

**A SELF IMPROVEMENT SHEET FOR BIOLOGY
TEACHERS
IN THE
SECONDARY SCHOOLS**

by

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Chapter I

I. INTRODUCTION

A. A general statement concerning the study

In the field of education the concept of teaching is changing. Burton tells us that teaching is stimulation, direction, or, the encouragement of learning. "It is setting the stage upon which learning is to take place; it is giving opportunity for learning to arise. It is the guidance of such spontaneous learning as appears in the natural activities of children or older students. It includes all the activities performed in the furtherance of learning."¹ In exact opposition to this view of some educators, according to Burton, that the teacher "stimulates, guides, and directs learning," is the view of the optimist or the extremist. The optimist is an advocator of liberality in education, or, in other words, he believes in allowing the child to do as he or she pleases with no aid from a teacher.² This latter view is a bit too radical; even though one wants liberality in education, it is sought through the guidance of the teacher.

Specifically, this study is an attempt to improve the teacher activity, and, thereby, stimulate the learning activity. In an effort to assist the teacher in finding where she has fallen short, the writer has compiled

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1. William H. Burton, The Nature and Direction of Learning.
 1. Cornell (New York: D. Appleton & Co., 1920), p. 56.
 2. Loc. cit. p. 56.

a list of important factors which she thinks should enter into the success of the biology teacher. The content of this list was collected from about one hundred sixty-three sources, consisting of the best and most widely used books and periodicals relating to biology and the teaching of it. The writer has also attempted to evaluate the items that are most likely to determine whether one is or is not a good biology teacher by the method of massed opinion, using as the device the questionnaire. Herein it is the plan of the writer to lay a foundation that will aid every teacher of biology to improve herself or himself, and at the same time, provide her or him with a uniform method of self-rating.

B. A brief history of self-supervisory activities

"Supervision has to do with the improvement of the teaching act, the selection and organization of subject matter, testing, measuring, and the improvement of teachers in service."¹ On the one hand we have the ancient type of supervision, long out-dated, in which a supervisor was a "snooper-visor," who went about checking techniques and standardizing progress, rather than assisting and aiding the teachers to realize their own possibilities, and making for ultimate improvement in service. Cornelia Adair probably shows us better than any one else how supervision has risen from inspection to dictation, and now our most modern type of

1. Cornelia S. Adair, "What Teachers Want in Supervision." N.E.A. Proceedings. (1928) p. 733.

supervision in which we seek to inspire leadership.

The value of the proper kind of supervision is recognized without a doubt. A.S.Barr points out this fact in his Introduction to Scientific Supervision.¹ He believes that the ultimate aim or purpose of all supervision is to improve the products of learning. He proves, rather conclusively, that the best type of supervision is scientific supervision compatible with cooperative, democratic, and creative supervision. The latter are compatible with self-supervision, and may be obtained through self-supervision and analysis. This type of supervision will lead to the self-improvement of the teacher, which in turn will initiate learning in the pupils through their activities, and the old type supervisor will become an advisor. Probably the greatest value to be derived from self-supervision or self-analysis is that it will make the teacher more efficient, and is also a means of improving her teaching.

The history of self-improvement sheets is a comparatively short one. "The first practical application of the principle of self-analysis and self-improvement probably originated with Carl Franzen of Indiana University."² The first account of such an improvement sheet states that: "When satisfactory Improvement Sheets have been worked out in each

1. A.S.Barr, An Introduction to Scientific Supervision. (New York : D.Appleton & Co., 1931) pp. 17-21.

2. Harold Bright, "The Place of Self-Evaluation, Self-Analysis, and Self-Improvement in the Teacher Training Program." Educational Administration and Supervision. (Maryland: Warwick and York, Inc., 1937) Vol. XXIII. Nov. 1937. pp. 563-564.

system, the busy principal (or the supervisor) has truly accomplished the task of supervision, for under his sympathetic guidance and counsel, his teachers have become supervisors of themselves."¹ Franzen has also made an improvement sheet in algebra. He points out, "The idea of the improvement sheet is that it may serve as a self-checking device for the teacher, or, as a basis for observation by the supervisor."² Franzen divided his sheet into two distinct divisions which embraced teacher activity versus pupil activity. His analysis sheet was of such a nature that each question could be answered by yes or no. In order to improve his study Franzen asked for suggestions. Thus, he realized that his was not the perfect improvement sheet.

W.T. Melchior, professor of educational supervision at Syracuse University in Syracuse, New York, made the next notable advance along the lines of self-supervision. He presented his argument in a very dynamic paper to the National Education Association in 1934. He advocated that a self-supervisory sheet would liberate teachers, and would aid each one to become efficient in self-analysis, and also in self-criticism and self-supervision. He says, "A practical

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1. Carl Franzen, "Plans for the Supervision of High School Teaching by the Busy Principal." Bulletin : School of Education of Indiana University. Vol. 3, Nov. 1926. p. 16.
 2. Carl Franzen, "Improvement Sheet for Algebra." School, Science, and Mathematics. Dec. 1932. p. 93.

way out is to substitute self-supervision for at least certain types of supervision."¹

J.R.Shannon, Indiana State Teachers College, has followed closely in the steps of Franzen. He has written several such sheets in various fields which have not been published. The only published self-analysis sheet that he has made is one in the field of geography. Shannon agrees with Melchior, "The principal value of the self-supervising sheet is to make the teacher more circumspect in her own teaching."²

As far as the writer knows, no similar sheet has been made in the field of biology, and, realizing the need for such a sheet, has endeavored to compile a self-improvement sheet in biology teaching in the secondary schools.

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1. William T. Melchior, "Self-Supervision By Teachers - A Practical Way Out." N.E.A. Proceedings. Vol. 72. February, 1934. p. 685.
 2. J.R.Shannon, "A Self-Analysis Sheet in Geography." Journal of Geography, December 1934. p. 346.

Chapter II

II. STATEMENT AND DEFINITION OF THE PROBLEM

A. The problem

This study was made to determine the relative importance of the various teaching procedures, methods, and techniques, to compile and evaluate these methods and techniques, and to discover in what way they relate to the success or failure of the teacher of biology in the secondary schools.

It is the purpose of the writer to formulate a device which will lessen the duties of the so-called "special" supervisor, and will make the teacher more critical of her own teaching procedures.

B. Justification of the problem

A cursory examination of conditions in the field of biology, in fact, all natural sciences, has revealed the fact that something needs to be done, and done immediately. The probable cause of the inadequacy in the field may be one of several: "The objectives are not clear; the principles of selection and organization of materials, and activities for the different courses and grades are not well-established; the sequence of courses is not agreed upon, and not conformed to by objective evidence; the teaching techniques employed still emphasize the storage conception of education; true learning activities are not provided adequately for the pupils."¹

1. Willis Uhl, Supervision of Secondary School Subjects. (New York: D. Appleton & Co., 1929) p. 40.

Since these things are true, the writer believes that every teacher, if provided with some form of self-checking device that was reliable, would be able to realize her own shortcomings and try to correct them in her teaching. It was with this in mind that the writer decided to compile such a sheet for the improvement of biology teaching.

True evidence that the writer has been justified in making a study of this kind may be noted in the following two letters which were received by the writer in the course of developement of this study:

In Indiana at the present time, biology in our high schools is being neglected. For five years I have observed that the subject has been turned entirely over to the vocational agriculture teachers. These men are not interested in the subject, most of that frankly admitting that they do not like to teach it, and the majority of them do not have enough term hours to secure a license; they are teaching on permits.

Indiana State Teachers College and Indiana University send out each year well trained biology teachers who seldom have the opportunity to teach their subject. Either the agriculture teacher or the home economics teacher teaches the subject under protest. This seems regrettable to me.

Sincerely,

.....

The exerpt of another letter says:

Practically all of the points listed are of major importance. Our present difficulties are, (a) being forced to teach a uniform course of study; (b) not getting pupils in

academic and commercial subjects, the latter being high grade here; (c) pupils of the city not being familiar with the common life about them.

These are only two people's views, but they can probably be made applicable to other situations with but little modification.

Chapter III

III. METHOD OF PROCEDURE

A. Formation of a self-rating device

In formulating a self-rating device for the improvement of biology teachers, it was decided that probably the best method or technique was to use massed opinion.

The teachers of biology, to become more efficient, and we shall go on the basic assumption that they are all desirous of the utmost in efficiency, must be able first to realize wherein they are falling short, and second, proceed to do something about it.

Practically all of the authorities in the field of the biological sciences are agreed that there are a number of failures in the teaching of this subject, and that these, probably, are due to indefinite objectives, poor organization of subject matter, and the failure to utilize various teaching devices.

The writer has attempted to compile a list of these important factors, and also to evaluate their relative importance. It is believed and hoped that such a list will improve teachers in the service.

1. Compilation of data

Owing to the fact that there was no objective method by which one could compile the items of this list, the writer was forced to use either personal judgement or the judgement of others in her choice.

One hundred sixty-three of these references were of superior quality, and therefore were used in compiling the desirable teacher activities, believed to result in pupil activity, and consequently in teacher improvement.

According to W.W.Charters in his article, "Traits of Home-Makers,"¹ it was decided that fifty personal interviews were sufficient to compile the traits of a successful home-maker. On the basis of his assumptions, the writer feels justified in using one hundred sixty-three authors in compiling a list of the desirable teacher activities. These references may be found in the bibliography.

The writer, after carefully analysing the references, magazines, and current periodicals, compiled one hundred eight questions that she considered relative to the improvement of the teacher. Also six objectives were formulated. The objectives are chiefly the result of the writer's

United States: 400 May 1944 was increased to 400,000 lb.

opinion substantiated by various authors.

c. Organization of the improvement sheet

The original sheet contained one hundred eight items. Ten of these were concerned with the organization of the subject matter, twenty-one with the presentation of the subject matter, twelve with the motivation of the subject, twelve with field trips, ten with visual aids, nine with project teaching, seven with pupils' activities, fifteen with supplementary teaching aids, five with correlations with other subjects, and seven with tests and measures. Each of the items was made into a question that could be answered by yes or no. In every case the positive answer was the desirable one.

