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Study of vocabulary teaching strategies of the BSCS green version textbook

Lynn Calvin Rettig

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A STUDY OF VOCABULARY TEACHING
STRATEGIES OF THE BSCS
GREEN VERSION TEXTBOOK

by
Lynn Calvin Rettig

A RESEARCH PAPER
SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS IN EDUCATION
(READING SPECIALIST)
AT CARDINAL STRITCH COLLEGE
Milwaukee, Wisconsin
1974
This research paper has been approved for the Graduate Committee of Cardinal Stritch College by

Sister Maria Colette (Advisor)

Date September 20, 1973
ACKNOWLEDGMENTS

The writer wishes to express his gratitude to the participants who made this survey possible.

Sincere appreciation is extended to Sister Marie Colette, O.S.F., for her guidance and encouragement.
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CHAPTER I

NATURE OF THE PROBLEM

Introduction

Technical vocabulary has long been a stumbling block in the comprehension of content subjects.

Each subject has its own language, its own technical vocabulary. To study the subject, students must know the language which serves as the basis for communicating ideas within that subject. They do not develop an understanding of this vocabulary by chance, but only by design.¹

The responsibility of the content teacher is "to improve his students' communication in the subject, and to help them read the source materials successfully."²

It is the writer's opinion that in many biology classrooms the teacher fails to place the correct emphasis on the teaching of the technical vocabulary of the BSCS Green Biology³ textbook.

²Ibid., p. 56.
Statement of the Problem

The purpose of this study was to identify selected teaching strategies of the teaching of the BSCS Green Version High School Biology textbook that impairs the comprehension of the teaching of technical vocabulary. In conjunction with the study, exercises and supplementary material have been developed by the writer to help transcend this vocabulary difficulty.

Scope and Limitations

The study included one hundred randomly selected high schools in Wisconsin that have adopted the BSCS Green Version textbook for use in their biology classes. The schools surveyed included all sizes and were both public and private institutions. The study was limited to the BSCS Green Version textbook because of its popularity in the state of Wisconsin and its unusual treatment of the technical vocabulary.

Significance of the Study

It was the purpose of this study to provide classroom teachers of biology who use the BSCS Green Version textbook with supplementary technical vocabulary and teaching methods that will provide better instruction for the students.
Definition of Terms


Technical vocabulary--consists chiefly of those words that a student would be unlikely to use in his lay conversation, but would need to use if he were to understand or discuss the topics under consideration.¹

Nontechnical vocabulary--consists of those terms that are used in lay conversation.²

Summary

The problem has been stated as identifying selected teaching strategies of the BSCS Green Version textbook. The scope of one hundred Wisconsin schools and single textbook limitation presented. The significance was presented and the important terms were defined.


²Ibid., p. 290.
CHAPTER II

REVIEW OF LITERATURE

BSCS Green

The writer chose the BSCS Green because of its popularity in Wisconsin and the ecological approach used by the textbook. The writer believes that this is the biology of the future and will become a leading textbook in both biology and ecology classrooms.

The BSCS biology program began in 1959 through National Foundation grants at the University of Colorado, Boulder. Professor Bently Glass, chairman of the steering committee, defined the goals of the BSCS study.

The aim of the Biological Sciences Curriculum Study is to place biological knowledge in its fullest modern perspective. If we are successful, students of the new biology should acquire not only an intellectual and esthetic appreciation for the complexities of living things and their interrelationships in nature, but also for the ways in which new knowledge is gained and tested, old errors eliminated, and an ever closer approximation to truth attained.¹

In 1960 a writing conference produced three versions of the BSCS biology program.

Each version embodied a different basic approach to biological science. The green version is ecological and evolutionary in outlook. The emphasis of the blue version is physiological and molecular; and the yellow version presentation is along cellular lines. The facts are made more meaningful in all three versions because they are organized around great biological themes. The relationships and interdependencies of concepts are stressed. Subject-matter emphasis is removed from organs and tissues of plants and animals to molecular, cellular and ecological biology.¹

From this conference the BSCS program has spread in popularity throughout the United States. It has been estimated that over two hundred public and private schools have adopted the BSCS Green in the state of Wisconsin.

