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INCREASING THE DEPENDABILITY OF SCHOLASTIC MARKS BY BETTER SAMPLING METHODS

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School marks originated as purported measures of scholastic achievements. The widening circle of subject matter achievements, including habits, skills, and attitudes makes increasingly difficult the task of evaluating student accomplishments. The broader objectives, often spoken of as Cardinal Principles, and the subject matter objectives arrived at through job analysis, are now expected to be student acquisitions. The expanse of these objectives is illustrated by those set up by (1) Krey¹ for social studies and (3) Tyler for scientific studies. They are essentially as follows:

1. Acquisition of a body of knowledge.
2. Ability to apply the knowledge to new situations.
3. Skill in dealing with new sources of information.
4. Possession of acceptable attitudes.
5. Expansion of individual interests.
6. Ability to discuss the facts clearly.

Whether the grade assigned describes accurately the amount of these objectives acquired is largely dependent upon the sampling method used.

Teachers can never call for a recital of the total learned material from each student before they assign a grade. That would be as impractical as examining each grain in a carload to establish a grade. Assigning grades to both grain and children is done through examining representative samples. A representative grain sample is taken from many parts of the car and through the entire depth of the grain. A subject matter grade should be the composite of many samples taken from each of the established objectives. Thus many samples should be taken from the student's store of facts, ability to solve problems, skill in finding and using facts, possession of attitudes

and habits and from his ability to state or discuss the material learned. Subjects which demand "doing" rather than "talking" cannot be completely sampled even by means of extensive examinations. The sampling methods described herein have been used in agricultural and shop subjects, in teacher training and vocational guidance courses, and it is believed they can be adapted to even wider use.

Materials and Methods

A course in grain crops, demanding skill in selection, identification, judging, and knowledge of cultural practices served as the basis for this study. A key showing how the test samples were to be taken was posted as below.

- A. Quiz
- B. Judging and identification
- C. Class discussion
- D. Problem sheets
- E. Special readings
- F. Outside readings
- G. Number of bulletins collected
- H. File system for bulletins and notes
- I. Interest

Judging team work, project work, use made of information learned.

A quiz or short unannounced examination of an objective type was given at any critical point in the class period. Identification material was exposed on numerous occasions. The seeds were generally mixed and were placed in small envelopes. The student was to report the number of each kind and was given credit for each correct identification.

The problems concerning variety selection and cultural practices were developed in class. Their development followed the plan proposed by (2) Lancelot. The problem sheet, or work sheet of the student, was graded at the completion of the problem. As interest in a problem increased, certain questions arose which later formed the basis of the assignment. Collecting the facts to answer these questions was considered the home or library work. These facts were outlined on the problem sheet and formed the basis of the next day's class discussion. After the class discussion a brief statement of conclusions and possible applications the student could make were added before the sheet was handed in. The completed problem sheets were generally sorted into

¹ Reference by number is to "Literature Cited."

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a five-pile distribution on the basis of completeness of facts and correctness of conclusions. Thirty points were given for a high quality problem sheet and others were scaled down accordingly. A sample problem sheet taken from a student's notebook is given below.

Problem: How can I identify and control the common corn diseases?

Assignment:

1. How can you tell the difference between *Gibberella* and *Diplodia*? At what temperature does each grow best?
2. What is a fungus? How do these live over the winter?
3. Where does smut winter over?
4. Make a list of things to avoid in selecting healthy seed.

Conclusions:

(A brief statement of the conclusions

obtained when all the facts were examined.)

Applications:

(A statement of the expected use the student will make of the information obtained.)

Special reports were graded on completeness, presentation, and conclusions drawn. The outside readings from agricultural magazines and bulletins were summarized on 3 x 5 cards and after being graded were filed in each student's agricultural file. These files were examined each month and graded on the basis of the number and adaptability of the articles extracted. Credit was also given on the number of bulletins collected providing they were suitably filed in permanent box. "Found and used" facts as defined by (2) Lancelot were sampled by giving a selected list of questions, the answers to which it was hoped could not be easily remembered. These facts were largely of the nature of handbook facts which would need to be used in solving problems but which would be more economically looked up than memorized. The questions were given orally, very rapidly, and the answers were to be found in the file. The test indicated whether the information had been collected and so organized as to be readily accessible.

