UNIVERSITY OF ILLINOIS BULLETIN

Issued Weekly

Vol. XXI December 17, 1923 No. 16

[Entered as second-class matter December 11, 1912, at the post office at Urbana, Illinois, under the Act of August 24, 1912. Acceptance for mailing at the special rate of postage provided for in section 1103, Act of October 3, 1917, authorized July 31, 1918.]

EDUCATIONAL RESEARCH CIRCULAR NO. 24

BUREAU OF EDUCATIONAL RESEARCH
COLLEGE OF EDUCATION

THE PROJECT IN EDUCATION WITH SPECIAL REFERENCE TO TEACHING AGRICULTURE

by

Aretas W. Nolan

Associate Professor of Agricultural Education

PUBLISHED BY THE UNIVERSITY OF ILLINOIS
URBANA


UNIVERSITY
OF ILLINOIS
PRESS

The Project in Education with Special Reference to Teaching Agriculture

I. THE PROJECT CONCEPT

Whatever the differences of opinion or concept may be in other fields of education with reference to the project, there is a satisfactorily clear and agreed upon conception of the project in agricultural education. Long before the term became known in the nomenclature of education, there were projects in agriculture on every farm in the land. Leaders in agricultural education have taken over the natural situation as represented by the farmers' larger unit enterprises, and by analyzing these situations and using practical common sense methods in teaching the enterprises or projects in agriculture, they have gained their concepts and methods with reference to the project.

Every farm enterprise or project is made up of a series of problems in seasonal and operational sequence. The analysis of the large unit representing a single enterprise or project, sets forth a picture of the project and gives a clear conception of the idea used in agricultural education. We may illustrate the form of the project by the single unit or farm enterprise of *wheat growing* as follows:

WHEAT GROWING PROJECT

(10 acre unit)

Major Problems:

1. Managerial decisions relating to reasons for going into the enterprise.
2. Locating the field.
3. Securing the seed.
4. Fertilizing the soil.
5. Preparing the land.
6. Preparing the seed.
7. Sowing the wheat.
8. Protecting winter wheat.
9. Growing clover in wheat.
10. Harvesting the grain.
11. Disposing of the crop.
12. Controlling the pests.
13. Checking up financial results.

These major problems, including all the *thinking, purposing, doing, knowing,* all the immediate results and related interests, in carrying to completion from the

first thought and act to the last thought and act, constitute this *project* of *wheat growing*. The whole large unit of *DOING* and *KNOWING* is the project.

The farmer's jobs or enterprises give us the clue to the project concept. Such large units as *corn growing, wheat growing, clover growing, orcharding, truck gardening, poultry raising, swine production, dairying, farm management,* etc., are very clear and definite examples of the *project,* as the men of agricultural education think of it. The definitions of the project as given by educational leaders accord with the project idea stated above.

Stevenson (8)[1] says, "the project is a problematic act carried to completion in its natural setting."

Charters (2) defines it similarly, "an act carried to completion in its natural setting, and involving the solution of a relatively complex problem."

Kilpatrick (4) would read into the term the idea of "purposeful activity," and would include the "adequate use of the laws of learning and the essential elements of the ethical quality of conduct."

Snedden defines the project as "a definite unit of instruction which combines practical or manipulative achievement with a definite enhancement of power to apply related technical knowledge."

The outstanding features of the project according to McMurray (5) are:—(a) it is an important whole; (b) it is dynamic in its essential forward movement; (c) it organizes and uses knowledge on the basis of a definite purpose; (d) it sets up a series of problems requiring continuous rational effort; (e) it works out a practical result which is embodied in a concrete object or situation in real life; (f) it leaves in the mind a knowledge product, which serves to introduce and explain other kindred projects.

McMurray (6) has organized a series of Type Studies and Lesson Plans, on the project basis, illustrating the above principles. These are issued from the George Peabody College for Teachers, Nashville, Tennessee, and include a wide range of subject-matter. Terms characterizing the *project* gathered from various authorities all true to the concept established in agricultural education are,—*reflective act, problematic act, large unit, natural setting, carried to completion, beginning and ending, sequence operational or seasonal, purposeful experience, manipulative processes, basic principles underlying processes, knowledge, residue, etc.*

---

[1]The numbers following the names refer to the bibliography at close of circular.