B. Evaluation of the items of the improvement sheet

The factors contributing to good teaching vary in their degree of importance. One of two techniques may secure the desired result, but one might be quite superior to the other, either in economy of time, interest of the pupils, or in the use of equipment. For this reason, it becomes necessary for the writer to evaluate the items in the improvement sheet in their relation to good teaching.

1. The questionnaire

The device used in this study for evaluating the items was the questionnaire. Five hundred questionnaires, containing the one hundred eight items, were sent out to the teachers of biology in the larger schools of Indiana and the United States; when this list was exhausted, the teachers in

the smaller schools were consulted. The reason such a difference was made was due largely to the fact that the writer has been led from observation to believe that the teachers in the larger schools, who teach the subject, would be better able to judge the items, mainly because of their wide experience, whereas, the inadequate facilities and heavy teaching loads of the teachers of smaller schools might tend to affect their opinions.

The questionnaire was accompanied by a letter signed by three members of the Indiana State Teachers College biology department. This letter explained the purpose of the questionnaire as well as rules for marking the items.

2. The actual questionnaire sent out in the study.

(See attached questionnaire on the following pages.)

INDIANA STATE TEACHERS COLLEGE

TERRE HAUTE, INDIANA

March 30, 1938

Dear Colleague:

Attached to this letter you will find a questionnaire, composed of what we think are the most important items related to the teaching of biology in the secondary schools. We are trying to compile a self-improvement sheet for teachers in the field of biology. The cooperation of the biology teachers in the secondary schools is being asked in this project.

We are requesting that you place your name at the head of the questionnaire in order that we may give credit where credit is due in writing up this little study. Attached to this letter you will find one hundred eight questions which relate to the various phases of the teaching of this subject. You are kindly requested to evaluate these items according to the key given below, and return to Ernestine Roberts, our secretary, at 1939 Spruce Street, Terre Haute, as soon as possible.

KEY TO MARKING

Please place at the left of each item the figure indicating to which class you consider it properly belongs:

Please mark all items you consider of maximum importance to the biology teacher with the figure one (1).

Please mark all items you consider of least importance to the biology teacher with the figure three (3).

All items which are left unmarked will be considered of average importance.

Your contribution will do much toward improving our biology teachers' techniques throughout the school system.

Very truly yours,

WILLIAM P. ALLYN, Professor of Zoology
FRED DONAGHY, Professor of Health
BENJAMIN SMITH, Professor of Botany

SELF IMPROVEMENT SHEET IN BIOLOGY TEACHING
IN THE
SECONDARY SCHOOLS

Objectives in Biology Teaching

- a. To bring about in the biology class a learning situation which is closely related to the pupils' welfare.
- b. To provide the pupils with the facilities to explore various fields in relation to vocational and occupational guidance.
- c. To aid the pupils in the understanding of the phenomena of their immediate environment and to develop the power of observation.
- d. To develop an interest in the plants and animals, and an appreciation of nature which will be enriched by the pupils' biological experience.
- e. To provide learning situations that will develop thinkers and a scientific attitude.
- f. To provide for some, a basis for a more comprehensive study of the biological sciences on the professional level.

ORGANIZATION OF SUBJECT-MATTER

1. Is the teacher's course well planned in advance?
2. Does she decide upon the minimum essentials for the year?
3. Does she know the source of all her materials, i.e., city library, school library, biology department, etc.?
4. Does she have a typewritten or mimeographed plan for the entire year?
5. Does she divide her minimum essentials into suitable units?
6. Does she know the pupils' background?
7. Does she organize the course around the pupils' environmental conditions of the community?
8. Does the teacher arrange her course by seasons?
9. Is sex education a part and a portion of the whole biological course?
10. Does the teacher arrange her course about the interest of the pupils?

PRESENTATION OF SUBJECT-MATTER

11. Does the teacher first remove all prejudices against her subject?
12. Does she give the pupils the fundamental principles common to all living things?
13. Does she begin teaching something well-liked by all, such as butterflies, plants, birds, etc.?
14. Is the biological subject-matter, and are the methods of teaching adapted to the capacity of the pupils?
15. Does the teacher begin each new unit or lesson with some challenging problem?
16. Does the teaching meet all of the health needs of the community?
17. Does the teacher place a special emphasis on the economic importance of the fauna and flora?
18. Are the lessons correlated with the occupational needs of the community?
19. Does the teacher teach along the lines of her pupils' interests?
20. Where the pupils' interests vary, does the teacher assign individual projects?
21. In the demonstration lesson does the teacher lead the pupils to definite conclusions by a series of well-worded questions?
22. Does the teacher make use of drawings on the board to illustrate ideas?
23. Does she make use of drills to instill principles and their application?
24. Does she have a varied knowledge of the plant and animal life to present to the pupils?
25. Is the subject-matter presented on the level with the learner?
26. Does the teacher avoid becoming monotonous and dull by not remaining on one subject too long?
27. In the lecture-demonstration-recitation does the teacher present her subject in such a way as to leave a permanent impression on the pupils?
28. Does she first present her topics as a whole, and then analyze them into their parts?
29. Does she systematize her knowledge, making clear all relationships of the part to the whole?
30. Does the teacher have a scientific approach?
31. Does she set up situations for questions as well as questioning?

MOTIVATION

32. Are the pupils allowed to follow up their own interest in the classroom and outside?
33. Can the teacher inculcate the desired interest in the beautification of the homes through her teaching?

34. Is pupil interest maintained and sustained throughout the class period?
35. Does the teacher have enthusiasm, interest, sincerity, and initiative in the subject?
36. Are the assignments varied from day to day in such a way that they arouse curiosity on the part of the learner?
37. Does the teacher exhibit the work of a better quality of her pupils?
38. Does the teacher make use of visual aids to motivate her work?
39. Does she activate interest on the part of the students by the organization of clubs and the making of scrapbooks, etc.?
40. Does the teacher encourage the students to collect specimens when they see them?
41. Does she give extra credit for collections which are brought in?
42. Are the pupils commended for successful attainments and effort?
43. Does the field trip activate the pupils?

FIELD TRIPS

44. On the field trip does the teacher have an orderly group?
45. Has she visited the place of the excursion prior to the trip?
46. Does she have the field trip well organized?
47. Does the field trip have a definite purpose?
48. Has the teacher found the problems for investigation?
49. Does the teacher leave each pupil as largely self-directive as possible?
50. Does each pupil have a definite thing or things to see while on the trip?
51. Does the teacher bring in material for future work?
52. Are the pupils acquainted with the fauna and flora of their locality?
53. Does the teacher collect quite a bit of her own material?
54. Does she show the pupils the source of her material?
55. Does she see that the material is sorted and labeled when they return from the trip?

VISUAL AIDS

56. Does the teacher use lantern slides to explain points which are not clear?
57. Does the teacher make use of the motion picture machine?
58. In the use of the motion picture machine, does the teacher give the child the proper mental set the day before?

59. Does the film appeal to the socially approved interests of the pupils?
60. Is the film one which will really attract attention?
61. Does the film create a problem in the observer that requires mental activity for solution?
62. Are still pictures used in connection with the stereopticon?
63. Are microscopes, hand-lenses, and binoculars used to study the most minute details?
64. Are the pupils held responsible for visual material that is shown?
65. Does the teacher use visual material only as a last resort, that is, only when living biological specimens are not available?

PROJECT TEACHING

66. Does the teacher encourage individual problems and projects?
67. In this problem solving does the problem or the project have a direct relation to the work of the classroom?
68. Is the project a purposeful, concrete problem, the solution of which is executed by the pupils?
69. Is the project a means of directing thinking of the individual?
70. Does the teacher guide direct the individual projects rather than assign projects of her own with hard and fast rules to go by?
71. Does the teacher develop a scientific attitude and scientific methods of thinking in her pupils?
72. From time to time, does the teacher place the completed projects on display?
73. Does the teacher include the project in the other work of the term in grading the pupil?
74. Does the project stimulate the child to thought along other lines?

PUPIL ACTIVITY

75. Do the pupils participate in the recitations, discussions, and demonstrations when the proper time arrives to do so?
76. Are the pupils allowed to display initiative through questioning and oral reports?
77. In the problem-solving method of teaching, do the pupils, themselves raise the problems?
78. Do the pupils select their own references to study?

79. Are the pupils encouraged to collect any other material that may be used later?
80. Does the teacher allow socialization of the recitation by allowing the pupils to lead in the discussions?
81. Do the pupils react favorably to tests, i.e., is pupil activity more pronounced after administering a test?

SUPPLEMENTARY TEACHING AIDS

82. Does the teacher present puzzles (preferably crossword puzzles) games and plays as a means of getting the lesson across?
83. Does the teacher make use of charts and graphs?
84. In the teaching of the geographical distribution of plant and animal life, does she use various maps?
85. Does her bulletin board contain authentic accounts of newspaper material?
86. Does she have exhibits of the life histories of harmful and helpful plants and animals?
87. Does she make use of diagrams, charts, graphs, and models to put her lesson across?
88. Does the teacher make use of the City Health Department, Water Supply, Dairy, etc., for trips?
89. Does the teacher make use of pamphlets from various manufacturing concerns, the Federal Government, State Board of Health, etc.?
90. Does the teacher encourage visits to the museum?
91. Does she make use of various references rather than to one or two?
92. Does the teacher maintain an aquarium, herbarium, and a terrarium?
93. Does the teacher encourage the attendance of lectures and the reading of outside books?
94. Does she give extra credit for the attendance of the outside lectures and the reading of books?
95. Does the teacher attempt to develop hobbies in the students by playing up the collective habit?
96. Does the teacher exchange specimens with other schools whose different location would result in the finding of different species of fauna and flora?

