for word recognition and comprehension as well as focus on synonyms, structural words, frequency words and so on.

Several suggestions for the instructional application of cloze exercises were made by Bortnick and Lopardo (1973). Until students become familiar with cloze activities, they suggest that students should read the passage silently; the passage should then be read aloud sentence by sentence by a teacher or student; finally, students should suggest words and give reasons for their choices. Deletion of items for which pupils must supply synonyms would focus instruction upon vocabulary development.

Aaronson (1973) used student-designed cloze exercises as a vocabulary tool. Thirty community college students served as the sample population. She hypothesized that after a training period in vocabulary cloze deletion, students would achieve higher scores on student designed cloze vocabulary tests as opposed to teacher designed cloze vocabulary tests due to the similarity in styles among students syntactically and semantically. However, there were no significant differences between the mean scores on the student and teacher designed tests.

A cloze program for third graders was described by Gunn and Elkins (1976). The program consisted of four cloze exercises a week, each of which lasted about half an hour. The cloze tasks were used for diagnosis as well as for word attack skills and vocabulary development. The results of this eight week treatment indicated a rise in pupils' comprehension skills.

A five week summer reading program for high risk students, grades one through five, used the cloze procedure for reading comprehension and vocabulary development (Sinatra, 1977). The procedure used consisted of three steps. In steps one and two, the student associated word meanings and concepts through direct experiences. The final step was the cloze exercise whereby students applied the specific vocabularies they had learned. Data analysis in the area of vocabulary knowledge demonstrated significant gains at all grade levels. Reading comprehension gains were significant for grade two only with positive trends at the other grade levels.

The usefulness of the cloze procedure as a teaching technique seems inconsistent based upon the research results. However, many of the past investigations have been hampered by the following flaws (Jongsma, 1971):

1. Inadequate description of the type, rate, and number of deletions as well as a rationale for the deletion system used.
2. Content type and difficulty not reported.
3. Description of the sample inadequate.
4. "Regular" instruction inadequately defined.

5. Cloze tests were correlated to inadequately described multiple choice comprehension tests.

More recent studies have tried to avoid the above errors. Subsequently, future research should yield more consistent and thorough results.

There are many unexplored areas for future research. For example, while many of the past studies dealt with reading comprehension, few have worked directly with vocabulary development. Few studies have dealt with cloze for developing content area reading skills.

Summary

The literature supports the teaching of content vocabulary for several reasons. First of all, content vocabulary enrichment contributes to content learning. Second, students will be more efficient readers of their content materials once they understand the terminology. In addition, learning content terms facilitates students' abilities to discuss the subject matter. Knowledge of content vocabulary provides a base of knowledge upon which further instruction can build. Finally, understanding the specialized terms results in better understanding of the course concepts.

Investigations of the cloze procedure as a teaching method have yielded ambiguous results. Several research flaws have been outlined by Jongsma (1971) in an effort to produce more reliable studies in this area. Furthermore, there are many areas where cloze can be utilized in the classroom that have yet to be investigated.

Chapter III

The Research Design

The purpose of the study was to determine whether the cloze procedure is an effective method for teaching content vocabulary.

Questions

1. Is there a significant difference between the posttest scores of the vocabulary group and the posttest scores of the cloze group?
2. Is there a significant difference between the mean vocabulary gains of the cloze group and the mean vocabulary gains of the vocabulary activities group?
3. Is there a significant difference between the mean vocabulary gains of females compared to males?
4. Is there a significant difference between the mean vocabulary gains of the cloze group females when compared to the vocabulary activities group females?
5. Is there a significant difference between the vocabulary gains of the cloze group males when compared to the vocabulary activities group males?

Methodology

Subjects

The subjects involved in this study were seventh grade students attending a suburban school in a predominantly middle to upper middle class school district.

A total of 41 students participated in this study during the regular meeting of their science class. There were 24 males and 17 females. The two classes used were equated in terms of the available IQ scores, reading level and age through the use of a t-test. Four students were eliminated from the study due to either poor attendance, lack of test score data necessary to equate the groups, or movement out of the school district. Table 1 provides the results of the t-test.

Table 1

Equation of Cloze and Vocabulary Activities Groups

| Groups | Reading Level | IQ | Age |
|-----------------------|-----------------|-----|--------------|
| Cloze | | | |
| Mean | 9.3 grade score | 112 | 12.66 |
| Standard Deviation | 1.29 | | .45 |
| Vocabulary Activities | | | |
| Mean | 8.9 grade score | 112 | 12.75 |
| Standard Deviation | 1.73 | | .41 |
| t(39) = | .84, p > .10 | | .72, p > .10 |

There were no significant differences between the groups for age and reading level. The reading level data was taken from

the May, 1977, total reading scores on the Stanford Achievement Tests, Intermediate II, Form A.

The two classes were randomly assigned to the control and experimental groups. The period four class was designated as the control group and used a variety of vocabulary exercises such as crossword puzzles, word jumbles, acrostics, categorization exercises, and word searches (see Appendix A). The control group will be referred to as the vocabulary activities group or the VA group for the duration of this study. The period three class was the experimental group and used a variety of cloze exercises to learn the science vocabulary. This group will be referred to as the cloze group throughout this investigation.

Instruments

Eighty-nine words from the ecology unit were selected by the investigator from the textbook Interaction of Man and the Biosphere published by the Rand McNally Company (1975). A pretest was administered before the treatment period and was readministered at the end of the study as a posttest. The test format was multiple choice, and was designed by the experimenter and reviewed by the classroom teacher, three faculty members of the reading staff, and one science faculty member from the State University of New York College at Brockport. The pretest and posttest were checked for reliability using the Kuder-Richardson₂₀ formula. High reliability scores of .861 and .933 were obtained. The pretest was administered

in two parts during the students' regularly scheduled science class. The same procedure was followed for the posttesting (see Appendix B).

The students were pretested on all 89 words, and those terms which 85 percent of the students had correct were eliminated from the study. Thirteen words were deleted through this method, leaving 76 core words to be taught during the treatment period. Once the core words were established, they were arranged into eight blocks, (see Table 2), for ease of instruction.