Not all the factors in the concept of the project may apply with equal clearness and force in other fields of learning as in agriculture, but a study of the project as considered in vocational education may clarify the concept and improve the methods of its use in general education.

Through the consideration of the next two aspects of the project to be discussed, the idea may be further clarified.

DAIRY PROJECTS AS A TYPE

(Conducted at the Metropolis High School, 1921-22)

Reported by H. C. Helm, Instructor

Following is a report of a Dairy Project conducted in connection with the class in Animal Husbandry at the Metropolis High School, Metropolis, Illinois. A modern dairy barn with Louden equipment was built on the block across from the High School. Four high grade Holstein cows and equipment necessary for the production and bottling of milk were purchased by the boys. (In March a fifth cow was added.) Under the supervision of the Instructor in Agriculture the boys operated the dairy before and after school hours each day. The project was a success in every respect. The boys took a keen interest in their work, which interest continued throughout the entire year. They learned the principles of dairying by actual experience and became proficient in the practices involved. The profits made it possible to divide $20 weekly in addition to an accumulated surplus at the end of the year.

Contract. At the beginning a contract was written and signed by the boys desiring to enter the project. It provided that each boy would invest $40 in the project for the purpose of buying the cows, feed and other equipment for production of milk. At the time the contract was signed each boy paid $5, which amount the contract provided he would forfeit in case he failed to go into the project the following year.

The barn. During the summer a modern barn was constructed, 18 x 30 ft., consisting of 5 stalls, a grain room, and a milk house, also a loft with a capacity for 9 tons of loose hay. The barn was equipped with Louden equipment, which that company was kind enough to furnish at a liberal discount. The barn with permanent equipment cost about $600, not counting the labor of the janitor and the Agriculture Instructor. The barn and permanent equipment were purchased by the school board. In return for their investment the school board received one tenth of the profits, which is an excellent return for the amount invested.

Cows. In the selection of the cows for the project the boys received excellent practice in livestock judging. The selection of the cows desired for the project was a very difficult task for Massac Co. Not being a dairy community, it has only a limited number of good cows. This task was made more difficult due to the fact that only fresh, high grade Holsteins in good condition were desired.

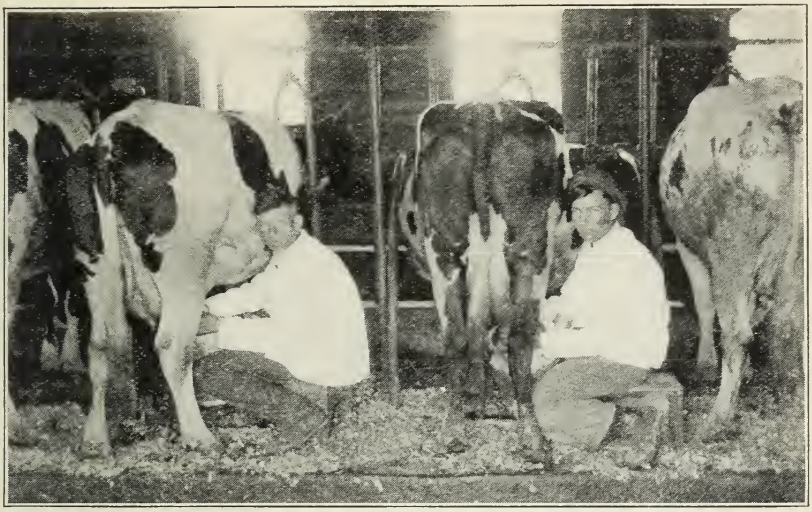
The boys. Nine boys entered the project. They were divided into three reliefs, of three each. Each boy worked three weeks and then for two reliefs or six weeks was off duty. This prevented the work becoming irksome. It was feared at

Cows and dairy barn, Metropolis High School dairy project

the outset that the boys might soon become careless about reporting to the barn for duty at the early hour of 5 o'clock. But this difficulty has been largely prevented by a system of fines for tardiness, also for any other neglect of duty or any failure to do their work in the proper manner and at the proper time. However it might be said that only seldom has it been necessary to fine the boys. One of the three boys of each relief was put in charge of the barn, with authority to order the others when necessary. As far as possible, however, each boy was made responsible for the performance of definite tasks. A set of rules for the governing of the project was posted in the milk house, and for every failure to obey the regulations a fine was imposed depending on the nature of the offense and the frequency of its occurrence.