Reaction to the new system has continued to surface since its infancy in 1960. The program that the writer has chose, BSCS Green, has drawn much interest because of the rising interest in ecology. A 1971 sample survey conducted in New York, New Jersey, Pennsylvania, and Maryland shows that "Forty percent of the respondents planned a new course in 'Environmental Science'."² Analysis of the data showed that "71 percent study ecology in tenth-grade biology."³

¹Ibid., p. 193.
³Ibid., p. 3.
Student and teacher reaction has shown a positive interest in the BSCS Green program. An example of such reaction is a progress report from Thibodaux High School, Thibodaux, Louisiana.

It was the consensus of students that BSCS biology is different from anything they encountered before, they enjoyed it and found it very interesting. The writer has found BSCS biology to be more demanding on the teacher, but the rewards seem to be greater and therefore the extra effort put forth is certainly not in vain.¹

Other reaction can be best expressed by the following summarization by Hutto in School Science and Mathematics.

The BSCS approach is not what the student expects biology to be. It destroys the myth that the textbook is an infallible authority. It emphasizes that scientific knowledge is constantly changing and what today is regarded as sound information, perhaps even fact, may tomorrow be simply a discarded theory.²

The conclusion can than be made that the educational science community has accepted the BSCS program as the new biology. Because of this acceptance, emphasis must be placed upon the student's understanding of the vocabulary material of the BSCS series.


Technical Vocabulary

Science is regarded as a technical subject. There are many concepts to be learned and they must be expressed by using words which are pertinent. These words are often new to the student and have little relationship to his past experience.¹

A student's ability to read may be affected by the presence of technical words within a given reading assignment. The classification of science as a technical subject should call the instructor's attention to the special needs and instructional skills that must be met in order that a student will develop the understanding needed to master the reading material of science.

Other reading experts have noted the difficulty and the importance of technical vocabulary that is a part of the new science.

The reading task of the new science programs assumes a much different function than the casual, noninvolved reading formerly done by the student. He must become highly proficient in his reading in a program where detail is important and missed directions mean that he will not be able to perform the experiment—or that he must start over because he has misread materials.²

The concept of technical vocabulary and special reading skills is not a new concept. Cole wrote The Teacher's


Handbook of Technical Vocabulary in 1940. The purpose of the book was "to suggest to teachers that they use the lists of terms presented later as nuclei around which to organize their teaching". In Chapter V, The Relationship of Technical to General Vocabulary, the author states,

Arithmetic and geography receive the greatest help from general reading matter. Chemistry, biology, hygiene, and physics, and foreign language obtain the least. The less support a subject receives outside of its textbooks, the more care must be taken by the teacher to make sure that the special terms are adequately explained and learned.

It appears to the writer that the problem of technical vocabulary has been recognized by educators. A new problem appears to be one of what design or method of instruction is to be used so that instruction can best master the technical vocabulary within a given science or reading assignment. The present trend in today's education is to teach reading within the content field.

Reading Instruction in Content Fields

Although content teaching of reading is not a new concept in education, school systems have been slow to adopt content reading programs. Experts in both the fields of science and reading have recognized the importance of content reading instruction and these people have made their convictions known.


2 Ibid., p. 23.
The cliché "Every teacher a teacher of reading" is appropriately applied to the teacher of the new science programs. But rarely has a teacher of the content areas had such an exhilarating springboard for enriching the reading program.¹

Attention of science teachers has now been focused upon the problem of science reading content materials. Ferguson, University of Chicago Laboratory High School, sums up the discoveries being made by the teachers of science.

I was puzzled for some time by the inability of some students—especially those who apparently had otherwise good minds—to exhibit an understanding of science, either on examinations or in class discussion. I finally concluded that the major problem was the failure of the students to absorb what they had allegedly read, since the main tool students use in learning is reading.²

Such discoveries have been invaluable to bring about an awareness of the problem of content teaching of reading, especially vocabulary. In the educator's search for content understanding, vocabulary appears to be the logical place to put the initial emphasis on the classroom teacher.