The cloze tasks were based on the ecology chapter of the textbook and in most passages only the core words were deleted. The majority of the deletions were noun-verb deletions which required students to produce the core word using the context clues of the passage. Synonyms were acceptable, however, the teacher did explain the core word that belonged in the cloze blank. The total number of deletions in the cloze passage closely paralleled the number of core words in the block. The text upon which the cloze passages were based had a Dale-Chall readability of grades 7-8 (See Appendix C for cloze tasks).

Procedure

The following procedure was used during the treatment period. The same teacher instructed both classes according to this general format:

1. Textbook reading (In class/Outside assignment)
2. Questions/Discussions about the reading

Table 2
Core Words Arranged Into Blocks

| <u>Block 1</u> | <u>Block 2</u> | <u>Block 3</u> |
|------------------------|-------------------|-----------------|
| species | dispersal | microorganism |
| interaction | balance | predict |
| randomly | carrying capacity | limiting factor |
| Homo sapien | exceed | competition |
| natural population | stocks | cooperation |
| population | biomass | territorial |
| census | food energy | relationships |
| inhabit | biotic potential | horizontal |
| ecology | calculate | axis |
| population-census | calorie | vertical axis |
| | environmental | adjacent |
| | resistance | |
| | birthrate | |
| | represent | |
| | herbicide | |
| <u>Block 4</u> | <u>Block 5</u> | <u>Block 6</u> |
| food chains | habitat | precipitation |
| photosynthesis | ecosystem | deciduous |
| producer | biotic community | coniferous |
| primary consumer | topography | tundra |
| secondary consumer | bacteria | pinon-juniper |
| herbivore | fungi | woodland |
| omnivore | natural ecosystem | chaparral |
| carnivore | urban | adaptations |
| scavengers/decomposers | | hibernate |
| vegetarian | | uniform |
| food webs | | |
| complex | | |
| <u>Block 7</u> | <u>Block 8</u> | |
| ecological niche | immigrant species | |
| camouflage | biological clocks | |
| occupant | succession | |
| nocturnal | lichens | |
| solitude | climax systems | |
| analysis | sequoia | |
| spore | pioneers | |

3. Problems/Laboratory work

4. Discussion and Conclusions

After the instructor taught the material which included all the Block I words, students practiced using the core vocabulary by completing the Block I vocabulary exercises devised by the experimenter. Thus, the instructor taught the subject matter and then reinforced the core vocabulary through either the cloze or general vocabulary activities. While students worked on these activities individually, the teacher recorded absentees as well as the length of time it took to complete and discuss the exercise. The same method was used for each block of words.

The cloze group used cloze exercises to reinforce the core vocabulary. Students were given a practice cloze prior to the treatment period to familiarize them and the teacher with the cloze procedure. Students were instructed to first read the cloze passage silently and then read it again filling in the words that best fit in the blanks. Students were allowed to self-check their answers using their textbook if they finished early. When everyone completed the task, a discussion of the passage was led by the instructor. Students were encouraged to make corrections and ask questions at this time. This procedure was also used throughout the treatment period.

The VA group learned the core words through the use of crossword puzzles, jumbled words, word searches, categorizing exercises and acrostics. This group followed the same sequence of instruction and spent the same amount of time working with

these vocabulary activities. Students completed the tasks individually and were allowed to use their texts as a reference. Upon completion, the teacher reviewed the task and answered any questions that arose (see Appendix A).

Analysis of Data

A t-test and an unweighted means solution of two-way factorial (nonorthogonal) design was used to test the hypotheses at the .05 level of confidence. Posttest scores of the students who learned the vocabulary through the cloze procedure were compared to posttest scores of students who used vocabulary activities. The cloze group mean gain score and the VA group mean gain score were compared and then analyzed in terms of sex differences. The mean gain score of cloze males was compared to the VA group males' mean gain score. The mean gain score of the cloze females was compared to the VA group females' mean gain score.

Summary

A quasi-experimental, nonrandomized, control group, pretest-posttest design was used for this study. The sample consisted of 41 students (two classes) taught by the same science teacher. The two classes were equated in terms of reading level, age and IQ scores. During the five week treatment period, the cloze group worked on cloze activities and the VA group used a variety of vocabulary exercises designed to reinforce the content terms of the ecology unit. A t-test and an unweighted means solution of two-way factorial (nonorthogonal) design was used to analyze the data.

Chapter IV

Analysis of Data

The purpose of this investigation was to assess the cloze procedure as a method for teaching content vocabulary.

Findings and Interpretations

The following questions were investigated:

1. Is there a significant difference between the posttest scores of the vocabulary group and the cloze group?
2. Is there a significant difference between the mean vocabulary gains of the cloze group and the mean vocabulary gains of the vocabulary activities group?
3. Is there a significant difference between the mean vocabulary gains of females and the mean vocabulary gains of males?
4. Is there a significant difference between the mean vocabulary gains of the cloze group females when compared to the vocabulary activities group females?
5. Is there a significant difference between the vocabulary gains of the cloze group males when compared to the vocabulary activities group males?

The first question was to determine whether a significant difference existed between the posttest scores of the cloze and VA groups. A t-test was used to test the hypothesis at the .05 level of significance. Table 3 provides the data from this statistical analysis.

Table 3
Analysis of Posttest Scores

| Source | Posttest |
|-----------------------|----------|
| Cloze | |
| Mean | 75.617 |
| Standard Deviation | 11.768 |
| Vocabulary Activities | |
| Mean | 71.926 |
| Standard Deviation | 17.224 |
| t(39) = | .796 |

The cloze group's mean score was higher than the VA group mean score but there was no significant difference between the two groups on the posttest as the data in Table 3 illustrates.

An unweighted means solution of a two-way factorial (non-orthogonal) design was used to analyze the data for questions two, three, four and five. The results of this analysis appear in Table 4.