One of the boys is responsible for the cleanliness of the milk house and has charge of the bottling of the milk and washing of the bottles, the other two have charge of the barn and the milking and feeding. As a rule the boys are through with the milking and bottling and ready to deliver the milk by 6:30 of a morning and 5:15 in the afternoon. For delivering the milk the boys are provided with 8 bottle quart carriers. As a rule the boys deliver on foot, which is not such a task, each boy having a route in the general direction of his home and the average number of bottles that each boy carries out each time is about 10 quarts and 5 pints. As a rule it takes from one half to an hour for the boys to deliver the milk walking, which means that at latest they are through of a morning by 7:30 and by 6:15 in the afternoon. Some of the boys deliver on bicycles, some in Ford cars and some have devised two wheel carts for the carrying of their bottles.

Sale of milk. From the start there has been a big demand for High-School milk. It would be possible to sell twice the amount that is sold. Although Metropolis is only a small town of 7,000 people, this dairy has interfered with other milk



Proper method of milking, Metropolis High School dairy project

producers but little. The boys have created their own market for by the production of an extra high grade of clean milk they have greatly increased the consumption of milk. Many people who as a rule used but a pint a day are now taking a quart and some as much as 4 quarts. In March at the request of the Woman's Club of the city a fifth cow was added to the herd and the sale of milk in 1-3 quart bottles was started. This milk was sold to the underweight children at the grade schools. The 1-3 quart bottles were sold at 4 cents.

Collections. With so many boys in the project it was not considered wise to use tickets. As a rule the customers pay weekly, each boy collecting for the milk he delivers. Every Saturday morning the boys collect all of the money due, they report to the barn at 10 o'clock, turn their money in and spend the remainder of the morning giving the barn and milk house a general cleaning. Some of the customers pay monthly by check. This is the best method and next year it is planned to have every one pay at the end of the month and instead of the reliefs being three weeks in length, they will be one calendar month.

Care of milk. One of the main objects of the project was the production of the cleanest milk possible. Every precaution was taken to insure the milk being clean. As soon as the milk is weighed it is run through a regular drum cooler and from there into a bottler which results in the milk being cooled and bottled within 5 or 10 minutes after it leaves the cow. Needless to say this rapid work greatly increases the cleanliness of the milk. The drum cooler removes any odors which might be present and by rapid cooling insures the milk keeping sweet a longer time. The special gurler pail is used.

Vaseline is used by the milkers. This has proved to be a great aid in the production of clean milk as it results in all foreign particles from the teats remaining on the milker's hands instead of falling into the pail.

The cows are kept as clean as is possible. The manure is cleaned out of the gutter several times a day. The mangers are scrubbed and disinfected weekly, as well as the platforms on which the cows stand.

Records. This being a class project, each boy kept a complete record and account of all operations. In the regular Project book all observations were entered. In addition, each boy kept a record of all receipts and expenditures as well as the feed used and the amount of milk produced weekly.

Difficulties. For the most part the boys took an active and keen interest in their work and seemed to take a pleasure in doing the various tasks. Yet at times the boys seemed to forget that they were working for themselves and seemed to take the attitude that they were working for the Agriculture Instructor. This attitude was not very marked and appeared only on certain occasions, mainly in the careless way in which they handled the equipment. At a very conservative estimate at least $50 worth of supplies were destroyed during the year as a result of carelessness.

