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A Practical Approach to Teaching Agriculture: A Review of Textbooks, 1905-1915

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By 1900, most teachers throughout the nation taught from a standardized curriculum developed by the state superintendent of public instruction. At that time, reformers urged educators to introduce a new subject, agriculture, into the rural school curriculum. By 1912, at least sixteen states required the inclusion of such a course in the curriculum. What many reformers failed to recognize were the theoretical and practical differences between the teacher-centered methods that much of the rural population had grown up experiencing and the new student-centered methods touted as superior for studying agriculture. Much scholarly attention has been given to the traditional teaching methods of country schools, but far less has been devoted to student-centered methods.* This paper focuses on the latter method as exemplified in a sample of agriculture textbooks of the era. Professors Ellis and Abreu-Ellis do not presume that the instructional methods in these textbooks were actually employed in country schools but that the textbooks revealed how the authors hoped country schoolteachers would utilize the methods.

—Ed.

Introduction

In 1837, Professor J. Orville Taylor, author of *The District School* and editor of the *Common School Assistant,* wrote in *The Farmers' School Book*, a reader targeted toward country schools, that "children may read and study in the school-room what they will practise [*sic*] when they become [adults]."[1] This was clearly a call for relevancy of educational material to the practical applications students would make in the job market or in their daily lives on the farm. In fact, Taylor was adamant that *The Farmers' School Book* should be used "in the place of the 'English Reader,' 'Columbian Orator,' and other similar works" with the intent that, in its reading, "the children will learn the business of practical life; and this is much more desirable than to read the English Reader, a book they seldom [understand], and one they can put to no practical use."[2]

This call is not surprising given the nation's industrial development. Frederick Rudolph, author of *The American College and University: A History,* observed that "by the 1850s the industrial potential of the United States was as apparent as its agrarian past, and there emerged a growing awareness that a new age required new training and new preparation."[3] This advancement would require the marriage of science and agriculture that was solidified in 1862 with the passing of the Morrill Act, under which each U.S. state was provided with the equivalent of 30,000 acres of land to be used, and the liquidation of its sale, to "provide colleges for the benefit of agriculture and the mechanic arts."[4] This act stated openly that there was a place for technical programs in higher education,[5] and this meant that people previously excluded from higher education such as farmers and industrial workers were now to be included. The dean of the College of Agriculture at the University of Missouri in 1872 stated, "We will teach the science of high production," and further, "Our college shall be a living and ever multiplying power to make the farms prosperous and happy and enable them to compete with the cities for the best talent of the land."[6]

In 1887 the federal government gave further support to the study of agriculture. On March 2, 1887, the Hatch Act was passed to establish agricultural stations in connection with the colleges founded under the Morrill Act. Section 2 of this Act asserted that the objective of these agricultural experiment stations was to conduct original research on the physiology, health, development, and sustainability of plants and animals.[7] The research and publications that came forth from the agricultural stations included such journals as *Science* (1880-2010), published by the Association of American Agricultural Colleges and Experiment Stations. The stations also helped textbook writers, many of whom were academics, in the development and layout of their instructional materials. For example, textbook writer G. F. Warren noted in his preface to *Elements of Agriculture*, "In preparing this book, the author has tried to carry out, as far as possible, the recommendations of the committee on methods of teaching agriculture of the Association of American Agricultural Colleges and Experiment Stations."[8] Willet M. Hayes, in his textbook *Farm Development: An Introductory Book in Agriculture,* deferred authority to state institutions observing, "No attempt is here made more than to introduce the several subjects[;] the farmer or pupil reading this book who wishes to pursue the subject in detail should seek advice of the State agricultural college and the Department of Agriculture as to the best up-to-date available literature published by public and private agencies."[9] Similarly, in their preface to

Agriculture Through the Laboratory and School Garden: A Manual and Text-book of Elementary Agriculture for Schools, C. R. Jackson and Mrs. L. S. Daugherty acknowledged their indebtedness to individuals and experiment stations for the illustrations included in their textbook. These curriculum developers also acknowledged the help of individuals from the U.S. Department of Agriculture.[10] It is evident that these authors built their content on the foundation of scientific findings from the agricultural experiment stations and public and private agencies.

Textbooks like these, as well as the institutions that shaped their contents, present a challenge to a common historical viewpoint. Many scholars and lay historians view teacher-centered instruction as the only method country schoolteachers used. They largely overlook curricular materials that began to promote student-centered methods to teach agriculture.[11] To promote a better understanding of this development, a sample of agriculture textbooks published between 1905 and 1915 was selected for content analysis. Patton (2002) explains content analysis as searching a text for recurring words or themes that allow for data reduction and formation of meanings of qualitative data.[12] This study analyzes agriculture textbooks recommended by Benjamin Marshal Davis, a professor of nature study and agriculture education at Miami University, who viewed the textbooks as being laboratory- and experiment-based.[13] The instructional methods described in the books fall along a spectrum from teacher-centered to student-centered. The methods that most clearly exemplify the new student-centered approach are used for identification and categorization.[14] Five themes emerged from this process: transferring knowledge, making comparisons, making field-based observations, collecting field-based samples, and demonstrating new knowledge and skills. Thus, the demonstration of any one of these skills by students, as described by the prescriptive methods in the reviewed textbooks, would constitute a student-centered lesson or approach to instruction.