Table 4
Analysis of Mean Vocabulary Gain Scores

| Source | DF | SS | MS | F |
|--------------|----|-----------|---------|--------|
| Groups | 1 | 80.750 | 80.750 | .651 |
| Sex | 1 | 1.424 | 1.424 | .011 |
| Groups x Sex | 1 | 651.817 | 651.817 | 5.261* |
| Error | 37 | 4,584.025 | 123.892 | |

* $p < .05$

Question two sought to determine whether the mean vocabulary gains of the cloze group differed from the mean vocabulary gains of the VA group. The cloze group had a higher mean gain, but there was not a significant difference between the two groups as shown by Table 4.

Question three investigated the mean vocabulary gains of females compared to males. There was no significant difference between females and males as illustrated in Table 4.

Question four compared the mean vocabulary gains of cloze group females and VA group females. There was no significant difference among females with respect to group placement.

Question five compared the mean vocabulary gains of cloze group males and VA group males. There was a significant interaction in that males in the cloze group did significantly better than males in the VA group.

The findings of the study demonstrate that the use of the cloze procedure to reinforce content vocabulary did not significantly affect vocabulary learning of females when compared to the vocabulary activities method. Males, on the other hand, made significant vocabulary gains using the cloze procedure as compared to males using the various vocabulary activities. Although no significant differences were found between the posttest data or the overall mean gains data of the two groups, the cloze group did score consistently higher in both areas.

Summary

The purpose of the investigation was to assess the effectiveness of the cloze procedure as a teaching technique for content vocabulary. Analysis of the data demonstrated that cloze group males made significant vocabulary gains when compared to VA group males. However, the females' vocabulary gain score was unaffected by group placement. Overall mean gains scores and posttest scores were not significantly different for the two groups although the cloze group did achieve higher scores in both areas.

Chapter V

Conclusions and Implications

The intent of this investigation was to investigate the cloze procedure as a teaching method for content vocabulary.

Conclusions

The results of this study demonstrated that the overall vocabulary mean gain scores for females and for males were not substantially different. However, when the variable of group placement was combined with the extra factor of sex, a significant interaction resulted. The use of the cloze procedure to teach content vocabulary was discovered to be significant for the male population. Females displayed an ability to perform equally well with both instructional methods.

A further check on the reading levels of the cloze males and VA group males revealed a difference of about 1.2 years in favor of the cloze group. This difference might explain the cloze males' superior performance. It is not known whether the VA group would have achieved significant vocabulary gains using the cloze procedure. The females' mean reading score was approximately 1.1 year higher than the males' mean reading score. Since their mean reading level was above average at the start of the study (9.89),

a ceiling effect could have occurred, which would explain the females' equivalent performance with both methods.

The mean posttest scores and mean vocabulary gain scores were not significantly different between the cloze and the VA group. However, the cloze group scores were consistently higher in both areas. Perhaps this trend would have been more distinct if it were not for the large standard deviation on the pretest and posttest in combination with the small sample population.

Implications for Future Research

This section is divided into two categories. The expansion and refinement of the study will be presented followed by the recommendations for future research.

Expansion and Refinement of the Present Study

The study was limited by a small sample of 41 students which resulted in 20 to 21 students per group. A larger sample would be advantageous should this study be replicated.

The pretest/posttest might have been given to a pilot group. In this way, a thorough item analysis could have been conducted to eliminate contradictory and inappropriate questions. Refining the testing instrument through this type of analysis might reduce the large standard deviation obtained by this investigator.

Recommendations for Future Research

Future investigations could be conducted in the following areas:

1. There does not seem to be an abundance of studies using cloze as a method to develop vocabulary. Future research could examine the effect of the cloze procedure with different deletion types, content areas, age levels, and reading levels.

2. An investigation that examines the teaching of context clues in conjunction with cloze vocabulary exercises to develop general vocabulary could be undertaken.

Jongsma (1971) has published guidelines outlining the most beneficial methods of conducting cloze research. His suggestions are practical and helpful to the novice researcher.

Classroom Implications

On the basis of the research results and classroom observations, the cloze procedure appears, to this researcher, to be a useful teaching tool as the following examples illustrate:

1. The cloze procedure generates discussion of content material since students usually ask for an explanation of the answer. This discussion serves as a catalyst for the instructor who can then clarify terms and concepts and eliminate misconceptions and ambiguities.

2. During a discussion, various synonyms are often considered; thus new vocabulary can be developed.

3. Students occasionally use a broad term when a specific word would be more appropriate. The hierarchy of the subject matter can then be explained showing the relationships between the broader concepts and the specific terms and concepts encompassed by the more global category.

4. When the cloze exercises are based upon the textbook, the students become more active readers since they must respond to the passage. The classroom instructor believed this to be a major advantage of the cloze procedure since pupils sometimes give their reading assignments superficial attention.

Summary

This study demonstrated that the cloze males performed significantly better than the VA males. However, females did equally well in both groups. The mean posttest and mean vocabulary gain scores of the cloze and VA groups were not significantly different although the cloze group's mean scores were consistently higher.

The study was limited by the small sample population and the large standard deviation of the pretest and posttest.

Future research could examine the following areas:

1. The effect of the cloze procedure using different deletion types and content areas as well as different age and reading levels.

2. An investigation into the effect of using cloze tasks along with the teaching of context clues to develop vocabulary.

In the classroom the cloze procedure was a useful discussion tool. The cloze exercises also helped students become cognitively involved in their reading since they had to actively respond to the passage in a logical manner based upon semantic, syntactic, and content restraints.