Feeds and feeding. The table of weekly production will show that the cows were giving almost as much milk in March as in September, although two of the cows freshened in August and two in September. The usual weekly production from 4 cows was 1,000 lbs. The aim throughout the project was not maximum production but maximum economical production, and the profits derived from the project will show that the milk was produced at a good profit.

Method of feeding. The milk flow of the cows was maintained for such a long period by careful and regular feeding of balanced rations. As a rule 1 lb. of grain was fed for each 3 lbs. of milk produced. The cows were fed three times daily and their bowels carefully watched and both extremes guarded against.

Feed mixtures. At the beginning of the project the following feed mixture was used:

400 lbs. Bran (mill run or mixed feed).
400 lbs. Corn and cob meal.
100 lbs. Linseed meal.
100 lbs. Cottonseed meal.
100 lbs. Dried beet pulp.
15 lbs. salt.
22 lbs. charcoal.

Later in the year when the price of bran became higher the following ration was used:

600 lbs. Corn and cob meal.
200 lbs. Bran.
100 lbs. Cottonseed meal.
100 lbs. Linseed meal.
100 lbs. ground oats.

SUMMARY AND CONCLUSIONS

Profits. Dividends amounting to $20 weekly were declared, which amounted to $2 weekly for each boy and $2 for the school board. There being three reliefs each boy worked only a third of the time, therefore he actually received $6 for each week on duty for the few hours work before and after school. In addition to

the weekly dividends a surplus of over $200 was accumulated which was divided among the boys at the end of the year.

Objects accomplished. The project was undertaken largely for the following purposes: first, to teach the boys by actual experience the principles and operations involved in dairying; second, to determine the practicability of the class project in connection with the teaching of vocational agriculture; third, to provide the boys with spending money; and lastly, to furnish the citizens of Metropolis with a high grade of milk at a fair price. All of these objects were accomplished.

The boys not only learned the operations involved in dairying, but also had an opportunity to observe for themselves the truth of some of the facts concerning dairying. For instance the project convinced them as well as all others who observed the operation of the project of the truthfulness of the well established fact that the highest producer is the cheapest cow in the long run even though she may cost considerably more when purchased. Our best cow cost $90 and our poorest $65. A number of people told the boys they paid too much for the $90 cow, but every one agreed that the $65 cow was well worth the money. Yet by March 1 the $90 cow had given $150 worth more milk (at only 5 cents per pint, whereas we really received 7 and 6½ cents) than the $65 cow. Both cows received about the same ration, exactly the same care, and about as much time was required for milking the low as the high producer. Therefore the $150 was almost entirely clear profit over the low producer's profit. It is on the high producers that the profit in dairying is made.

The boys also had opportunity to see the result of regular care and proper feeding. In March a cow was secured, which, although having been fresh 3 weeks, was given only 6 lbs. at a milking. As a result of regular feeding of balanced rations within two weeks the cow was brought up to 18 lbs. per milking.

II. ORGANIZATION OF SUBJECT-MATTER BY THE PROJECT METHOD

If the project is to be taught to a learner, the subject-matter making up the enterprise must be determined. What is done in the project must be done by the learner, either in actual practice as in agriculture, or in a vicarious way by imagination, as in case of the study of the Panama Canal project. That which is known and done by the one who carries on the actual life project, must be imparted to the learner if he is successfully taught. All this constitutes the subject-matter of the project.

By *job analysis*, the enterprise to be taught is first resolved into the following parts, as a basis for curriculum organization:—(1) the problems of the larger unit or project in sequential order; (2) the procedure or manipulative and managerial processes in solving the problems; and (3) the reasons, principles, and basic facts, underly-

ing the processes used and such related matter necessary for the best success of the project and the educational development of the student.

The project-method of organization of subject-matter for teaching purposes involves: (1) large units of subject-matter having complete cycles of activities in natural order (2) problems and sub-problems arising in operational and seasonal sequence; (3) solution of problems in real life situations; (4) basic facts and principles underlying the processes in solving the problems.

The following illustrate types of job analysis outlines from which curriculums are built up on the project basis.[2]

OUTLINE OF TYPE PROBLEMS IN CROP PROJECTS[3]

Problem I. Why Grow Corn?