Vocabulary development in a content area is functional. Specific vocabulary is studied for the purpose of improving communication and understanding of specific concepts.³

The basic reading skill needed here would relate directly to the vocabulary of science. An adequate background in scientific vocabulary as well as precision in the use of such terms are both requirements to be met if


³Herber, Teaching Reading, p. 154.
the student is to state his problem with accuracy and definiteness.¹

There appears to be some confusion as to the background vocabulary and vocabulary that is new to a student. Many feel that a student should be equipped with a certain working vocabulary when he enters a content course. Some teachers are of the opinion that a modern student has an increased vocabulary as a result of the students' exposure to mass media and communication.

The broadening of a students' experiences through television and other media of communication have no doubt increased the apperceptive mass of contemporary students, so that the appropriate vocabulary load today is probably greater than two decades ago. Nevertheless, extreme caution should be taken in "piling it on" merely to "raise standards". It is quite possible to confuse the modern child who has a high level of sophistication or an adolescent who has a more mature intelligence with a vocabulary that is presented "for its own sake". The average child of today cannot lift a greater load or carry it further up hill than a child of twenty years ago. He merely starts the journey from a higher altitude.²

The understanding by the instructor of a student's vocabulary power is the first step that must be taken if the needs of a student in a content subject are to be met. Continuation of vocabulary instruction, especially technical vocabulary, by the content teacher is the positive way of insuring a students' success in the content subject.

¹Shepherd, "Reading and Science," p. 152.

The teacher's job is to convince students that they cannot consider the assignment completed until they have mastered the spelling, pronunciation, and meaning of the terms.1

Students should be encouraged to take an active part in the instruction of content vocabulary that they are receiving. They must have an understanding of the importance that a mastery of a content subject's language can mean to them educationally.

The problems of reading in the sciences require student-teacher teamwork is ascertaining the problems and then in developing procedures to contribute toward the solution of the problems. The problem of incorporating the reading skills into scientific methodology should be planned by the teacher and then with the students. Students can work toward the solving of many of their own problems if they are informed.2

Content teaching of reading has proven effective in all subject areas including biology. A study made at Nicolet High School, Milwaukee, Wisconsin, showed positive results at the conclusion of the one year experiment.

The control classes were at a complete loss in determining the meaning of new words not previously encountered in their reading. They had difficulty in being able to pronounce words and they could not intelligently determine the meanings of words. Members of the experimental class were able to attack the pronunciation of new words with much ease and fluency, and they were able to derive the meanings of words previously unknown to them because of their knowledge of the meanings of affixes and roots.3

1 Ferguson, "Teaching the Reading," p. 116.
Such success is not an accident. A content teacher is in the best position to help a student in the content area. The content teacher knows the vocabulary of his discipline and understands the importance of the mastery of the vocabulary.

Summary

Developed in 1960, BSCS Green has become a very popular biology textbook. Its success is attributed to its new approach and a theme based on ecology. The textbook has made a concentrated effort in its presentation of technical vocabulary.

Experts agree that biology contains a large amount of technical vocabulary. The understanding of biology is contingent upon the mastery of technical vocabulary. Educators have long been aware of the importance of technical vocabulary and new approaches are being developed for this mastery.

One educational design for the teaching of technical vocabulary is content field instruction. Research has shown that this approach has proven effective; thus continuation and expansion of content teaching of reading, especially vocabulary, should lead to the understanding of biology vocabulary by the student.
CHAPTER III

PROCEDURE

Introduction
The purpose of this study was to identify selected teaching strategies of the BSCS Green Version biology textbook. The writer chose the method of a survey questionnaire to identify such teaching strategies.