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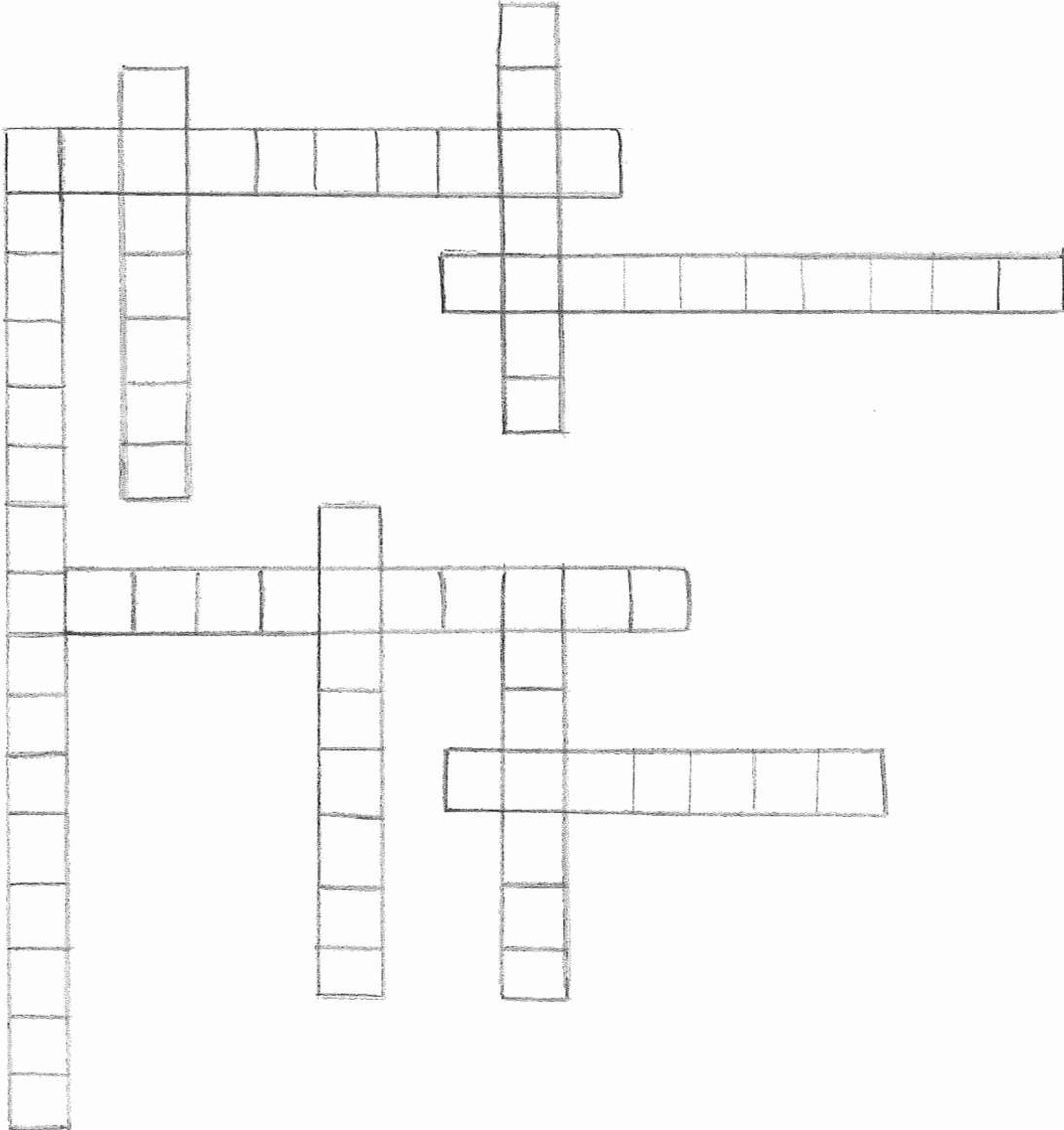
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Appendix A

Vocabulary Activities Group Reinforcement Exercises

Down

1. A method used by scientists to estimate population size.
2. Individuals that are alike in all important ways.
3. Haphazardly; no particular way.
4. The study of organisms and their environment.
5. To live or reside in.
6. The name for a population count.

Across

1. All the organisms of one kind found in an area.
2. The scientific name for mankind.
3. All the different ways organisms affect each other, their environment and how the environment affects organisms.
4. Fish living in a lake would be an example of a _____ population.

Directions: Each of the scrambled words below is followed by a definition that states the meaning of the word when put in its correct spelling. Read each of the definitions and then unscramble the word to mean a word corresponding to the given definition. Write the new word on the blank given.

- | | | |
|---------------------|---|-------|
| 1. perdissal | movement of organism in an out of an area | _____ |
| 2. aalbcne | If a population is not changing in size it is in | _____ |
| 3. cityaapc | An area can only support a certain number of individuals. This is known as its carrying . . . | _____ |
| 4. deexce | To go beyond the limits | _____ |
| 5. soktc | When one adds fish to a lake | _____ |
| 6. missbao | The total weight of a population | _____ |
| 7. doof neryge | The ability of a field to feed a population can be measured this way | _____ |
| 8. biocit tentpoial | Ability of a population to grow | _____ |
| 9. ccaallute | To work a problem out mathematically | _____ |
| 10. aoieclr | A measure of heat energy | _____ |
| 11. bithterra | Births per year | _____ |
| 12. senteprrre | One who serves as an example | _____ |
| 13. retissance | Factors that prevent population growth are known as environmental | _____ |
| 14. berhiicde | plant killer | _____ |

Directions: Read the definitions below and figure out the word that is being defined. The word has been hidden across, up and down and backwards.

1. An organism that can only be seen with a microscope is called a _____.
2. To foretell the future. _____
3. Factors that limit the size of a population are called _____.
4. When organisms have to fight for the same living space or food they are in _____.
5. When organisms work together, it is called _____.
6. The interactions within a territory are called t_____ relationships.
7. Lines that go from left to right are h_____ lines.
8. Lines that go up and down are v_____ lines.

G O K W U I N D C E E H T C

A L C E R O P F O W O C A Y

M I C R O O R G A N I S M E

P M O N D Z A O R D T S A M

Q I O T F Y I R E H B N D X

R T P K G L D R G T O E J V

V I E J L O P E A H E O A E

U N R C I P A T N A X X C R

P G A L A I R O T I R R E T

B F T D O B A E I Y Y I N I

A A I G N A I L S Z I T T C

E C O M P E T I T I O N D A

B T N H O D U L M E N S W L

W O Z I O D Y S S R G B H O

N R O J L A T N O Z I R O H

Directions: Below are a list of words. Each word is to be placed under one or more of the categories. Be prepared to defend your choices.