CORRELATION WITH OTHER SUBJECTS

97. Does the teacher advocate the use of the best possible English?
98. Are all of the written reports required to be in some special form, preferably that used by the English department?
99. Is the scientific method of thinking which is developed in the biology classroom carried over into physics, chemistry, and other subjects?
100. Are the basic principles of biology applicable in the home economics class?
101. Does the biology course work in harmony with every other course in the school?

TESTS AND MEASUREMENT

102. Are questions on the coming assignment cleared up before the class is dismissed?
103. Does the teacher make use of all sorts of measuring devices, i.e., objective tests, essay tests, true-false, and completion, etc.?
104. Does the teacher base her teaching on the weaknesses found in the tests?
105. Are the tests well worded?
106. Do the tests determine the needs of the pupils?
107. Do the tests motivate the pupils to further study?
108. Does the teacher develop thinking on the part of the learner by her tests?

3. Adequacy of the number of people returning the improvement sheet

Somewhere in this article, the writer has previously quoted W.W.Charters, saying that only fifty people are necessary to get a fair estimate of the necessary traits that make a good home-maker.¹ Again the writer feels satisfied that the one hundred twenty-three people whose questionnaires were returned in time to be included in this study make up a representative group of the biology teachers in the secondary schools. Therefore, the writer believes that a sufficient number of people have adjudged the items to make the sheet workable.

4. Directions for rating the items in the improvement sheet

After deciding to evaluate each item in the sheet, the writer was at a loss as to how this should be done. First, it was suggested that the items be ranked "1," "2," and "3" according to the maximum, average, and minimum importance of the items. Then, to avoid confusion, a better system was devised.

The directions accompanying the questionnaire stated:

Please place at the left of each

1. W.W.Charters, op.cit. pp. 673-685.

item the figure indicating to which class you consider it belongs.

Please mark all items you consider of maximum importance to the biology teacher with the figure one (1).

Please mark all items you consider of least importance to the biology teacher with the figure three (3).

All items left unmarked will be considered of average importance.

Therefore, the following discussion will refer to items of maximum importance as the ratings by 1's and those of minimum importance as the ratings by 3's.

5. Ranking the questionnaire

First, the writer ranked the items of the questionnaire according to the frequency with which they were marked. Then Spearman's Foot Rule was run to see what the correlation was between the 1's and the 3's, with the hope of using only the 1's in case the correlation was high.

It was found that the correlation was very low, being .125, thus, it became necessary to find some other means of weighting the items of the questionnaire.

Since the correlation between the 1's and 3's was so very low, it became necessary for the writer to rank the items according to both the 1's and the 3's. The weight of each item was found by subtracting the frequency with which items of the scale, it was found that there were 100 items it was rated 3 from the frequency with which it was rated 1, or, the number of 3's of each question was subtracted from the number of 1's. It was decided that the entire

questionnaire be based on 1000 points. The method of distributing the thousand points among the several items was as follows: the sum of the weights previously described was 5,738 points. Therefore, the point value of each item would be equal to $1/5,738$ of 1000, multiplied by the frequency with which it was ranked according to weights. For example, item one received 112 first rankings and one third ranking; therefore, the ranking weight of the item would equal 111. That is, the ranking by 3's subtracted from the ranking by 1's. Then the point value of item one equalled 19.314, or, $1/5,738$ of 1000 multiplied by 111. It was decided that this was to be taken to the nearest whole number, therefore, the decimal was dropped, and the value of item one became 19. Where the decimal was greater than one-half, the number was taken to the next highest whole number; for example, if the point value was 12.702, the number value assigned to the item was 13.

Since the entire improvement sheet was based on 1000 points, the sum of the point values of the items should have equalled 1000. But, because of the fact that the point value was taken to the nearest whole number, causing some decimals to be dropped and some points raised to the next highest integer, it was necessary to devise some scheme whereby the point value of the items would equal 1000 points in the finished study. In taking the sum of the point value of the items of the scale, it was found that there were 1014 points instead of 1000. So, arbitrarily, the writer took fourteen of the items of the original scale having the lowest decimals

that were greater than one-half and reverted their point value to the figure in front of the decimal. This procedure remedied the situation. For example, 8.526 should be raised to the next highest integer, becoming 9.0, but .526 was one of the fourteen lowest decimals greater than one-half, so 8.526 was given the value of 8.0 instead of 9.0.

6. Self-rating scale for biology teachers

Following is a table composed of the results of this evaluation. This table is headed according to the information contained in each column.

Question	No. of 1st Ranking	No. of 3rd Ranking	Weight	Point value in thousandths	Point Value
----------	--------------------	--------------------	--------	----------------------------	-------------

Organization of subject matter

1	112	1	111	19.314	19
2	66	7	59	10.266	10
3	81	8	73	12.702	13
4	34	44
5	57	8	49	8.526	8
6	56	11	45	7.830	8
7	70	7	63	10.962	11
8	75	12	63	10.962	11
9	55	28	27	4.698	4
10	61	8	53	9.222	9

Presentation of subject matter

11	25	44
12	96	2	94	16.356	16
13	52	24	28	4.872	5
14	95	..	95	16.530	16
15	57	10	47	8.178	8
16	39	29	10	1.740	2
17	36	25	11	1.914	2

6. Self-rating scale for biology teachers

Question	No. of 1st Rankings	No. of 3rd Rankings	Weight	Point va- lue in thousandths	Point Value
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Presentation of subject matter-continued

18	32	23	9	1.566	1
19	51	14	37	6.438	6
20	60	9	51	8.874	9
21	68	6	62	10.788	11
22	91	6	82	14.268	14
23	46	18	28	4.872	5
24	98	..	98	17.052	17
25	90	2	88	15.312	15
26	61	9	52	9.048	9
27	74	4	70	12.180	12
28	39	14	25	4.350	4
29	66	5	61	10.614	10
30	73	5	66	11.832	12
31	70	3	67	11.658	11

Motivation

32	68	9	59	10.266	10
33	34	11	23	4.002	4
34	68	..	88	15.312	15
35	117	117	117	20.358	20
36	56	9	47	8.178	8
37	42	17	25	4.350	4
38	37	13	24	4.176	4

6. A self-rating scale for biology teachers

Question	No. of 1st Rankings	No. of 3rd Rankings	Weight	Point va- lue in thousandths	Point Value
38	89	1	88	15.312	15
39	45	17	28	4.872	5
40	81	8	73	13.702	13
41	51	25	26	4.524	4
42	85	2	83	14.442	14
43	63	6	57	9.918	10
<u>Field trips</u>					
44	83	3	80	13.920	14
45	89	7	82	14.268	14
46	94	3	91	15.834	16
47	114	2	112	19.488	19
48	53	7	46	8.004	8
49	56	14	42	7.308	7
50	58	10	48	8.352	8
51	52	11	41	7.134	7
52	54	6	48	8.352	8
53	53	20	33	5.742	6
54	35	15	20	5.220	5
55	49	8	41	7.134	7
<u>Visual aids</u>					
56	54	15	39	6.736	7
57	58	12	47	8.178	8
58	37	13	24	4.176	4

6. A self-rating scale for biology teachers

Question	No. of 1st Rankings	No. of 3rd Rankings	Weight	Point va- lue in thousandths	Point Value
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59	25	10	15	2.610	2
60	50	9	41	7.134	7
61	41	8	33	5.742	6
62	23	14	14	2.436	2
63	72	9	63	10.963	11
64	67	13	54	9.396	9
65	44	25	19	2.306	2

Project teaching

66	98	1	97	16.878	17
67	54	13	41	7.134	7
68	70	5	65	11.310	11
69	77	2	75	13.050	13
70	60	11	49	8.526	8
71	87	3	84	14.516	14
72	58	11	47	8.178	8
73	57	11	46	8.004	8
74	54	5	49	8.526	8
75	104	1	103	17.922	18

Pupil activity

76	94	1	93	16.182	16
77	48	4	44	7.686	8
78	9	58	33
79	63	4	59	10.206	10

6. A self-rating scale for biology teachers

Question	No. of 1st Rankings	No. of 3rd Rankings	Weight	Point va- lue in thousandths	Point Value
----------	------------------------	------------------------	--------	------------------------------------	----------------

79	70	11	59	10.266	10
80	65	11	54	9.396	9
81	41	5	36	6.264	6

Supplementary teaching aids

82	8	63
83	87	5	82	14.268	14
84	59	12	47	8.178	8
85	67	7	60	10.440	10
86	71	3	68	11.832	12
87	84	5	79	13.746	14
88	59	9	49	8.526	8
89	76	8	68	11.832	12
90	70	4	66	11.484	11
91	79	6	73	12.702	13
92	87	1	86	14.964	15
93	67	8	59	10.266	10
94	25	27
95	49	8	41	7.134	7
96	13	37

Correlation with other subjects

97	99	1	98	17.052	17
98	43	24	19	3.306	3
99	63	4	59	10.266	10

6. A self-rating scale for biology teachers

Question	No. of 1st Rankings	No. of 3rd Rankings	Weight	Point va- lue in thousandths	Point Value
100	58	5	53	9.222	9
101	75	5	70	12.130	12
<u>Tests and measurement</u>					
102	75	2	73	12.702	13
103	86	8	78	13.572	13
104	56	10	46	8.004	8
105	76	1	75	13.050	13
106	50	7	43	7.482	7
107	62	5	57	9.918	10
108	89	6	<u>74</u>	12.876	<u>13</u>
Totals.....			5,738		1000

7. A self-improvement sheet in biology teaching with
items and their point value

To make the self-improvement sheet usable for teachers of biology, the writer has here listed the items of the sheet and given their point value as was found in the self-rating scale. The original questionnaire contained one hundred eight items, but owing to the very evident unimportance of some of the items, questions 4, 11, 78, 82, 94, and 96 were omitted from the final sheet. (Each of these items had more 3's than 1's and, therefore, had negative numbers as weights.)