(Values and reasons entering into the farmer's decision to grow corn.)

Problem II. Deciding the acreage and fields.

Sub. p. 1. To determine the number of acres to sow of plant.
- a. & b. What factors determine corn acreage on a given farm?

Sub. p. 2. To locate the field for corn.
- a. What factors will determine the selection of a given field for corn?
- b. Reasons for such selection. Some references to crop rotation.

Problem III. Securing the Seed.

Sub. p. 1. To choose the variety.
- a. Name good varieties suitable for given localities.
- b. Give reasons for choice.

Sub. p. 2. To obtain the seed.
- a. Explain methods of getting seed. *Place, time, quality, price,* etc.
- b. Reasons for above procedure.

Sub. p. 3. To care for the seed.

Problem IV. Fertilizing the Soil.

Sub. p. 1. To apply manure.
- a. Time, method, amount, etc.
- b. Principles underlying use of manure.

Sub. p. 2. To provide green manure.
- a. Methods of supplying green manure.
- b. Values, basic principles involved.

---

[2]A full and detailed discussion of the points under (a) and (b) of each sub-problem outlined, would together constitute the curriculum organized upon the project basis.

[3]This outline is in accordance with the project idea as discussed by Bobbitt (1), Charters (2), Greene (3), and Nolan (7).

Sub. p. 3. To apply mineral plant food.
a. What to use, when and how to apply.
b. Reasons for above practices.
Sub. p. 4. To use limestone.
a. Describe the method of procedure in best practice to use.
b. Values and principles in limestone usage for this crop.

Problem V. Preparing the Land for Corn.

Sub. p. 1. To break the land.
a. Describe good practice.
b. Give principles involved in the process described.
Sub. p. 2. To prepare the seed bed.
a. Explain every step in the preparation of a good seed bed.
b. Values of a good seed bed, and reasons for the methods used.

Problem VI. Preparing the Seed for Sowing.

(Omit for Corn) Sub. p. 1. To inoculate the seed.
a. Describe good methods.
b. Reasons and principles for inoculation.
Sub. p. 2. To clean or test seed.
a. Methods used.
b. Reasons and basic facts.

Problem VII. Sowing or Planting the Seed.

Sub. p. 1. To plant the seed.
a. Describe methods used.
b. Reasons and principles involved.

Problem VIII. (Omit for Corn) Winter Protection of the Crop.

Sub. p. 1. To protect against winter conditions.
a. Practices to use.
b. Some winter injuries and reasons for methods of protection used.

Problem IX. Cultivating.

a. Methods used.
b. Principles.

Problem X. Harvesting.

Sub. p. 1. To harvest the fodder for silage.
a. Time and method used.
b. Reasons and principles for each practice.
Sub. p. 2. To harvest the seed.
a. Time, methods used, good yields, etc.
b. Reasons for procedure.

Problem XI. Disposing of the Crop.

Sub. p. 1. To cut for fodder.
- a. Describe good practices.
- b. Principles underlying practice recommended.

Sub. p. 2. To dispose of or handle seed.
- a. Procedure to follow.
- b. Reasons.

Problem XII. Control of Pests.

Sub. p. 1. To combat insects.
- a. The insect pests, and method of control.
- b. Reasons and interesting related facts.

Sub. p. 2. To combat fungous diseases.
- a. Diseases and methods of control.
- b. Principles and related facts.

Sub. p. 3. To combat weeds.
- a. Methods used with common weeds.
- b. Principles involved.

Problem XIII. Financial Accounting.

Sub. p. 1. To keep cost accounts.
- a. Methods.
- b. Principles.

EXAMPLE OF CURRICULUM CONSTRUCTION UPON THE PROJECT ORGANIZATION

(Paragraphs taken from a curriculum on a Corn Growing Project—Problem IV—Sub-problem 4—in Outline on Crop Projects.)