Procedure
The first step to conduct such a survey was to secure a random list of schools to which the questionnaire would be sent. The writer contacted Mr. J. W. Geniesse, consultant for the publisher of the BSCS Green Version textbook. Mr. Geniesse agreed to supply the list of schools in Wisconsin that had purchased the textbook through his company. After consultation with the writer, Mr. Geniesse listed the first one hundred schools in Wisconsin which had purchased the BSCS textbook. This list included public and private schools of all enrollment sizes.

The number of schools, one hundred, was chosen by the writer so that a valid sample would be taken, and the number would facilitate the computation of the statistical information.
The questionnaire\(^1\) was designed under the direction of the writer's advisor, Sister Marie Colette Roy, Chairman, Reading Department, Cardinal Stritch College, Milwaukee, Wisconsin. The questionnaire asked for a simple yes or no response for the convenience of the individuals who responded to the questionnaire and the writer in compiling the responses.

Two cover letters were constructed to accompany the questionnaires to the respective schools. The first letter\(^2\) was addressed to the school principal asking him to distribute the questionnaire to one of his biology teachers who uses the BSCS Green Version textbook. The rationale of including a letter to the school principal was to inform the principal of the survey, and to insure that the correct teacher would receive the questionnaire so that a good sampling could be achieved.

The second letter\(^3\) was attached to the questionnaire to explain the questionnaire's purpose to the responding instructor. Also enclosed was a postage paid envelope addressed to the writer for the convenience of responding to the questionnaire.

\(^1\)Appendix I. \\
\(^2\)Appendix II. \\
\(^3\)Appendix III.
The questionnaires were number-coded on the back to facilitate record-keeping of the returned questionnaires. Cards with corresponding numbers and the names and addresses of the schools surveyed were kept on file by the writer. When the responses were received the card was attached to the corresponding questionnaire. The questionnaire, enclosed letters and postage paid envelope were distributed by mail on March 30, 1973.

**Summary**

A questionnaire was designed to meet the purpose of this study. A random sample of one hundred schools in Wisconsin was selected to receive the questionnaire. The sample schools had all purchased the BSCS Green Version textbook through the consultant of the Rand McNally Company. Letters to both the school principal and BSCS instructor accompanied the questionnaire which was mailed on March 30, 1973.
CHAPTER IV

INTERPRETATION OF DATA

Introduction

The writer received responses from eighty-one of one hundred questionnaires that were sent to the selected schools in Wisconsin. The returns were placed into four categories for the purpose of interpretation. Three of the categories were compiled into tables for ease of interpretation and are discussed in detail in this chapter. The fourth category consisted of twelve returns from schools that no longer use the BSCS Green Version textbook in their respective schools.

BSCS Green Textbook Primary Source

Fifty-eight of the eighty-one responding schools use the BSCS Green as their primary source in their biology classrooms. The writer interprets a primary source as being the textbook from which a majority of the material is taken for a given course. Thirty-five of the fifty-eight responded that their students expressed difficulty with the BSCS Green Version textbook. The data from the thirty-five questionnaires was compiled into Table 1.
### TABLE 1
**BSCS GREEN TEXTBOOK PRIMARY SOURCE VOCABULARY DIFFICULTY EXPRESSED**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes</th>
<th>No</th>
<th>Other Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course taught in sequential order</td>
<td>17</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Chapter assigned before it is discussed</td>
<td>26</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Pre-teach vocabulary</td>
<td>10</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Supplementary vocabulary supplied</td>
<td>24</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Technical vocabulary notebooks</td>
<td>4</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Marginal vocabulary explanations helpful</td>
<td>30</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Marginal notes consistently explained</td>
<td>9</td>
<td>24</td>
<td>2</td>
</tr>
</tbody>
</table>

Sixty per cent (thirty-five) of the responding schools who use the BSCS Green as a primary classroom source expressed that their students had difficulty with the textbook's vocabulary. Of these thirty-five, eighteen stated that they did not teach the course in sequential order. The accompanying teacher's manual for the BSCS Green Version textbook states,

The student's book has been organized so that vocabulary and concepts are sequential and accumulative. Full advantage can be taken of this only if the chapters are studied consecutively. Further, if this is done, the teacher is freed from problems of extemporaneous course design—which is expensive of time and which, like all
extemporaneous art, has a low probability of success even though the occasional success may be brilliant.¹

It appears to the writer that some of the vocabulary difficulty could be overcome by the teaching of the course in sequential order.