Objectives in Biology Teaching

- a. To bring about in the biology class a learning situation which is closely related to the pupils' welfare.
- b. To provide the pupils with the facilities to explore various fields in relation to vocational and occupational guidance.
- c. To aid the pupils in the understanding of the phenomena of their immediate environment and to develop the power of observation.
- d. To develop an interest in the plants and animals, and an appreciation of nature which will be enriched by the pupils' biological experience.
- e. To provide learning situations that will develop thinkers and a scientific attitude.
- f. To provide for some, a basis for a more comprehensive study of the biological sciences on the professional level.

ORGANIZATION OF SUBJECT MATTER

1. Is the teacher's course well planned in advance?....19

2. Does she decide upon the minimum essentials for the year?.....10
3. Does she know the source of all her materials, i.e., city library, school library, biology department, etc.?.....13
5. Does she divide her minimum essentials into suitable units?..... 8
6. Does she know the pupils' background?..... 8
7. Does she organize the course around the pupils' environmental conditions of the community?.....11
8. Does the teacher arrange her course by seasons?.....11
9. Is sex education a part and a portion of the whole biological course?..... 4
10. Does the teacher arrange her course about the interest of the pupils?..... 9
12. Does she give the pupils the fundamental principles common to all living things?.....16
13. Does she begin teaching something well-liked by all, such as butterflies, plants, birds, etc.?..... 5
14. Is the biological subject matter, and are the methods of teaching adapted to the capacity of the pupils?..... 16
15. Does the teacher begin each new unit or lesson with some challenging problem?..... 8
16. Does the teaching meet all of the health needs of the community?..... 2
17. Does the teacher place a special emphasis on the economic importance of the fauna and flora?..... 2
18. Are the lessons correlated with the occupational needs of the community?..... 1
19. Does the teacher teach along the lines of her pupils' interests?..... 6
20. Where the pupils' interests vary, does the teacher assign individual projects?..... 9
21. In the demonstration lesson does the teacher lead the pupils to definite conclusions by a series of well-worded questions?.....11

22. Does the teacher make use of drawings on the board to illustrate ideas?.....14
23. Does she make use of drills to instill principles and their application?..... 5
24. Does she have a varied knowledge of the plant and animal life to present to the pupils?.....17
25. Is the subject matter presented on the level with the learner?.....15
26. Does the teacher avoid becoming monotonous and dull by not remaining on one subject too long?. 9

PRESENTATION OF SUBJECT MATTER

27. In the lecture-demonstration-recitation does the teacher present her subject in such a way as to leave a permanent impression on the pupils?..12
28. Does she first present her topics as a whole, and then analyze them into their parts?..... 4
29. Does she systematize her knowledge, making clear all relationships of the part to the whole?..10
30. Does the teacher have a scientific approach?.....12
31. Does she set up situations for questions as well as questioning?.....11

MOTIVATION

32. Are the pupils allowed to follow up their own interests in the classroom and outside?.....10
33. Can the teacher inculcate the desired interest in the beautification of the homes through her teaching?.....4
34. Is pupil interest maintained and sustained throughout the class period?.....15
35. Does the teacher have enthusiasm, interest, and sincerity in the subject?.....20
36. Are the assignments varied from day to day in such a way that they arouse curiosity on the part of the learner?..... 8
37. Does the teacher exhibit the work of a better quality of her pupils?..... 4

38. Does the teacher make use of visual aids to motivate her work?.....15
39. Does she activate interest on the part of the students by the organization of clubs and the making of scrapbooks, etc.?..... 5
40. Does the teacher encourage the students to collect specimens when they see them?.....13
41. Does she give extra credit for collections which are brought in?..... 4
42. Are the pupils commended for successful attainments and efforts?.....14
43. Does the field trip activate the pupils?.....10

FIELD TRIPS.

44. On the field trip does the teacher have an orderly group?.....14
45. Has she visited the place of the excursion prior to the trip?.....14
46. Does she have the field trip well organized?.....16
47. Does the field trip have a definite purpose?.....19
48. Has the teacher found the problems for investigation?..... 8
49. Does the teacher leave the pupil as largely self-directive as possible?..... 7
50. Does each pupil have a definite thing or things to see while on the trip?..... 8
51. Does the teacher bring in material for future work?..... 7
52. Are the pupils acquainted with the fauna and flora of their locality?..... 8
53. Does the teacher collect quite a bit of her own material?.....6
54. Does she show the pupils the source of her material?..... 5
55. Does she see that the material is sorted and labeled when they return from the trip?..... 7
71. and scientific methods of thinking in her pupils?..14

VISUAL AIDS

56. Does the teacher use lantern slides to explain points which are not clear?..... 7
57. Does the teacher make use of the motion picture machine?..... 8
58. In the use of the motion picture machine, does the teacher give the child the proper mental set the day before?..... 4
59. Does the film appeal to the socially approved interests of the pupils?..... 2
60. Is the film one which will really attract attention? 7
61. Does the film create a problem in the observer that requires mental activity for solution?..... 6
62. Are still pictures used in connection with the stereopticon?..... 2
63. Are the pupils held responsible for visual material that is shown?..... 9
64. Are microscopes, hand-lenses, and binoculars used to study the most minute details?.....11
65. Does the teacher use visual material only as a last resort, that is, only when living biological specimens are not available?..... 2

PROJECT TEACHING

66. Does the teacher encourage individual problems and projects?.....17
67. In this problem solving does the problem or the project have a direct relation to the work of the classroom?..... 7
68. Is the project a purposeful, concrete problem, the solution of which is executed by the pupils?...11
69. Is the project a means of directing thinking of the individual?.....13
70. Does the teacher guide direct the individual projects rather than assign projects of her own with hard and fast rules to go by?..... 8
71. Does the teacher develop a scientific attitude and scientific methods of thinking in her pupils?..14

72. From time to time, does the teacher place the completed projects on display?..... 8
73. Does the teacher include the project in the other work of the term in grading the pupil?..... 8
74. Does the project stimulate the child to thought along other lines?..... 8
75. Do the pupils participate in the recitation, discussions, and demonstrations when the proper time arrives to do so?.....18
76. Are the pupils allowed to display initiative through questioning and oral reports?.....16
77. In the problem-solving method of teaching, do the pupils themselves raise the problems?..... 8
79. Are the pupils encouraged to collect any other material that may be used later?.....10
80. Does the teacher allow socialization of the recitation by allowing the pupils to lead in the discussions?..... 9
81. Do the pupils react favorably to tests, i.e., is pupil activity more pronounced after administering a test?..... 6
83. Does the teacher make use of charts and graphs?....14
84. In the teaching of the geographical distribution of plant and animal life, does she use various maps? 8
85. Does her bulletin board contain authentic accounts of newspaper material?.....10
86. Does she have exhibits of the life histories of harmful and helpful plants and animals?.....12
87. Does she make use of diagrams, charts, graphs, and models to put her lesson across?.....14
88. Does the teacher make use of the City Health Department, Water Supply, Dairy, etc., for trips?..... 8
89. Does the teacher make use of pamphlets from various manufacturing concerns, the Federal Government, State Board of Health, etc.?.....12

90. Does the teacher encourage visits to the museum?...11
91. Does she make use of various references rather than of one or two?.....13
92. Does the teacher maintain an aquarium, herbarium, and a terrarium?.....13
93. Does the teacher encourage the attendance of lectures and the reading of outside books?.....10
95. Does the teacher attempt to develop hobbies in the students by playing up the collective habit?..... 7

CORRELATION WITH OTHER SUBJECTS

97. Does the teacher advocate the use of the best possible English?.....17
98. Are all of the written reports required to be in some special form, preferably that used by the English department?..... 3
99. Is the scientific method of thinking which is developed in the biology classroom carried over into physics, chemistry, and other subjects?....10
100. Are the basic principles of biology applicable in the home economics class?..... 9
101. Does the biology course work in harmony with every other course in the school?.....12

TESTS AND MEASUREMENT

102. Are questions on the coming assignment cleared up before the class is dismissed?.....13
103. Does the teacher make use of all sorts of measuring devices, i.e., objective tests, essay tests, true-false, completion, etc.?.....13
104. Does the teacher base her teaching on the weaknesses found in the tests?..... 8
105. Are the tests well worded?.....13
106. Do the tests determine the needs of the pupils?... 7
107. Do the tests motivate the pupils to further study? 10
108. Does the teacher develop thinking on the part of the learner by her tests?.....13