Applying Limestone.

a. Limestone was applied in this particular project at the rate of four tons per acre for the initial application. After four years the limestone is applied at the rate of two tons per acre each subsequent four years. The Kankakee limestone is used in the form of natural ground rock. A lime spreader is used in scattering the limestone. It is applied upon the fall plowed land.

b. The chief purpose in applying limestone to soils is to break up or destroy their acidity. Farm crops, especially the legume crops, will not grow in acid soils; while some crops like corn, oats, and wheat are more tolerant to acid conditions, but they will do much better in a soil that is sweet.

Limestone also has a tendency to break up tight soils and make them more porous so that surface water may percolate through them more readily. The soil bacteria or flora are also stimulated to a greater activity by the presence of limestone in the soil.

An application of 4000 pounds of lime applied every four years, is sufficient to break up the acidity of most soils. A greater application will do no harm and may produce larger crop yields, but where large applications are made they will not give as great financial returns for each ton applied, as when the limestone is applied

in smaller amounts. However, limestone should not be applied at a rate less than two tons per acre.

Extensive experiments on the use of the different forms of lime have been conducted at the Pennsylvania and Maryland Experiment Stations. The conclusions of these two stations are that lime in the form of the natural rock not only gives greater crop yields, but is less destructive on the organic matter of the soil. Where the burned lime was used there was a loss of 375 pounds of nitrogen from each acre.

It makes no difference when the lime is applied to the soil so long as it is dry. Whenever possible the lime is applied to the plots by the use of a limestone drill on ground that has been plowed. When this method of applying the lime is used, the lime is more thoroughly incorporated with the soil when it is being worked down to a seed bed. This method will also make the limestone available much quicker.

III. TEACHING BY THE PROJECT METHOD

Teaching by the project method means simply teaching the student to carry on and complete the project intelligently. Stockton (9) in his Project Work in Education says, "Subject-matter is manipulated and prepared for the mind, not in a logical, but in a psychological manner; and individual differences have full play. Special interests furnish the push, the motive for attack upon problems; and the solution of problems rather than the pouring-in of facts is seen operative everywhere.....

"Subjects are taught, not so much as separate factors, but as inter-related (correlated) elements of the social life involved. The whole content of the curriculum is unified and made practical (useful) not on an economic basis, (necessarily) but on this broad, cultural basis which interprets modern practical life, and makes the school part and parcel of it.

"If one looked for a single phrase to sum up the whole set of principles, he could not find a better one than Dewey's, *'self-education* through *activities,* or the common *learning to do by doing,'* so often quoted in the illustrations.....*'Learning to do by doing'*— is the absolutely fundamental element in project work."

Teaching by the project method as applied in agriculture involves the following devices:

1. Helping the pupils to lay out and plan an adequate project.
2. Using the project organization of subject-matter as a basis for study and teaching.
3. Visiting and giving personal instruction in the presence of the project, during its progress.
4. Assisting the pupils to recognize and solve problems arising.

5. Giving verbal directions, demonstrations, and supervised practice in teaching farm-craft skills involved in the project.

6. Teaching best farm practices as the processes in the solution of all problems of the project.

7. Teaching the principles and basic facts of science underlying the processes in the work of the project. This involves, according to Stevenson (8), the priority of problem to principle.

8. Organizing the knowledge gained, and the attitudes obtained into workable relationships in life.

9. Teaching methods and habits of good business procedure through records and accounts.

10. Endeavoring to "incarnate all the assured values" inherent in the case.

TEACHING BY THE PROJECT METHOD, AN EXAMPLE

The following stenographic sketch is taken from a full report of a teaching situation in which the teacher of agriculture had called at the farm to instruct the boy who had a pure bred swine project, on methods of registering his animals. After the usual greetings upon the occasion of a farm visit, the boy, impatient to get at the subject for which the visit was made, led the way to the pasture where the pigs were grazing and began the conversation as follows:

P.—I would like to know whether I should join a breed association or not.

T.—What are the advantages in joining such an association?

P.—Well, if I join it I can register my animals for a dollar apiece, whereas the rate for non-members is two dollars.

T.—What would help you then to decide as to whether you should join or not?

P.—If I register ten pigs I would save $10 or the fee for joining the association, and after that I would save a dollar on each animal registered. I wondered whether I should join or not, since I intend going to college next year, and a membership would not be of any value to me then.