Twenty-six of thirty-five responses stated that they assigned a chapter to be read by their students before it was discussed by the instructor. Corresponding with this response only ten of thirty-five pre-teach vocabulary to their students. The writer suggests that the absence of pre-discussion and pre-teaching of vocabulary and concepts may tend to compound the vocabulary difficulty of the students.

While twenty-four of the thirty-five teachers responding stated that they provide supplementary vocabulary materials, only four of thirty-five require their students to keep a technical vocabulary notebook. The writer believes that a supplementary vocabulary notebook would be advantageous to the students in their understanding of the vocabulary of the BSCS Green Version textbook.

Thirty of the thirty-five thought that the marginal vocabulary explanations were helpful, but only nine of the thirty-five consistently explained the marginal notes to their students.

"Other responses" that appear in Table 1 were responses where the instructor stated that "sometime" or "occasionally" would be a more accurate response to the question than "yes" or "no".

Several of the responding instructors volunteered additional comments concerning the vocabulary of the BSCS Green Version textbook. Concerning vocabulary, one instructor stated that he found the lack of vocabulary tests supplied by the textbook publisher was a disadvantage in the classroom. Other instructors commented that because of the difficulty of the textbook, supplementary textbooks were used to help the students.

Twenty-three of the fifty-eight teachers who use the BSCS Green Version textbook as a primary classroom source expressed that their students had no difficulty with the book's vocabulary. The data from the twenty-three questionnaires are compiled in Table 2.
The writer was surprised to find that the responses in Table 2 do not differ greatly from the responses in Table 1. Only nine of twenty-three teach their courses in sequential order.

**TABLE 2**

BSCS GREEN TEXTBOOK PRIMARY SOURCE NO VOCABULARY DIFFICULTY EXPRESSED

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes</th>
<th>No</th>
<th>Other Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course taught in sequential order</td>
<td>9</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Chapter assigned before it is discussed</td>
<td>16</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Pre-teach vocabulary</td>
<td>3</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Supplementary vocabulary supplied</td>
<td>15</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Technical vocabulary explanations helpful</td>
<td>6</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Marginal vocabulary explanations helpful</td>
<td>20</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Marginal notes consistently explained</td>
<td>6</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Although only three of twenty-three pre-teach vocabulary and sixteen of twenty-three assign a chapter before it is discussed, fifteen of twenty-three supply their students with supplementary vocabulary material. Additional comments volunteered by the instructors stated that many of them supplied a great deal of supplementary vocabulary materials.
Technical vocabulary notebooks were required by only six of the twenty-three responders. Although twenty of twenty-three believed the marginal vocabulary aids helpful, only six consistently explained the marginal notes to their students.

"Other responses" were statements indicating that "sometime" or "occasionally" would be a more accurate response than "yes" or "no".

The writer notes that the pattern of answers reported in both Table 1 and Table 2 is very similar. There does not appear to be any significant difference in teaching strategies used by instructors (of students) who express students' difficulty with the vocabulary of the BSCS Green textbook and the teaching strategies used by instructors who state that their students have no vocabulary difficulty with the BSCS Green textbook.

**BSCS Green Textbook Supplementary Source**

The writer received eleven responses from instructors who stated that they use the BSCS Green textbook as a supplementary source in their classrooms. The data from the eleven questionnaires are compiled in Table 3.