IV. APPENDIX

A. Names and addresses of people returning questionnaire

<u>Name</u>	<u>Location</u>
1. Adams, Lena W.	Lincoln Junior High; Logansport, Ind.
2. Andry, Charles	Birdseye H.S.; Birdseye, Ind.
3. Alexander, Lloyd	Fisk University; Nashville, Tenn.
4. Ashby, Lois	North Vernon H.S.; North Vernon, Ind.
5. Baese, Harold	Tudor Hall School; Indianapolis, Ind.
6. Babbitt, Ellis	North Eastern Jr. Col.; Kansas City, Mo.
7. Baker, D. Lincoln	Roosevelt H.S.; St. Louis, Mo.
8. Baker, Ruth D.	Silver Creek H.S.; Speed, Ind.
9. Barnett, Mary A.	Western Ill. State; Macomb, Ill.
10. Barbee, Rula E.	Thornton Jr. H.S.; Terre Haute, Ind.
11. Barr, Kenneth	Arsenal Tech. H.S.; Indianapolis, Ind.
12. Beck, P.L.	
13. Bennett, Catherine	Montgomery H.S.; Montgomery, Ind.
14. Bell, Bessie E.	Morgan Park H.S.; Chicago, Ill.
15. Berchmann, Taylor Anne (Sister)	St. Agnes Academy, Indianapolis, Ind.
16. Berger, Ida	Ft. Branch H.S.; Ft. Branch, Ind.
17. Blecher, George R.	Chambersburg H.S.; Chambersburg, Pa.
18. Bohning, Mary G., and Prevo Whittaker	Otter Creek School; North Terre Haute, Ind.
19. Boren, John	DeMotte H.S.; DeMotte, Ind.
20. Boyer, O.C.	Sahide H.S.; Lexington, Ind.
21. Bollinger, Harry R.	Concord Twp. H.S.; St. Joe, Ind.
22. Brannock, R.J.	Lowell H.S.; Lowell, Ind.
23. Braun, Morton L.	New Richmond H.S.; New Richmond, Ind.
24. Brayton, James H.	Manual Tr. H.S.; Indianapolis, Ind.
25. Breeden, Earl S.	Burney H.S.; Burney, Ind.
26. Buck, Oscar	Mackey H.S.; Mackey, Ind.
27. Byrne, C.F.	Lewisville H.S.; Lewisville, Ind.
28. Cassidy, E.P.	Batesville H.S.; Batesville, Ind.
29. Capps, F. Olin	Laboratory School; Columbia, Mo.
30. Clavin, R.B.	Fair Oaks H.S.; Wheatfield, Ind.
31. Creaser, Myrtle M.	Washington Jr. H.S.; Kenosha, Wis.
32. Cross, Walter M.	Kokomo H.S.; Kokomo, Ind.
33. Cunningham, H.T.	Kent State University; Kent, Ohio
34. Taffrose, O.P.M. Agnes (Sister)	Catholic High School; Brooklyn, N.Y.
35. Davis, Mary W.	Judson School; Judson, Ind.
36. Davlason, Joe H.	Patrickburg School; Patrickburg, Ind.
63. Leis, Albert (Trier)	St. Nicholas Academy; St. Louis, Ind.

37. Dawson, Callie Garfield H.S.; Terre Haute, Ind.
38. Disque, H.W. Greelandville, Indiana
39. Becker, William B. Lincoln H.S.; Vincennes, Ind.
40. Eilar, Frances Atlanta H.S.; Atlanta, Ind.
41. Feeler, Thelma West Twp. School; Plymouth, Ind.
42. Fischer, Pearl L. Troy H.S.; Troy, Ind.
43. Folger, Harry T. Fisk University, Nashville, Tenn.
44. Force, Edith F. Wilson Jr. H.S.; Tulsa, Okla.
45. Ford, James Rhodes H.S.; Cleveland, Ohio
46. Frank, O.D. School of Education, University of Chicago; Chicago, Ill.
47. Franklin, Charles W. Meridian Jr. H.S.; Kokomo, Ind.
48. Cates, Florence Libbey H.S.; Toledo, Ohio
49. Geiger, Rhetta (Mrs.) R.R. #2, Box 61; Ligonier, Ind.
50. Cross, Arthur Linton-Stockton School; Linton, Ind.
51. Cross, Garrett New Castle H.S.; New Castle, Ind.
52. Gould, E.S. South Side H.S.; Fort Wayne, Ind.
53. Gottelmaller, Karl Evansville Dietz School; Evansville, Ind.
54. Gormong, Wayne Honey Creek School; Terre Haute, Ind.
55. Greenwalt, H.R. Washington H.S.; Washington, Ind.
56. Greenwalt, Leon
57. Hall, W.J. North Division H.S.; Milwaukee, Wis.
58. Hancock, O.B. Harrison-Blue River Twp. School; Depauw, Ind.
59. Hoffhaus, Edwin Alamo High School; Alamo, Ind.
60. Hoffner, Wayne Bryant H.S.; Bryant, Ind.
61. Hotke, M. Agnes (Sister) Huntington Catholic High School; Huntington, Ind.
62. Houdek, P.K. Robinson Twp. High School; Robinson, Ill.
63. Isenberger, Jerome Wright Jr. Col.; Chicago, Ill.
64. Jones, Frank Greencastle H.S.; Greencastle, Ind.
65. Jones, Norman R.D. Elewett H.S.; St. Louis, Mo.
66. Jones, William R. Nashville H.S.; Nashville, Ind.
67. Jurica, Dr. Hillary St. Procopius Col.; Miele, Ill.
68. Kendrick, John W. Arsenal Tech. H.S.; Indianapolis, Ind.
69. Leis, Albert (Friar) Mt. St. Francis Academy; Mt. St. Francis, Ind.

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|-----------------------------|---|
| 70. Lewis, Harold C. | Jefferson Twp. School; Mathew, Ind. |
| 71. Logan, Ward | Winemac H.S.; Winemac, Ind. |
| 72. Mathers, Freda | Switz City H.S.; Switz City, Ind. |
| 73. Mayfield, John C. | University H.S.; University of Chicago; Chicago, Ill. |
| 74. Mayhugh, Pauline | Marion H.S.; Marion, Indiana |
| 75. McMullen, H.S. | University of Wisconsin H.S.; Madison, Wis. |
| 76. McCoy, I.T. | Montgomery H.S.; Montgomery, Ind. |
| 77. McDermott, H.C. | Hartwell H.S.; Cincinnati, Ohio |
| 78. Norton, Charles | Howe School; Howe, Ind. |
| 79. Padgett, Elizabeth | Goodland H.S.; Goodland, Ind. |
| 80. Pierce, Estelle | Kokomo H.S.; Kokomo, Ind. |
| 81. Peterson, Vincent R. | Glenville H.S.; Columbus, Ohio |
| 82. Pinnick, M.R. | New Castle H.S.; New Castle, Ind. |
| 83. Prather, W. Dwight | 403 Judiciary St.; Aurora, Ind. |
| 84. Rawles, E.S. | Shortridge H.S.; Indianapolis, Ind. |
| 85. Reed, George F. | Crown Point H.S.; Crown Point, Ind. |
| 86. Ruben, Nellie M. | R.F.D. #2 - Fritchon School; Fritchon, Ind. |
| 87. Sabin, A.R. | Northern H.S.; Detroit, Mich. |
| 88. Schmidt, Margaret | Greencastle H.S.; Greencastle, Ind. |
| 89. Schott, Mary Lou | Hammond H.S.; Hammond, Ind. |
| 90. Seddelmeyer, C.M. | John Hay H.S.; Cleveland, Ohio |
| 91. Schneider, Leonard | Warsaw Jr. H.S.; Warsaw, Ind. |
| 92. Shoup, Mary K. | Bloomington H.S.; Bloomington, Ill. |
| 93. Slichenmeyer, H.L. | Fair Oaks School; Fair Oaks, Ind. |
| 94. Spears, Effie I. | New Castle H.S.; New Castle, Ind. |
| 95. Smith, Florence | Mercy H.S.; Milwaukee, Wis. |
| 96. Staniclaus, E. (Sister) | Ashboro H.S.; Center Point, Ind. |
| 97. Stevenson, Joe | Withrow H.S.; Cincinnati, Ohio |
| 98. Stephany, Carl O. | Spencer H.S.; Spencer, Ind. |
| 99. Stewart, Albert | State Teachers College; Charleston, Ill. |
| 100. Stover, E.L. | McKinley H.S.; Washington, D.C. |
| 101. Strauss, Samuel | |
| 102. Tarvin, Alice | Staunton School, Brazil, Ind. |
| 103. Thomas, H.C. | Greencastle H.S.; Greencastle, Ind. |

104. Ulrich, B.K. New Paris H.S.; New Paris, Ind.

105. Vancleave, Louise Sarah Scott Jr. H.S.; Terre Haute, Ind.
106. Vinal, W.S. Massachusetts State College; Amherst, Mass.

Science, and Mathematics, in formulating the items of the

107. Ware, Dale Huntington H.S.; Huntington, Ind.
108. Ward, Herman D. Hillsboro H.S.; Hillsboro, Ind.
109. Webb, W.J. Laurel Twp. School; Shoals, Ind.
110. Weber, James V. North Vernon H.S.; North Vernon, Ind.
111. Welton, Byron Hickwell H.S.; Hickwell, Ind.
112. Wesner, Phillip Sulphur Springs H.S.; Sulphur Springs, Ind.
113. Wilkins, R.C. Central H.S.; Superior, Wis.
114. Wood, A.G. Grove City College; Grove City, Pa.
115. Woodrow, Walter H. Laboratory School; Terre Haute, Ind.

ions were not utilized.

116. Zeig, J.V. Noble Twp. School, R.F.D. #1; Logansport, Ind.

swart:

views may have indicated a generalization of the situation and perhaps a generalization of the situation.

Test the teacher's ability to select the available materials, and select the most pertinent type of film for the situation, the presentation of work.

57. Test the teacher's ability to select the most pertinent type of film for the situation, the presentation of work.

Are the films chosen that correlate directly with the "current" class work?

Does the teacher preview the film and plan the

also accordingly?
B. Comments

55. At the beginning of this study, the writer, to discover if it were worthwhile, solicited the aid of Mr. Jerome Isenberger, editor of the biology section of School Science, and Mathematics, in formulating the items of the improvement sheet. He, in turn, referred the sheet to Mr. Lyle Stewart, Oak Park High School, Oak Park, Illinois. The writer greatly regrets the fact that the suggestions did not reach her hand until the improvement sheet had gone to press, which accounts for the fact that the suggestions were not utilized.

The following are the suggestions offered by Mr. Stewart:

"Visual Aids"

"The following question is suggested in place of number 56 because lantern slides are only one form of visual material (note-film slide, motion picture film, model, charts, and maps.)"