All grades were entered as numerical values on cross-section paper in the form of a continuous bar graph. The class sheet was on display at all times. Each student was shown how the final grade would depend upon the amount and quality of the work done. This grading sheet may be better understood by examining

Facts:

Smut: Grayish white bolls that have black strands inside. Later burst open and show black powder—the spores. Attacks plant in all parts, especially where injured. Lives over in crop residue (corn). Many spores are found in manure piles and may be spread when manure is hauled out. Soil contaminated with many organisms so that nearly every field is a source of infection. Average loss 2 to 3 per cent yield. Control by rotation, 5-7 years, raking and burning stalks, composting manure, selecting resistant strains.

Gibberella: Early in growth of corn dark red and brown rotten spots on kernel and mesocotyl, rots off roots, penetrates lower nodes of stem. Blown about later and lodges behind leaf sheaves and on ear showing brown rot and pink mold with shredded shank and pith of stalk with discoloration at nodes. Lives over winter in crop residues (corn, small grains) causes scab on wheat or barley and even oats and rye are often infected. Carried over also on seed corn. Animal loss 1 per cent but in cool springs loss runs to 5-7 per cent. Grows best at lower temperature, and at 75 degrees may not show up on rag doll germinator even though present. Control—sanitation; burn stalks; select seed; treat with mercury dust.

Diplodia: Etc.

References

Wallace and Bressman

III Bul. 354

III Bul. 354

III Bul. 354

III Bul. 255
Wallace and Bressman

III Bul. 354

III Bul. 354

Table II. The Point Rank and Grade Distribution of 19 Students in Grain Crops for One Month

Point Rank	Grade Distribution
125	A
122	A
103	B
102	B
100	B
99	B
99	B
92	C
87	C
85	C
82	C
75	C
65	D
65	D
62	D
60	D
54	D
35	F
27	F

Note: The grades assigned were determined by dividing the range (98 points in this case) into five approximately equal parts with the middle point as the center of the "C" distribution.

Literature Cited

1. Krey, August C. Improvement of Examinations in Social Sciences. Differential functions of examinations, University Committee on Educational Research. Bul. 36:4. University of Minnesota, Minneapolis, Minnesota. 1933.
2. Lancelot, W. H. Handbook of Teaching Skills. John Wiley and Sons, New York. 1925.
3. Tyler, R. W. Formulating Objectives for Tests. Educational Research Bul. 12:8. 1933.

COLLECTION, PREPARATION AND STORAGE OF PLANT MATERIALS

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Outline of remarks made at Annual State Conference of Vocational Agriculture Instructors. June 5, 1935.

I. Uses of Material

- A. For decorative purposes
 1. Harvest slightly before maturity
 2. Dry in shade
- B. For instruction
 1. Must be true to type
 2. To illustrate good qualities and lack of quality

3. Morphology
4. Weed identification
5. Disease identification
6. Important varieties of crops (Teach control measured in connection with identification)
7. Judging material
 - a. Place on seed basis
 - b. Have boys collect samples
 - c. Correlate with pure seed work and identification

II. Preparation of Material

A. Green plants where in bloom

1. Drying
 - a. Place between newspapers
 - b. Next two blotting papers, one on each side
 - c. Two boards and weights for press
 - d. Change blotters every day. If very juicy plants, change every 12 hours.

2. Mounting plants

- a. Sheets $11\frac{1}{2} \times 16\frac{1}{2}$ good size
- b. Smear glue on window glass, lay plant in glue—transfer to sheet. Label properly.

B. Disease specimens in jars

1. To preserve
 - a. Use 3-4% formalin solution
 - b. Add 50% alcohol to make soft specimens firm

C. Preserve green color of specimens

1. Make stock solution of copper acetate by adding copper acetate crystals to 50% solution of acetic until saturated. When preserving specimens, take 1 part of stock solution to 4 parts of water. Boil specimen until the chlorophyll has broken down to a yellowish green, and this in turn is replaced by the green of copper acetate. Boiling varies from 3 to 15 minutes. Wash in tap water and place in 5% formalin solution.

D. Insects

1. Use carbon disulfide to destroy—very inflammable
2. Low temperatures
3. Para dichlo benzene crystals to prevent infestation
4. Metal cabinets
5. Metal containers with slip covers to keep out insects and mice.