Because of the use of the BSCS Green as a supplementary source the writer changed item one in Table 3 from course taught in sequential order to, "Do your students express difficulty with the vocabulary in the BSCS Green textbook?"
TABLE 3
BSCS GREEN TEXTBOOK SUPPLEMENTARY SOURCE

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes</th>
<th>NO</th>
<th>Other Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary difficulty expressed</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chapter assigned before it is discussed</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Pre-teach vocabulary</td>
<td>2</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Supplementary vocabulary supplied</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Technical vocabulary notebooks</td>
<td>3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Marginal vocabulary explanations helpful</td>
<td>10</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Marginal notes consistently explained</td>
<td>1</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

Vocabulary difficulty was expressed in seven of eleven responding questionnaires. This could be a possible cause for the textbook's use as a supplementary source.

Eight of the eleven instructors assign chapters before they are discussed and only two of the eleven pre-teach vocabulary. Five supply supplementary vocabulary while only three require their students to keep technical vocabulary notebooks. Although ten of eleven thought the marginal vocabulary was helpful to their students only two consistently explained the marginal notes to their students. Other responses fell into the "sometime" or "occasionally" category.
Summary

The writer categorized the eighty-one of one hundred responses received into four categories. The first category contained thirty-five responses which indicated that their students expressed difficulty with the BSCS Green textbook vocabulary. The second category consisted of twenty-three responses which indicated that their students did not express any vocabulary difficulty of the textbook. Both of the first two categories contained data from instructors who use the BSCS Green Version textbook as a primary classroom source. The third category consisted of eleven responses which indicated that they use the BSCS Green Version textbook as a supplementary classroom source. The data from the first three categories was compiled and placed in Tables 1, 2, and 3 and was then interpreted by the writer.

The fourth category consisted of twelve responses which indicated that they no longer use the BSCS Green Version textbook in their respective schools. Because the data from this category were not applicable for interpretation, the category was not put into Table form.
CHAPTER V

SUMMARY

Conclusions

Seventy-one per cent, (58 of 81), responding schools use the BSCS Green Version textbook as the primary source in their respective classrooms. Thirty-five of the 58, (sixty per cent), expressed that their students had difficulty with the vocabulary of the BSCS Green Version textbook. Forty per cent, (23 of 58), schools expressed no student difficulty with the textbook as a primary source.

Little difference in responses between the group that expressed vocabulary difficulty and the group that did not express vocabulary difficulty was noted by the writer.

Because sixty per cent of the teachers who use BSCS Green Version textbook as a primary classroom source express textbook vocabulary difficulty, the writer suggests that the instructors teach the course in sequential order as suggested in the accompanying teacher's guide of the BSCS Green Version textbook.

The writer suggests that the supplementary vocabulary materials be put in the organized form of a student technical
vocabulary notebook. Corresponding with the technical vocabulary notebook, the writer suggests that pre-teaching of vocabulary and pre-discussion of chapters before the student is assigned the reading material would help clarify the vocabulary for the students. The writer has provided a sample content list for a technical vocabulary notebook.¹

Eighty-six per cent, (50 of 58), responses from teachers who use the textbook as a primary source indicated that they felt the marginal vocabulary notes were helpful to the students. Only twenty-six per cent, (15 of 58), primary source users consistently explain the marginal notes to their students. The writer suggests that if the marginal notes are considered helpful to the students, the instructor should consistently explain the marginal notes to their students.

Thirteen per cent, (11 of 81), responding schools use the BSCS Green Version textbook as a supplementary classroom source. The writer suggests that this group should consider the recommendations concerning vocabulary as suggested to the primary source instructors. The one exception would be the teaching of the textbook in sequential order, because this does not apply when the BSCS Green Version is used as a supplementary source.

¹Appendix IV.
Suggestions for Future Research

The writer suggests that future research center around the use of a control and an experimental group. The experimental group would be subjected to the teaching strategies and suggestions the writer has concluded from the questionnaire survey. The control group's instruction would be in accord with the norm of instruction as identified by the questionnaire.

In future questionnaire surveys concerning instructional strategies, the writer suggests that the ability grouping of the respondent's students be identified. This variable was not included in this research project and the writer is of the opinion that such information might have helped explain why the same basic teaching strategies result in vocabulary difficulty in some classrooms and no vocabulary difficulty in other classrooms.