56. Does the teacher use visual aids to explain points which are not clear?

"The next question is suggested because the various visual aids have unique characteristics....advantages and disadvantages which can make one type very useful in one situation and another type more advantageous in another situation."

Does the teacher carefully canvass the possibilities and available materials, and select the most practical type of visual aid for clarifying the problem (Unit of work)?

57. Does the teacher make use of the motion picture film?

Are the films chosen that correlate directly with the "current" class work?

Does the teacher preview the film and plan the

class work accordingly?

58. In the use of the motion picture machine does the teacher give the child the proper mental set the day before?

Does the teacher repeat the film, emphasizing certain difficult or important facts, in order to facilitate the learning process?

65. Carefully controlled research and empirical observation has proved that properly prepared visual material facilitates learning when used as a supplement to living biological specimens. Consequently, a re-statement of the question is suggested.

(b) *Unimpaired* students.

"I feel that the conditions are very good, even after a number of days of the same work, since it gives the child a new idea from the teacher standpoint, as well as from the more important, well-studied."

"No more (items) seem to be needed, but the conditions are commendable, but to make it more interesting take the same time."

C. Further recognition of this study

In making a survey of this kind, it is quite evident that the best estimates of such a study would come from people who are in the field. During this research the writer has come across both favorable and unfavorable, as well as, comments which could be classed under neither of these two heads. All of these comments were unsolicited. The writer has classed the comments which were neither favorable nor unfavorable as "indifferent." Following are some of the comments which were received.

(a) "Favorable" comments

"The list of questions is very good, and I have taken the liberty of having a copy made of them."
- H.T.Folger

"Pardon my delay in returning this very valuable questionnaire.....not resting satisfied with numbering (1) or (3), I saw fit to give answers a little more definite."

- Sr. M. Staniclaus

"Most of your statements (in improvement sheet) are worthy of consideration and have value. I will be interested in receiving a copy of the final report when it is published."

- P.K.Houdek

(b) "Unfavorable" comments

"I feel that the questionnaire will be of but little value, even after a summary of the results has been made, since it approaches the biology course from the teacher standpoint, instead of from the more important, pupil standpoint."

"So many (items) seem to be so much alike. All are commendable, but to grade or mark them would take too much time."

(c) "Indifferent" comments

"Very good, and most items are important. I could have given almost every one a (1) rating."

"I would like to know the results of such a study carried on in Pennsylvania."

"Of course in classes of fifty, and where a teacher has five sections of fifty each, the ideal is almost an impossible goal. Required extra-curricular activities may render any desired procedure impossible."

The preceding are only a few of the comments receiving the attention of the writer. Of the 123 questionnaires used in this study 12 made favorable comments, 4 unfavorable ones, and 4 made comments which could neither be classed as favorable or unfavorable, and which the writer considered "indifferent" comments.

Further recognition of the worth of this survey came from the members of the Illinois Biology Curriculum Committee, when several of its members requested copies of the improvement sheet, as well as copies of the results of such a study. Mr. Jerome Isenbarger also requested that the results of the study be turned over to the School, Science, and Mathematics magazine for publication in the fall.

The writer furnished Mr. Harry T. Folger, Fisk University, Nashville, Tennessee, with 25 copies of the finished study; P.K. Houdek, Robinson Township School, Robinson, Illinois, with 25 copies. Other people receiving copies of the results of the study were H.L. Selichenmeyer, A.S. Wood, Lloyd Alexander, R.L. Wilkins, and E.S. Rawles.

123 : 702 : 31 : 31 : 33 : 345 : 36 : 400 :
45 : 398 : 35 : 10 : 31 : 111 : 107 : 110-12 :

D. Items of the original improvement sheet with page references

In listing the items of the original improvement sheet the writer attempted to justify her choice of questions in the improvement sheet on the basis of the bibliography on pages 64-79. Concerning some of these questions, there is considerable agreement. Some have been included on the basis of the writers own judgement.

Following each item are to be found several pairs of numbers. The second number of each pair is followed by a semi-colon, thus : 150 : 213 ; . The first number, 150, refers to the article 150 in the bibliography, while the second, 213, indicates the exact page of the article to which reference is made.

Objectives in Biology Teaching

- a. To bring about in the biology class a learning situation which is closely related to the pupils' welfare.

150 : 213 ; 21 : 126 ; 12 : 94 ; 31 : 39 ;
53 : 21 ; 140 : 473-76 ; 83 : 1 ; 53 : 38 ;
45 : 398 ; 97 : 315-16 ; 125 : 797-98 ;
31 : 51 ; 39 : 462 ; 81 : 111 ; 113 : 221 ;
124 : 114 ; 82 : 92-93 ; 79 : 37-38 ; 140 :
473-76 ; 10 : 616 .

- b. To provide the pupils with the facilities to explore various fields in relation to vocational and occupational guidance.

143 : 126 ; 126 : 39 ; 39 : 126 ; 126 : 39 ;
21 : 126 ; 31 : 39 ; 83 : 3 ; 53 : 30 ;
113 : 261 ; 82 : 93 ; 85 : 509 .

- c. To aid the pupils in the understanding of the phenomena of their immediate environment and to develop the power of observation.

143 : 126 ; 126 : 39 ; 39 : 126 ; 126 : 39 ;
39 : 126 ; 126 : 39 ;
12 : 94 ; 83 : 19 ; 31 : 39-40 ; 92 : 162 ;
125 : 798 ; 31 : 51 ; 28 : 945 ; 39 : 462 ;
45 : 398 ; 53 : 10 ; 81 : 111 ; 107 : 316-19 ;

113 : 261 ; 117 : 48 ; 98 : 375 ; 122 : 310 ;
79 : 37-38 ; 107 : 315-16 ; 10 : 616 ; 102 : 127 .

- d. To develop an interest in the plants and animals, and an appreciation of nature which will be enriched by the pupils' biological experience.

150 : 213 ; 9 : 162 , 317 ; 53 : 5 ; 107 : 316-19 ;
79 : 37-38 ; 107 : 316-17 ; 144 : 78 ; 102 : 130 .

- e. To provide learning situations that will develop thinkers and a scientific attitude.

150 : 44-45 ; 49 : 51 ; 31 : 40 ; 83 : 3 ; 97 :
163 : 35 ; 568 ; 38 : 462 ; 66 : 94 ; 107 :
316-19 ; 155 : 104 ; 82 : 98-99 ; 7 : 822-23 ;
81 : 1 ; 140 : 473-76 ; 102 : 130 .

- f. To provide for some, a basis for a more comprehensive study of the biological sciences on the professional level.

28 : 945 ; 107 : 315-16 ; 85 : 521 .

Organization of Subject Matter

1. Is the teachers course well planned in advance?

143 : 328 ; 150 : 58 ; 31 : 191 ; 87 : 727-29 ;
113 : 264 ; 143 : 84 ; 144 : 232-39 ; 95 : 361 ;
61 : 58 .

2. Does she decide upon the minimum essentials for the year?

143 : 328-30 ; 113 : 264 ; 144 : 332 ; 95 : 365 ,

366 ; 361 ; 58 .

82 : 390-99 ; 88 : 27 ; 101 : 13 ; 99-100 ;

3. Does she know the source of all her materials, i. e., city library, school library, biology department, etc.?

143 : 64-67 ; 82 : 518 ; 113 : 264 .

4. Does she have a typewritten or mimeographed plan for the entire year?

113 : 264 ; 143 : 84 ; 114 : 232-33 ; 95 : 361 ; 61 : 57 .

5. Does she divide her minimum essentials into suitable units?

113 : 264 ; 144 : 232-33 ; 47 : 744 ; 61 : 56 .

6. Does she know the pupils' background?

12 : 93-95 ; 113 : 264 ; 144 : 237 ; 3 : 52 ; 61 : 53 .

7. Does she organize the course around the pupils' environmental conditions in the community?

12 : 94-95 ; 83 : 92-93 ; 82 : 522 ; 150 : 5 ; 39 : 462 ; 53 : 5 ; 53 : 35 ; 113 : 261 ; 31 : 47 ; 144 : 237 ; 95 : 362 ; 61 : 51-52 .

8. Does the teacher arrange her course by seasons?

31 : 65 ; 10 : 616 ; 11 : 717 ; 61 : 53 .

9. Is sex education a part and a portion of the whole biological course?

150 : 5 ; 39 : 462 ; 53 : 5 ; 53 : 35 ; 113 : 261 ; 31 : 47 ; 144 : 237 ; 95 : 362 ; 61 : 51-52 .
82 : 398-99 ; 50 : 17 ; 161 : 15 ; 79-82 ;

102 ; 126 .

10. Does the teacher arrange her course about the interests of the pupils?

143 ; 333 ; 82 ; 81-82 ; 150 ; 5 ; 113 ;
264 ; 13 ; 101 ; 31 ; 46 ; 144 ; 169 ;
10 ; 616 ; 11 ; 717-21 ; 47 ; 743 ; 61 ; 51 .

Presentation of Subject Matter

11. Does the teacher first remove all prejudices against her subject?

12 ; 96 ; 113 ; 264 .

12. Does she give the pupils the fundamental principles common to all living things?

150 ; 213 ; 12 ; 94 ; 31 ; 345-50 ; 45 ; 398 ;
107 ; 316-19 ; 85 ; 519 ; 10 ; 616 ; 11 ; 717-21 ;
102 ; 123 .

13. Does she begin teaching something well-liked by all, such as butterflies, plants, birds, etc.?

113 ; 262 ; 31 ; 46 ; 10 ; 616 ; 47 ; 743-44 .

14. Is the biological subject matter, and are the methods of teaching, adapted to the capacity of the pupils?

150 ; 18 ; 31 ; 191 ; 53 ; 30 ; 13 ; 105 .