T.—You could sell your membership to your father, or better still you could register under the name of Kipfer and Son, with one membership, and when you go to school your father could register your animals for you. How many are you planning to register?

P.—I intend to register two or three best sows for breeding purposes and sell the rest to dad.

T.—Why do you like the Hampshire breed?

P.—The Hampshire matures well and finishes out evenly and economically. They have less lard and furnish good expensive cuts of meat

T.—You have the blanks upon which to make application do you not?

P.—Yes, I have them here in my pocket. You will notice on this pedigree (showing the blank forms) that the ancestry is only traced back one generation. This is their new form of pedigree just recently adopted

T.—This outline takes up the registering of hogs under three phases;—the *herd record book* and *breed association*, the *pure-bred animal*, and the *pedigree*. Is there any question about filling it out? (None raised by boy.) You must give the name of your animal that you desire to register, and the name and number of the sire and dam. How would you know if your animal was eligible to register?

P.—I would see if both its sire and dam have been registered, then I would know that my animal would be eligible, providing he meet the breed requirements.

T.—How far do you trace back the ancestry in registering?

P.—Only the first generation back.

T.—Where would you get the serial number of the sire and dam?

P.—From their pedigrees.

T.—What is the special value in the pedigree?

P.—You can trace back and find out the breeding of any registered animal.

T.—If you give the sire's name and number, and the dam's name and number, that is all that is necessary in applying for pedigree.

P.—The number of my sow is 8580.

T.—And you must be sure of the number. When you make application for these pigs, you must be sure to get the number correct or they will find that the name they have does not agree with the serial number you sent in, and they will check up on you. Now I would like to have you fill out your registry blanks as carefully and neatly as you can and let me see them before you send in your application. The association will look over the application and decide on the right to give pedigree to your pigs.

SUMMARY

Three purposes prevailed in the writing of this circular:

First, to set up the general concept of the *project,* as understood in vocational agriculture. The farmers' enterprises were considered as examples of projects as a basis for forming the project concept. The definitions as given by Charters (2) and Stevenson (8) are accepted as satisfactory.

Second, to show the method of organizing curriculums on the project basis. The project is analyzed into its problems and subproblems, the manipulative processes necessary in the solution of the problems are described, and the basic principles and related facts underlying the processes making for intelligent performances are stated. All this subject-matter taken together constitutes the project curriculum.

Third, to explain and illustrate the project method of teaching. The teacher aids in setting up the project, stimulates and guides the pupil in the solution of the problems of the project, and teaches inductively the principles underlying the processes in the solution of the problems. Individual instruction is given at the scene of the project, and the pupil's interest and motives are stimulated by real life issues of vital concern to the pupil.

BIBLIOGRAPHY

1. Bobbitt, J. F. The Curriculum. Boston: Houghton Mifflin Co., 1918. Chapters VI and X.

2. Charters, W. W. Curriculum Construction. N. Y.: Macmillan Co., 1923. Chapters XIV and XXI.

3. Greene, J. H. Constructing a Project Curriculum in Sheep Husbandry. Thesis. University of Illinois, 1920. 233 p.

4. Kilpatrick, W. H. "The project method; the use of the purposeful act in the educative process." Columbia University Teachers College Bulletin, Series 10, No. 3. N. Y.: Columbia University Teachers College, 1918. p. 3.

5. McMurray, C. A. Teaching by Projects; a Basis for Purposeful Study. N. Y.: Macmillan Co., 1920. 257 p.

6. McMurray, C. A. Type Studies and Lesson Plans. George Peabody College for Teachers Bulletins. Nashville, Tenn.: George Peabody College for Teachers.

7. Nolan, A. W. The Teaching of Agriculture. Boston: Houghton Mifflin Co., 1918. Chapter VII.

8. Stevenson, J. A. The Project Method of Teaching. N. Y.: Macmillan Co., 1921. p. 43.

9. Stockton, J. L. Project Work in Education. Boston: Houghton Mifflin Co., 1920. p. 67.