One instructor responded that many of the questions of the survey should be asked of a random sample of students who use the BSCS Green Version textbook. This is a valid suggestion for future research.

It is the opinion of the writer that the return of eighty-one per cent has a direct relationship to the addressing the questionnaire personally to the principal of the selected schools. This practice insured that the correct instructor received the questionnaire. It is suggested that this method be used by future researchers using the survey questionnaire method. The writer acquired the list of school principal names from his school principal.
Summary

Conclusions and suggestions were made by the writer. The writer hopes that his information will have a positive influence on the teaching of vocabulary in biology classrooms, and that interest has been stimulated for future research in this area.
BIBLIOGRAPHY

Books


Articles and Periodicals


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QUESTIONNAIRE

1. Is the BSCS Green textbook used as the primary textbook source in your biology class? Yes ___ No ___

2. If it is not the primary source, please explain the use of the BSCS Green textbook.

3. Do your students express any difficulty with the vocabulary of the BSCS Green Version textbook? Yes ___ No ___

4. Do you teach the course in sequential order of the textbook (chapter 1, 2, 3, etc.)? Yes ___ No ___

5. Are students assigned a chapter to read before the chapter is discussed? Yes ___ No ___

6. Do you pre-teach vocabulary before a unit of chapter is taught? Yes ___ No ___

7. Do you supply any supplementary vocabulary materials for your students? Yes ___ No ___

8. Do you require the students to keep a technical vocabulary notebook? Yes ___ No ___

9. Do you think the marginal vocabulary explanations are helpful to your students? Yes ___ No ___

10. Do you consistently explain the marginal vocabulary notes to your students? Yes ___ No ___

Your contribution will help me make a valid study of the BSCS Green Version textbook and vocabulary. Thank you very much for your time and consideration.
Sir:

Would you please pass the enclosed questionnaire to one of your biology teachers who is using the BSCS Green textbook.

Thank you for your time and consideration.

Sincerely yours,

Lynn C. Rettig
APPENDIX III
March 30, 1973

Sir:

Just what you needed. Another questionnaire ...@#$%. Now that we have established the norm of communication concerning questionnaires I would like to explain my motives.

I am doing a research paper for my M.A. degree at Cardinal Stritch College, Milwaukee, on the technical and non-technical vocabulary of the BSCS Green biology textbook. In order that I may understand the use of this textbook I need information from teachers like yourself.

As you examine the questions you will find that the ask for simple responses concerning your methods of using the textbook. I hope that the results of the questionnaire will help me in establishing supplementary materials for classroom use.

If you participate in this project I would be pleased to share the results of the questionnaire and the materials that will be developed as a result of this project,

Sincerely,

Lynn C. Rettig

I appreciate your cooperation in helping Mr. Rettig gather his data.

Sincerely yours,

Sister Marie Collette Ray
Chairman, Reading Department
Cardinal Stritch College
APPENDIX IV
SAMPLE CONTENT LIST FOR A TECHNICAL VOCABULARY NOTEBOOK

The writer offers this appendix as suggested contents for a technical and supplementary vocabulary student notebook. The organization of such a notebook will be contingent upon the individual classroom, but the writer believes that it would be advantageous for the individual instructor to include the suggested contents.

Word Attack Unit

This unit should contain explanations and exercises for the students use of word attack skills, listings of prefixes, suffixes, and roots that are common to scientific language. The prefixes should include prefixes that denote number, quantity, size, direction, and general use. The suffixes should include those that are noun forming, verb forming, and adjective forming. Roots that are common to scientific language are measurement, chemistry, electricity, light, sound, heat, and energy and should also be included.

Chapter Units

Each chapter unit should contain vocabulary pre-tests and post-tests and marginal vocabulary note explanation and a cross-chapter reference of previously used vocabulary.
This is especially important when the textbook is not taught in sequential order. Other inclusions should be at least one non-graded fun exercise per chapter unit such as word scramble, crossword puzzles, and review exercises to help the students' vocabulary retention and word attack skills.