- | | |
|------------------------|----------------------------|
| 1. producers | 7. omnivores |
| 2. herbivores | 8. food webs |
| 3. secondary consumers | 9. photosynthesis |
| 4. food chains | 10. vegetarians |
| 5. carnivores | 11. scavengers/decomposers |
| 6. primary consumers | 12. carnivores |

Plants

Animals

Complex Interactions

Directions: Read the definitions below and figure out the word that is being defined. Place the word into the corresponding blanks.

1. Any form of falling moisture
2. An area of dry, coastal brushland
3. An area of open forest with low trees; dry and mild
4. Trees which produce cones
5. Special structures and behaviors that permit organisms to survive
6. A cold, windy, dry region; far north or south in location
7. Inactive during the winter months
8. When things look alike or the same in appearance
9. Trees that lose their leaves in the fall: cold, snowy winters and hot, humid summers

1. ___ E _____
2. C _____
3. ___ O _____
4. _____ S
- Y
5. _____ S
6. T _____
7. E _____
8. M
9. S

Directions: Read the definitions below and figure out the word that is being defined. Place the word into the corresponding blank.

1. An organism's way of life. p. 192
2. A tenant or one who occupies a place. p. 193
3. Alone. p. 194
4. Animals that are active at night. p. 193
5. Seed-like but microscopic. A method of plant dispersal. p. 196
6. Blending in with the surroundings. p. 192
7. To investigate a subject. p. 195

1. E _____

2. C _____

3. O _____

4. L _____

5. O _____

6. G _____

7. Y _____

Directions: Read the definitions below and figure out the word that is being defined. The words are hidden in the puzzled vertically and horizontally.

1. Species, like the ring-necked pheasant, that came here from another continent, are known as m_____s_____.
2. An organisms sense of time is called its b_____c_____.
3. The gradual replacement of one set of organisms by another. s_____.
4. The first organisms to appear during this gradual replacement. p_____.
5. The first organisms to appear on a rock. l_____.
6. An ecosystem that maintains itself for many years. c_____s_____.
7. The giant red-wood trees in California. s_____.

S B I O L V B O G L D O R M E E Y
 U I M M I G R A N T S P E C I E S
 C O C C U P B I O L U C L L O C E
 C L I C N V E R S T C O P I S I Q
 Z O B E Y O S U T K C N O M W W U
 I G I W H L Y O M V E E Y A O U O
 P I O N E E R S C L S O C X G H I
 F C L O B V Y X W R S R R S J L A
 I A H J B C S D T E I U F Y V G W
 D L M X N Y O Z A A O P B S Q C R
 D C V J D S Q S H U N T C T A C N
 O L I C H E N S T R I D I E O J K
 U O T E A C M S G K A N O M W E V
 P C J S E T R M Y J C L T D J S H
 O K N I W N G T X H A Y T W S K Z

Appendix B

Vocabulary Pretest/Posttest

Science Vocabulary Pretest and Posttest

Part I

Name _____

Directions: Read each selection below carefully. Choose the best answer and circle it. If you do not know an answer select letter e. Do not guess.

1. Choose the best example of a species.
 - a. Irish setter
 - b. dog
 - c. German Shepherd
 - d. Siamese cat
 - e. I don't know

2. Organisms are:
 - a. plants only.
 - b. animals only.
 - c. living things.
 - d. things that are living or dead.
 - e. I don't know

3. If something becomes extinct it:
 - a. has a strong odor.
 - b. is obsolete.
 - c. is asleep.
 - d. has died out forever.
 - e. I don't know

4. The portion of the earth where some type of life is found is called the:
 - a. ionosphere.
 - b. biosphere.
 - c. geosphere.
 - d. chemosphere.
 - e. I don't know

5. If your friend's life is in jeopardy, he is:
 - a. safe.
 - b. confused.
 - c. in danger.
 - d. in a coma.
 - e. I don't know

6. The term interaction in science means:
- the relationship between plants and animals.
 - the relationship between organisms and man.
 - the relationship among organisms and their environment.
 - the relationship of water to the land.
 - I don't know
7. The word exist means to:
- isolate.
 - live.
 - die.
 - be lonely.
 - I don't know
8. When scientists study the environment of a plant or animal they are studying the:
- air.
 - pollution.
 - surroundings.
 - topography.
 - I don't know
9. Ecology is the study of:
- man and his environment.
 - pollution in our country.
 - organisms and their environment.
 - life.
 - I don't know
10. A Homo sapien is a:
- human being.
 - type of plant.
 - scientific name for a small monkey.
 - four footed animal.
 - I don't know
11. All the organisms of one kind found in an area are:
- a species.
 - similar in appearance.
 - a population.
 - the same.
 - I don't know

12. The word inhabit means to:
- a. reside.
 - b. restrain.
 - c. possess.
 - d. enter.
 - e. I don't know
13. A census is:
- a. a hundred years.
 - b. the midpoint.
 - c. a population count.
 - d. one who prohibits objectionable materials.
 - e. I don't know
14. Choose the best example of a natural population.
- a. fish in an aquarium
 - b. mice in a field
 - c. puppies in a pet shop
 - d. lions in a zoo
 - e. I don't know
15. The population-census method involves:
- a. introducing a new animal into the environment.
 - b. tagging animals and then returning them to their environment.
 - c. destroying sick and aged animals.
 - d. introducing new plant life into the environment.
 - e. I don't know
16. If deer are randomly caught, they are:
- a. caught quickly.
 - b. captured according to age.
 - c. not captured in any particular way.
 - d. caught in a row, one after the other.
 - e. I don't know
17. Dispersal refers to:
- a. movement of organisms in and out of a community.
 - b. throwing out unneeded goods.
 - c. treating sewage chemically.
 - d. providing enough food for animals.
 - e. I don't know