15. Does the teacher begin each new unit or lesson with some challenging problem?

150 ; 71 ; 7 ; 825 ; 45 ; 398 ; 113 ; 264 ;

- 146 ; 262 ; 10 ; 615 ; 47 ; 744 .
22. Does the teacher use any aids or illustrations to illustrate ideas?

16. Does the teaching meet all of the health needs of the community?

82 : 376-77 ; 31 : 46-47 ; 81 : 111 ; 13 : 299 ; 102 : 123 .

17. Does the teacher place a special emphasis on the economic importance of the fauna and flora?

21 : 126 ; 45 : 5 ; 107 : 316-19 ; 31 : 84 ; 11 : 720 ; 102 : 121 .

18. Are the lessons correlated with the occupational needs of the community?

28 : 945 ; 31 : 46-47 ; 53 : 35 ; 21 : 126 ; 83 : 3 ; 113 : 261 ; 82 : 93 ; 107 : 316-19 ; 35 : 521 ; 61 : 54 .

19. Does the teacher teach along the lines of her pupils' interests?

150 : 76 ; 41 : 7 ; 146 : 252 ; 144 : 169 ; 143 : 333 ; 82 : 81-82 ; 10 : 616 ; 61 : 51 .

20. Where the pupils' interests vary, does the teacher assign individual projects?

15 : 160 ; 21 : 127 ; 82 : 196 ; 105 : 1079 ; 125 : 397-98 ; 76 : 53 ; 95 : 354 ; 61 : 79 .

21. In the demonstration lesson does the teacher lead the pupils to definite conclusions by a series of well-worded questions?

26 : 811 .

13 : 120 ; 30 : 198-99 ; 141 : 35 ; 86 :

22. Does the teacher make use of drawings on the board to illustrate ideas?

621 : 31 : 82-83 ; 144 : 171 ; 61 : 117-18 .

Does the teacher make use of drawings on the board to illustrate ideas?

70 : 68 ; 131 : 228 .

23. Does she make use of drills to instill principles and their applications?

143 : 227-251 ; 45 : 398 ; 87 : 727 ;
146 : 258 ; 144 : 238 .

24. Does she have a varied knowledge of the plant and animal life to present to the pupils?

12 : 96-97 ; 35 : 567,69 ; 45 : 5 ; 3 ;
37-39 ; 61 : 49 .

25. Is the subject matter presented on the level with the learner?

150 : 90 ; 31 : 191 .

26. Does the teacher avoid becoming monotonous and dull by not remaining on one subject too long?

150 : 140 ; 113 : 262 .

27. In the lecture-demonstration-recitation does the teacher present her subject in such a way as to leave a permanent impression on the pupils?

82 : 166-67 ; 150 : 139 ; 53 : 19 ; 86 ;
619 ; 144 : 56-57 .

28. Does she first present her topics as a whole, and then analyze them into their parts?

86 : 621 .

29. Does she systematize knowledge, making clear all relationships of the part to the whole?

4 : 3 ; 150 : 22 ; 79 : 37-38 ; 86 : 621 ;
95 : 358-60 .

30. Does the teacher have a scientific approach?

150 : 20 ; 86 : 621 ; 140 : 473-76 .

31. Does she set up situations for questions as well as questioning?

150 : 71 ; 7 : 825-83 ; 35 : 47 ; 241 ;
86 : 621 ; 13 : 121-22 ; 30 : 197 ; 143 ;
267 ; 31 : 90-91 ; 144 : 171 .

Motivation

32. Are the pupils allowed to follow up their own interests in the classroom and outside?

4 : 9-10 ; 15 : 82-87 , 270 ; 30 : 41-42 ;
26 : 103 ; 146 : 252 ; 144 : 169 ; 71 :
721 ; 47 : 743 ; 144 : 171 .

33. Can the teacher inculcate the desired interest in the beautification of the homes through her teaching?

31 : 46-47 .

34. Is pupil interest maintained and sustained throughout the class period?

31 : 191 ; 53 : 35 ; 146 : 252 ; 61 : 135 .

35. Does the teacher have enthusiasm, interest, sincerity, and initiative in the subject?

82 : 526 ; 150 : 60 ; 52 : 28-33 ; 69 : 185 ;
3 : 32, 37 .

36. Are the assignments varied from day to day in such a way that they arouse curiosity on the part of the learner?

150 : 60-66 ; 82 : 273-74 ; 89 : 272 ; 30 :
42 ; 61 : 119 .

37. Does the teacher exhibit the work of a better quality of her pupils?

145 : 242 ; 144 : 206 .

38. Does the teacher make use of visual aids to motivate her work ?

70 : 3-25 ; 64 : 4 ; 21 : 126-27 ; 82 :
294 -95 ; 82 : 319-21 ; 31 : 127 ; 78 :
65-69 ; 87 : 727-29 ; 154 : 278 ; 43 :
17 ; 157 ; 100 ; 91 : 35 ; 41 : 7.

39. Does she activate interest on the part of the students by the organization of clubs and the making of scrap books, etc.?

82 : 284 ; 88 : 59 ; 269 ; 87 : 727 ; 29 ;
113 : 261 ; 125 : 397-98 ; 31 : 134 ; 3 ;
208 : 226 ; 61 : 143-46 .

40. Does the teacher encourage the students to collect specimens when they see them?

21 : 127 ; 37 : 955-56 ; 150 : 93 ; 53 :
10-11 ; 59 : 268 ; 69 : 185 ; 145 : 238-43 ;
11 : 717-21 ; 61 : 147 ; 108 : 364 .

41. Does she give extra credit for collections which are brought in?

42. Does the teacher give a detailed report

69 : 185 .

70 : 45 ; 82 : 126 ; 21 : 126-27

42. Are the pupils commended for successful attainments and effort?

69 : 186 ; 145 : 239 ; 145 : 242 .

43. Does the field trip activate the pupils?

21 : 126 ; 12 : 96 ; 32 : 278 ; 22 : 243 ;
149 : 947-50 ; 43 : 61 ; 145 : 241 .

Field Trips

44. On the field trip does the teacher have an orderly group?

150 : 147 ; 77 : 395-97 ; 43 : 66-67 ; 91 :
40 : 41 : 14 : 739 : 145 ; 31 : 136 ; 144 :
58-59 ; 153 : 262 .

45. Has she visited the place of the excursion prior to the trip?

70 : 46-47 ; 150 : 146 ; 32 : 168 ; 77 :
395-97 ; 125 : 797-98 ; 127 : 278 ; 43 :
67 : 91 : 40 ; 41 : 14 ; 139 : 144 ; 31 :
136 ; 144 : 59 ; 153 : 262 .

46. Does she have the field trip well organized?

150 : 147-48 ; 70 : 46 ; 32 : 168-69 ; 77 :
395-97 ; 127 : 278-79 ; 43 : 67 ; 91 : 40 ;
41 : 14 ; 139 : 144-45 ; 31 : 135-36 ; 144 :
58-59 ; 153 : 262-63 .

47. Does the field trip have a definite purpose?

70 : 46 ; 32 : 168 ; 77 : 395-97 ; 150 :

48. Does she show the pupils the objects of the excursion?

146 ; 113 ; 265 ; 125 : 397-98 ; 127 : 278 ;
43 : 67 ; 91 : 40-41 ; 41 : 14 ; 139 : 144 ;
31 : 136 ; 153 : 262 .

48. Has the teacher found the problems for investigation?

150 : 146 ; 70 : 44 ; 82 : 168 ; 77 : 395-97 ;
125 : 397-98 ; 127 : 278 ; 43 : 67 ; 91 :
40 ; 41 : 14 ; 139 : 144 ; 51 : 136 : 144 : 59 .

49. Does the teacher leave each pupil as largely self-directive as possible?

150 : 148 ; 70 : 47 ; 77 : 395-97 ; 41 :
15 ; 139 : 145 ; 31 : 136 .

50. Does the pupil have a definite thing or things to see while on the trip?

150 : 146 ; 70 : 46 ; 82 : 168 ; 77 : 395-97 ;
125 : 397-98 ; 91 : 40 ; 41 : 14-15 ; 139 :
144 ; 31 : 136 ; 144 : 58 .

51. Does the teacher bring in material for future work?

125 : 397-98 ; 127 : 280 ; 131 : 229 .

52. Are the pupils acquainted with the fauna and flora of their locality?

70 : 46 .

53. Does the teacher collect quite a bit of her own material?

113 : 265 : 131 : 229 .

54. Does she show the pupils the source of her material?

43 : 196 .

131 : 229 .

55. Does she see that the material is sorted and labeled when they return from the trip?

70 : 80-81 ; 125 : 397-98 ; 43 : 85 ; 31 :
136-37 ; 28 : 948-47 .

Visual Aids

56. Does the teacher use lantern slides to explain points which are not clear?

150 : 231 ; 70 : 158-59 ; 82 : 310 ; 113 :
264-65 ; 157 : 82 ; 91 : 45 ; 41 : 35 ;
37 : 133 .

57. Does the teacher make use of the motion picture machine?

70 : 93-143 ; 21 : 126 ; 82 : 301 ; 22 :
243 ; 113 : 264-65 ; 131 : 228 ; 43 : 328 ;
157 : 127 ; 91 : 46 ; 41 : 64 ; 156 : 211 ;
31 : 128 .

58. In the use of the motion picture machine does the teacher give the child the proper mental set the day before?

70 : 133 ; 43 : 190 ; 91 : 48 ; 49 : 173 ;
41 : 66-67 ; 31 : 128 .

59. Does the film appeal to the socially approved interests of the pupils?

70 : 119-21 ; 43 : 188-89 .

60. Is the film one which will really attract attention?

43 : 194 .