18. A community in balance:
- has the same number of predators as prey.
 - is growing.
 - is pollution free.
 - is not changing in size.
 - I don't know
19. The carrying capacity refers to:
- a population's life support systems.
 - the balance of nature.
 - survival of the fittest.
 - an area's ability to support life.
 - I don't know
20. The word exceed means:
- to do as well as others.
 - of the highest quality.
 - to go out.
 - to go beyond the limits.
 - I don't know
21. When a person stocks a lake with fish he:
- counts the number of fish in a given lake.
 - maps out the life forms in a particular lake.
 - adds fish to the lake.
 - carefully removes the algae from the lake.
 - I don't know
22. Biomass is:
- the total weight of a population.
 - the total height of a population.
 - the total number of organisms within a population.
 - a method of determining the biokinetics of a population.
 - I don't know
23. Choose the best example of food energy.
- The number of organisms a field can feed.
 - The weight of an organism.
 - When 275 ml of water is heated to 72 degrees C.
 - The five basic food groups.
 - I don't know

24. Biotic potential is the:
- ability of a population to grow.
 - chances a population has for survival.
 - ability of a population to change as the surroundings change.
 - ability of an organism to change as the surroundings change.
 - I don't know
25. The word calculate means to:
- make a decision.
 - compute a problem mathematically.
 - be funny.
 - be logical.
 - I don't know
26. A calorie:
- measures the fat in food.
 - is a measure of heat energy.
 - is the weight a person gains.
 - the measurement of heat one loses.
 - I don't know
27. Environmental resistance:
- is the environment's ability to protect itself from natural diseases.
 - includes factors that prevent population growth.
 - includes factors that prevent population weight increases.
 - is man's inability to fully control his environment.
 - I don't know
28. Birthrate is:
- the number of births per year minus the number of deaths.
 - an organism's rate of growth in the first year of life.
 - how fast an organism is born.
 - the number of births per year.
 - I don't know
29. The word represent means:
- an illustration.
 - to serve as an example of something.
 - to give someone something.
 - to take advantage of a person.
 - I don't know

30. A population explosion is:
- the destruction of a population.
 - an extremely high increase in a population.
 - an increase in the death rate of a species.
 - an increase in the amount of water in lakes and streams.
 - I don't know
31. A herbicide:
- kills plants.
 - is a fertilizer.
 - fight germs.
 - destroys fungi.
 - I don't know
32. Choose the best example of a microorganism.
- protozoa
 - seed
 - fleas
 - gnats
 - I don't know
33. When scientists investigate they:
- make up theories.
 - change old ways of thinking.
 - examine things systematically.
 - look over lists of problems.
 - I don't know
34. When scientists predict what happens in an experiment they tell what:
- happens after the experiment.
 - occurs during the experiment.
 - will happen before it happens.
 - their sources of error were.
 - I don't know
35. Which is an example of a limiting factor?
- Lack of vitamin B₁
 - Old age
 - Lack of food
 - Plentiful water supply
 - I don't know

36. An example of competition in the animal world is:
- Bees making honey.
 - An eighth grader tutoring a fourth grader.
 - Dolphins swimming alongside a boat.
 - Sharks hunting for prey.
 - I don't know
37. An example of cooperation in the animal world is:
- ants construction an anthill.
 - lions fighting over food.
 - a squirrel storing nuts.
 - a chimpanzee making a tool.
 - I don't know
38. A territory is:
- the place where an organism is born.
 - a method of planting new forests.
 - the living area of a particular organism.
 - a place where plants are grown indoors.
 - I don't know
39. Territorial relationships are:
- interactions within a territory.
 - controlled by the territory leaders.
 - interactions between several territories.
 - of little importance.
 - I don't know
40. On a globe, a horizontal axis runs:
- North to South.
 - East to West.
 - diagonally Northeast to Southwest.
 - diagonally Northwest to Southeast.
 - I don't know
41. On a globe, a vertical axis runs:
- North to South.
 - East to West.
 - diagonally Northeast to Southwest.
 - diagonally Northwest to Southeast.
 - I don't know

42. The word adjacent means:
- joined at opposite corners.
 - next to each other.
 - in addition to.
 - far apart.
 - I don't know
43. The word encounter means:
- away from the counter.
 - on the counter.
 - to meet or come across something.
 - to have run away from something.
 - I don't know
44. In the study of science, food chains are:
- stores such as Wegmans or Star Market.
 - eating patterns of a particular animal group.
 - species that depend on other species for food.
 - species that compete for food.
 - I don't know
45. Photosynthesis is the:
- way plants are able to grow.
 - production of photons.
 - synthesis of light and energy.
 - way most plants produce food.
 - I don't know
46. An example of a producer would be:
- horses
 - humans
 - plants
 - water
 - I don't know
47. An example of a primary consumer would be:
- animals that eat plants.
 - spiders that eat flies.
 - plants like the Venus Fly Trap that eat animals.
 - humans.
 - I don't know

48. Secondary consumers eat:
- a. after the primary consumers finish.
 - b. before the primary consumers finish.
 - c. primary consumers.
 - d. only plants.
 - e. I don't know
49. Herbivores eat:
- a. plants only.
 - b. animals only.
 - c. both plants and animals.
 - d. once a month.
 - e. I don't know
50. Carnivores eat:
- a. plants only.
 - b. animals only.
 - c. both plants and animals.
 - d. twice their weight daily.
 - e. I don't know
51. Omnivores eat:
- a. plants only.
 - b. animals only.
 - c. both plants and animals.
 - d. three times a day.
 - e. I don't know

Science Vocabulary Pretest and Posttest

Part II

Name _____

Directions: Read each selection below carefully. Choose the best answer and circle it. If you do not know an answer select letter e. Do not guess.

52. Scavengers and decomposers are:
- a. organisms that eat only specific plants or animals.
 - b. plants and animals that live on dead organisms.
 - c. organisms that feed on water life.
 - d. always hunting around for any kind of food to survive.
 - e. I don't know
53. The best example of a vegetarian is a:
- a. horse.
 - b. dog.
 - c. cat.
 - d. human.
 - e. I don't know
54. Several different but connected food chains are called:
- a. food links.
 - b. food webs.
 - c. food interlocks.
 - d. food resources.
 - e. I don't know
55. A word that has the same meaning as complex is:
- a. easy.
 - b. complicated.
 - c. cumbersome.
 - d. tiresome.
 - e. I don't know
56. An insecticide is:
- a. a type of food for insects.
 - b. the study of insect life.
 - c. the study of insect behavior and its relation to man.
 - d. used to destroy insects.
 - e. I don't know

57. The word habitat refers to:
- a habit that is hard to break.
 - the lifestyle of an organism.
 - the type of shelter an organism makes.
 - the environment in which an organism lives.
 - I don't know
58. Organisms and their physical environment are organized into a(an):
- biosphere.
 - ecosystem.
 - geosphere.
 - ecology unit.
 - I don't know
59. The living organisms in an environment are called a:
- biotin group.
 - biogenesis.
 - biotic community.
 - ecocomplex.
 - I don't know
60. Topography has to do with:
- the curvature of the earth.
 - the study of maps.
 - mapping out the plant and animal life in a region.
 - the physical features of an area of land.
 - I don't know
61. Single cell plants that feed on living and dead organisms are called:
- bacteria.
 - microbes.
 - fungi.
 - protozoa.
 - I don't know
62. A simple plant that does not contain chlorophyll is:
- fructose.
 - daisy.
 - microorganism.
 - fungi.
 - I don't know

63. A grassland is an example of a:
- a. natural ecocomplex.
 - b. physical ecocomplex.
 - c. natural ecosystem.
 - d. physical ecosystem.
 - e. I don't know
64. An urban environment is located:
- a. in a city.
 - b. in a rural area.
 - c. in the suburbs.
 - d. out west.
 - e. I don't know
65. The term precipitation means:
- a. any form of falling moisture.
 - b. impetuous.
 - c. another word for weather.
 - d. the climate of an area.
 - e. I don't know
66. The term deciduous refers to:
- a. a type of environment.
 - b. a decisive person.
 - c. tree climbing mammals.
 - d. trees that lose their leaves in the fall.
 - e. I don't know
67. The term coniferous refers to:
- a. moisture-loving plants.
 - b. trees which produce cones.
 - c. shrubbery.
 - d. nesting birds.
 - e. I don't know
68. A cold, windy, fairly dry region, located far north or south with short vegetation is called a(an):
- a. tundra.
 - b. arctic system.
 - c. cold front.
 - d. Polar system.
 - e. I don't know

69. A pinon-juniper woodland is an area of:
- dry brushland, near coastal areas.
 - open forest of low trees, dry and mild.
 - forest with humid summers and cold snowy winters.
 - forest in rolling countryside.
 - I don't know
70. A chaparral is a(an):
- horse ranch.
 - almost desert-like region.
 - dry coastal brushland.
 - a plant that can live with little water.
 - I don't know
71. The word characteristic means:
- unconventional.
 - rare.
 - distinguishing features.
 - similar.
 - I don't know
72. Special structures and behaviors that permit an organism to survive are called:
- acquired features.
 - adaptations.
 - annualar traits.
 - evolved formations.
 - I don't know
73. A warm-blooded animal that feeds its young on milk and has fur or hair is called a(an):
- amphibian.
 - reptile.
 - vertabrate.
 - mammal.
 - I don't know
74. The word hibernate means to be:
- dormant.
 - inactive in the winter.
 - hypnotized.
 - bear-like.
 - I don't know

75. The word uniform can mean:
- a. alike.
 - b. unique.
 - c. variety.
 - d. change.
 - e. I don't know
76. The ecological niche of an organism is:
- a. another word for an animal's dwelling.
 - b. the study of the locations of various life forms.
 - c. its way of life.
 - d. the relationship between the living and non-living parts of the environment.
 - e. I don't know
77. Camouflage means to:
- a. fool the enemy.
 - b. blend in with the surroundings.
 - c. change one's appearance.
 - d. hide in the dark.
 - e. I don't know
78. The organism that lives in a dwelling is a(an):
- a. visitor to the dwelling.
 - b. occupant of the dwelling.
 - c. survivor of the dwelling.
 - d. constructor of the dwelling.
 - e. I don't know
79. Nocturnal animals:
- a. are active during the day.
 - b. sleep at night.
 - c. are active during the night.
 - d. are active day and night.
 - e. I don't know
80. The word solitude means:
- a. alone.
 - b. afraid.
 - c. friendly.
 - d. anxiety.
 - e. I don't know

81. The word analysis means to:
- investigate.
 - learn.
 - unite.
 - displace.
 - I don't know
82. A spore is:
- seed-like but microscopic.
 - fern-like but smaller.
 - what's left over after a plant flowers.
 - the inner core of a seed.
 - I don't know
83. An example of an immigrant species is a:
- cockroach.
 - pigeon.
 - ring-necked pheasant.
 - dandelion.
 - I don't know
84. An organism's activity is related to the time of day. This sense of time is due to:
- instinct.
 - biological clocks.
 - internal time zones.
 - seasonal eras.
 - I don't know
85. The slow replacement of one group of organisms by another is called:
- ecological change.
 - succession.
 - biological replacement.
 - evolution.
 - I don't know
86. The first organisms to appear during this slow replacement are called:
- pioneers.
 - frontrunners.
 - shrubby.
 - mosses.
 - I don't know

87. Lichens are:
- a. small wild flowers.
 - b. able to live on rocks.
 - c. a delicacy in Russia.
 - d. able to survive very wet conditions.
 - e. I don't know
88. The organisms and physical environment that last for many years are called:
- a. long lasting systems.
 - b. climax systems.
 - c. ancient systems.
 - d. efficient systems.
 - e. I don't know
89. A sequoia is:
- a. the scientific name for sunflowers.
 - b. a redwood tree.
 - c. a type of bacteria.
 - d. a form of vegetation that no longer exists.
 - e. I don't know

Appendix C

Cloze Group Reinforcement Exercises

Directions: Read the entire passage silently first. Then reread the passage writing in the words you think fit in the blanks.

Many species of organisms are in danger of becoming extinct.

Their future may be in jeopardy if we fail to learn about the _____ that exist in the biosphere. These interactions may involve members of a single _____. These _____ may also be among different organisms and between _____ and their physical environment. The study of these interactions is called _____.

Until now, you may have thought that populations were made up only of _____. However, all the organisms of one kind found in an area make up a _____.