61. Does the film create a problem in the observer that requires mental activity for solution?

70 : 135 ; 64 : 30 ; 82 : 305 ; 43 : 192 ;
91 : 37 ; 31 : 129 .

62. Are still pictures used in connection with the stereoptican?

70 : 148-207 ; 64 : 102 ; 21 : 126 ; 113 :
264 ; 265 ; 43 : 176-77 ; 91 : 44 ; 49 :
168 ; 31 : 133 .

63. Are microscopes, hand lenses, and binoculars used to study the most minute details?

70 : 135 ; 21 : 126 ; 113 : 261,266 ; 131 : 228 .

64. Are the pupils held responsible for visual material that is shown?

70 : 135 ; 64 : 12-14 ; 21 : 127 ; 49 : 173 ;
49 : 162 ; 41 : 67 ; 31 : 123 .

65. Does the teacher use visual material only as a last resort, that is, only when living biological specimens are not available?

113 : 64-65 ; 31 : 129 .

Project Teaching

66. Does the teacher encourage individual problems and projects?

15 : 160-61 ; 21 : 127 ; 82 : 196 ; 105 :
1079 ; 125 : 397-98 ; 76 : 53 ; 95 : 354 ;
47 : 744 .

67. In this problem solving, does the problem or project have a direct relation to the work of the classroom?

143 : 150 ; 93 : 332 ; 115 : 152-55 ; 82 :
190 ; 150 : 131 ; 34 : 267 ; 69 : 186 ;
127 : 282 ; 76 : 45 ; 75 : 2 .

68. Is the project a purposeful, concrete problem, the solution of which is executed by the pupils?

4 : 106 ; 4 : 52 ; 143 : 147-48 ; 82 : 191 ;
150 : 131 ; 34 : 267 ; 127 : 282 ; 76 : 43 ;
75 : 7 ; 141 : 96 ; 31 : 66 ; 95 : 344 .

69. Is the project a means of directing the thinking of the individual?

82 : 191-93 ; 34 : 268 ; 4 : 91 ; 18 : 1 ;
31 : 80 ; 47 : 744 .

70. Does the teacher guide and direct the individual problems rather than assign projects of her own with hard and fast rules to go by?

4 : 58-59 ; 82 : 196 ; 34 : 268 ; 18 : 3 ;
76 : 44 ; 47 : 745 .

71. Does the teacher develop a scientific attitude and scientific methods of thinking in her pupils?

4 : 91 ; 82 : 144-45 ; 34 : 268 ; 39 : 462 ;
76 : 21-23 ; 141 : 120-22 .

72. From time to time, does the teacher place the completed projects on display?

82 : 196 ; 105 : 1082 ; 18 : 4 ; 144 :
226-227 .

100 : 93 ; 31 : 277 ; 89 : 343 ; 37 : 330-331 .

73. Does the teacher include the project in the other work of the term in grading the pupil?

105 : 1079 .

74. Does the project stimulate the child to thought along other lines?

4 : 107 ; 82 : 193 ; 105 : 1081 ; 146 : 262 .

Pupil Activity

75. Do the pupils participate in the recitations, discussions, and demonstrations when the proper time arrives to do so?

31 : 191-205 .

76. Are the pupils allowed to display initiative through questioning and oral reports?

82 : 275 ; 31 : 191-205 ; 66 : 94 ; 113 : 264-65 ; 144 : 170-71 .

77. In the problem-solving method of teaching do the pupils themselves raise the questions?

93 : 333-34 ; 150 : 52 ; 66 : 94 ; 26 : 114 ; 141 : 99 ; 144 : 169 ; 47 : 744-45 .

78. Do the pupils select their own references to study?

143 : 54 ; 87 : 727-29 ; 61 : 124 .

79. Are the pupils encouraged to collect any other material that may be used later?

80. Does her bulletin board contain material from
or newspaper 150 : 93 ; 21 : 1271 ; 59 : 268 ; 37 : 955-56 .

53 ; 10-11 ; 265 ; 125 ; 397-98 ; 127 ;
280 ; 131 ; 229 ; 154 ; 281 ; 11 ; 720-21 ;
108 ; 364 .

80. Does the teacher allow socialization of the recitation by allowing the pupils to lead in the discussions?

21 ; 126 ; 43 ; 259 ; 146 ; 262 ; 3 ; 233-34 .

81. Do the pupils react favorably to tests, i.e., is pupil activity more pronounced after administering a test?

32 ; 275 ; 32 ; 346 .

Supplementary Teaching Aids

82. Does the teacher present puzzles (preferably crossword puzzles), games, and plays as a means of getting the lesson across?

21 ; 126 ; 129 ; 284-96 .

83. Does the teacher make use of charts and graphs?

64 ; 74 ; 82 ; 318-19 ; 7 ; 825 ; 150 ;
229-30 ; 78 ; 65-70 ; 131 ; 228 ; 154 ; 278 ;
43 ; 98-113 ; 157 ; 129 ; 91 ; 50-51 ;
41 ; 19-20 .

84. In the teaching of the geographical distribution of plant and animal life, does she use various maps?

70 ; 227-39 ; 64 ; 77 ; 82 ; 318-19 ; 91 ;
50 ; 41 ; 20 .

85. Does her bulletin board contain authentic accounts of newspaper material?

70 : 255-57 ; 82 : 277-78 ; 69 : 187 ; 113 :
264-65 ; 61 : 146 .

86. Does she have exhibits of the life histories of harmful and helpful plants and animals?

60 : 398 ; 57 : 727-29 ; 113 : 264-65 ;
43 : 70 ; 41 : 18 ; 144 : 66 .

87. Does she make use of diagrams, charts, graphs, and models to put her lesson across?

70 : 68 ; 240-51 ; 64 : 273 ; 82 : 318 ;
19 : 150 ; 230 ; 7 : 825-26 ; 78 : 65-70 ;
87 : 727-29 ; 113 : 264-65 ; 131 : 228 ;
154 : 278 ; 43 : 98-112 ; 157 : 129 ;
91 : 50-51 ; 41 : 19 .

88. Does the teacher make use of the City Health Department, Water Supply, Dairy, etc., for trips ?

150 : 144-45 ; 82 : 279-80 ; 31 : 46-47 ;
113 : 264-65 ; 125 : 397-98 ; 43 : 63 ; 41 : 15 .

89. Does the teacher make use of pamphlets from various manufacturing concerns, the Federal Government, State Board of Health. etc.?

150 : 231 ; 82 : 502 .

90. Does the teacher encourage visits to the museum?

70 : 82 ; 82 : 170 ; 82 : 314-15 ; 154 : 278 ;
43 : 65 ; 91 : 63 ; 41 : 13-15 .

91. Does she make various references rather than one or two?

113 : 262 , 264-65 ; 61 : 55 .

92. Does the teacher maintain an aquarium, herbarium, and a terrarium?

150 : 228 ; 32 : 317-18 ; 37 : 955-56 ; 60 :
396 ; 87 : 727-29 ; 113 : 265 ; 125 : 397-98 ;
151 : 229 ; 41 : 33 ; 108 : 365 .

93. Does the teacher encourage the attendance of lectures and the reading of outside books?

150 : 93 ; 32 : 275 ; 87 : 727-29 .

94. Does she give extra credit for the attendance of outside lectures and reading of books?

150 : 93 ; 87 : 727 ; 29 .

95. Does the teacher attempt to develop hobbies in the students by playing up the collective habit?

150 : 93 ; 21 : 126-27 ; 37 : 955-56 ; 69 :
185 ; 87 : 727-29 ; 113 : 261 ; 125 : 397-98 ;
154 : 281 ; 41 : 17 ; 31 : 136-37 ; 144 :
21 : 61 ; 147 ; 108 : 364 .

96. Does the teacher exchange specimens with other schools whose different locations would result in the finding of different species of fauna and flora?

70 : 32 ; 113 : 265 .

97. Correlation with Other Subjects

97. Does the teacher advocate the use of the best possible English?

33 : 912-20 ; 7 : 136-40 ; 31 : 87 ;
150 : 85 ; 139 : 146 ; 31 : 73 .

98. Does the teacher have her teaching on the vocabulary

98. Are all of the written reports required to be in some special form, preferably that used by the English department?

150 : 141 ; 31 : 72-74 ; 139 : 146 .

99. Is the scientific method of thinking, which is developed in the biology classroom, carried over into physics, chemistry, and other subjects?

150 : 214 ; 21 : 127 ; 139 : 145-46 ; 31 : 72 .

100. Are the basic principles of biology applicable in the home economics class?

139 : 146 .

101. Does the biology course work in harmony with every other course in the school?

45 : 398 ; 139 : 145-46 ; 31 : 72 .

Tests and Measurement

102. Are the questions on the coming assignment cleared up before the class is dismissed?

82 : 328 ; 150 : 122 ; 144 : 172 ; 3 : 90 ;
61 : 118-120 .

103. Does the teacher make use of all sorts of measuring devices, i.e., objective tests, essay tests, true-false, and completion?

143 : 301-316 ; 82 : 436-37 ; 92 : 168 ;
30 : 219-20 ; 3 : 184-86 ; 61 : 82 .

104. Does the teacher base her teaching on the weaknesses

found in the tests?

143 ; 289 ; 82 ; 410, 437 ; 92 ; 155 ; 3 ;
138 ; 61 ; 151 .

105. Are the tests well-worded?

82 ; 416 .

106. Do the tests determine the needs of the pupils?

143 ; 289 ; 82 ; 414 ; 92 ; 155 ; 3 ;
188 ; 61 ; 151 .

107. Do the tests motivate the pupils to further study?

143 ; 290 ; 82 ; 418 ; 30 ; 209 ; 92 ; 155 .

108. Does the teacher develop thinking on the part
of the learner by her tests?

143 ; 317 ; 82 ; 414 ; 30 ; 209 ; 61 ; 151 .

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