Most of the earth is _____ by a large number of different populations. To find out the size of a particular population, scientists take a _____. There is one method scientists use to estimate the size of a _____ population. It is called a _____ method. For example, deer from the mixed herd are _____ caught and marked. Through a series of equations, scientists can estimate the population size.

Directions: Read the entire passage silently first. Then, reread the passage writing in the words you think fit in the blanks.

The three things that affect population size are births, deaths and movement of organisms into and out of an area. The last item is called _____. When a population is not changing in size, it is in _____. This happens when births, deaths, and dispersal balance one another.

Any area can only support a certain number of individuals. This is known as its carrying _____. The carrying capacity of an area can be _____. For example, a fisherman may _____ a lake with more fish than the lake can feed.

The total weight of a population is called its _____. In addition to knowing the numbers and weight of a population, it is good to know how much food _____ it has. Scientists have to _____ the food energy in a field mathematically. This energy is measured in _____.

Any population has a potential for increasing its size. This is called _____ potential. Many factors prevent a population from growing. Such factors are known as e _____ r _____. A high _____ would increase a population's size. A lack of food or spraying weeds with a _____ are examples of environmental resistance, that decrease population size. In nature population sizes _____ a balance between biotic potential and environmental resistance.

Directions: Read the entire passage silently first. Then reread the passage writing in the words you think fit in the blank.

Various kinds of environmental pollution increases environmental resistance to various organisms. When such a factor limits the size of a population, it is called a _____. Too much or too little of something might serve as limiting factors. For example, a grass-water mixture contains several populations of _____. By adding pollutants to the environment the population may increase or decrease. Some people might be able to _____ what would happen.

No individual organism can live entirely alone. Every organism has interactions with other organisms and the physical environment. For example, shrubs _____ for water in the desert. Ants in a colony _____ in gathering food.

Many animals establish territories within which they live. Scientists will map out an animal's territory in order to study the t_____ r_____ of the animal. The map is drawn on graph paper which has a _____ axis that goes from left to right and a _____ axis that goes up and down. Once the territories are plotted one can see which territories are _____ to one another and which are far apart.

Directions: Read the entire passage silently first. Then reread the passage writing in the words you think fit in the blanks.

The interactions among food members of the same species and different species are equally important. _____ are made up of different species that have a feeding relationship. Plants produce their own food through the process of _____. Plants are _____ and the animals that eat the plants are _____. In addition, there are many animals that eat primary consumers. These are called _____. One can think of food chain being made up of producers, primary consumers and secondary consumers.

There are many animals that only eat plants. They are called v _____ or h _____. Animals that only eat other animals are _____. Those animals that eat both plants and animals are called _____. Those plants and animals that live on dead organisms are called s _____ or d _____.

A food chain is a simple series of links. Each link serves as food for the next link in the chain. A more _____ interaction, involves different but connected food chains. These make up a _____.

Directions: Read the passage silently first. Then reread the passage writing in the words you think fit in the blanks.

The word _____ refers to the type of environment in which an organism lives. Organisms and their physical environment are organized into _____. The non-living part of an ecosystem is the physical environment. The living part of an ecosystem is the physical environment. The living part is called the _____. It is made up of the plants and animals of the ecosystem. The physical environment includes the amount of light, soil type, _____ and so on.

For example, the inside of an acorn is an ecosystem. The biotic community consists of _____ and possibly some _____. The physical environment is dark, moist and acidic.

The community one lives in might be surrounded by one of the _____ ecosystems like the grasslands. One might also live in an _____ or city ecosystem.

Directions: Read the entire passage silently first. Then reread the passage writing in the words you think fit in the blanks.

There are several natural ecosystems. Some like the desert receive very little _____ while others, like a rain forest are very wet during certain seasons. The woodland trees that lose their leaves in the fall are known as a _____ forest. This area has cold, snowy winters and hot, humid summers. A _____ forest is usually made up of evergreen trees and is in an area that has heavy snows and cool summers. A cold, windy, dry region located far to the north or south is called a _____. An open forest of low trees that is dry and mild is known as a _____ woodland. A _____ is noted for being seasonally dry, mild, and having coastal brushland.

In each of the above ecosystems, the plants and animals have _____. These are special structures or behaviors that permit them to survive. For example, during hard winters some animals _____ or become inactive.

Very often the vegetation of a large ecosystem is _____ or the same in appearance.

Directions: Read the entire passage silently. Then reread the passage writing in the words you think fit in the blank.

Each kind of organism in any ecosystem exhibits distinctive physical structures, behavior and interactions. These make up what is called its _____. It is the organism's way of life.

Spiders and their ecological niches are readily available for study. All spiders are carnivorous but they obtain food differently. For example, some weave webs that snare insects, while others are _____ hiding in the flowers to grab their victims. The _____ of a web may feed in _____ away from other organisms. Many spiders are _____, so they are located most easily at night. An _____ of spider behavior will yield some interesting information.

Plants can become widely distributed in many ecosystems. This occurs due to various methods of dispersal. Ferns, mushrooms and mosses disperse with seed-like but microscopic _____. Plants are also dispersed by the wind and birds.

Directions: Read the entire passage silently. Then reread the passage writing in the words you think fit in the blank.

When our ancestors began building cities in North America, large natural ecosystems were destroyed. Many plants and _____ were eliminated. New species, many from the Old World, filled in the empty places. The ring-necked pheasant from China is an example of an _____.

An organism's activity is related to the time of day. This sense of time is called a _____. People are not too aware of this until they begin to travel across many time zones.

Ecosystems can change. There may be a gradual replacement of one group of organisms by another and this is called _____. The first organisms to appear in succession are called _____. Those that survive are hardy just as human pioneers on the American frontier had to be. The first pioneers on rock are often _____. This organism actually changes the physical environment on a rock. Succession seems to end with an ecosystem that maintains itself for many years. It is called a _____ ecosystem. It will maintain itself as long as the climate remains the same. For many years, it was thought that the giant _____ in California were a climax ecosystem. Recently, it was discovered that these giant trees are actually a stage in succession.