The Call for Agricultural Education

The authors represented in this study believe that the use of better science will result in agricultural practices and production that will reap many rewards. Thus, they argue that it is important to educate the young in the science of agriculture. As textbook authors Hilgard and Osterhout state in *Agriculture for Schools of the Pacific Slope*, "In order to equip the farmers of the future, it is necessary to instruct the children of the country in agriculture, and the time has come when the subject must have a place in school teaching."[15] To their minds, agriculture is an indispensable subject, for agriculture is a part of all of humanity. For example, textbook author G. F. Warren observes, "We can never wholly separate our interests from the soil on which we walk, and the plants and animals on which our life depends."[16] Similarly, Jackson and Daugherty point to humanity's co-existence with the land. "All the food, clothing, and shelter for all animals, including man, must come directly or indirectly from the soil," they write. "When this soil is exhausted through the carelessness of man, where will this same man appease his hunger or obtain sustenance?"[17] This latter quotation is evidence of a movement toward preservation, another justification for including agriculture in the curriculum. Kenyon L. Butterfield writes in the introduction to *Fundamentals of Agriculture*,

> Farming is no longer a matter of experience only—it has become a subject of study. A farmer must be an educated man.—The very fact that there is so much that is new to learn about agriculture, and that farm practice must be worked over in the light of this new knowledge, makes it important that everything possible be done to give a wide distribution to what we already know about the science of agriculture.[18]

The textbooks in this study include a general condemnation of urban conditions when compared to the healthier conditions of life in the country. Hayes observes, "Farm life [is] still more desirable and the farm home a better place for the development of character in the boys and girls who are fortunate in passing their early years with sturdy and truthful nature rather than amid the often adverse conditions obtaining in the crowded city."[19] Warren further notes,

> The present trend of all our education is cityward. We have been living in a city-making epoch. The bright farm boy, as he has attended the village high-school, has been taught much that would naturally interest him in city occupations. The teacher has become interested in him, and has encouraged him to "make something of himself." This usually means that he becomes a lawyer, a doctor, or perhaps an engineer. The nature of his books, and the advice of his friends, have led him to believe that these are the lines in which mental ability will bring the greatest returns. If he did become a farmer, he frequently felt that by doing so he lost his real opportunities. In the past, this may have been so; but today, law, medicine, and the ministry are not the only learned professions. The practice of agriculture now offers as great a field for scientific study as is offered by the practice of medicine.[20]

What Warren's observation represents can be characterized as romanticism for farm living and a celebration of farming as a worthy occupation. Warren also argues that the central focus of teaching agriculture is not to breed more farmers, but instead to bring “the schools in touch with the home life—the daily life of the community” and as such build a bridge between scientific theory and practical application at home, on the farm, and in the garden.[21]

Teacher vs. Student-centered Instructional Methods

In 1911, textbook author Benjamin Marshall Davis laments that a preponderance of school textbooks cover agriculture but very few emphasize using the subject as a platform for laboratory or experimental methods.[22] Davis’s view is congruent with that of other educational theorists such as Grace Marian Smith who writes that “agriculture is not a book subject. The way to teach agriculture is the ideal way to teach anything. Assign a topic for experimental work.”[23]

In the majority of elementary textbooks of the time, teacher-centered instructional methods do not rely on laboratory training; instead, authors utilize a scripted textbook method of teaching. Authors use clear and concise language to facilitate the learning of the subject matter. It is assumed that the students have background knowledge and experiences and are able to interpret the content being presented in the texts. The students are not required to apply their knowledge but to summarize or memorize it.[24]

The preferred instructional methodology of the authors selected for this study, conversely, is student-centered. The authors hold the view that in student-centered learning, pupils are prompted to act independently of the teacher and perform experiments. The students are the producers of knowledge while the teacher is a guide or facilitator. Discovery is apparent when the experiment’s results drive the students’ application of knowledge. For example, L. H. Bailey observes, “The subject is not one that can be memorized, or even acquired in the ordinary method of school study; it must relate itself to the actual work and business of the community in such a way as will develop the student’s judgment of conditions and affairs.”[25] Jackson and Daugherty note, “It is neither pedagogical nor scientific to tell a student what he can find out for himself. It takes away both the incentive and the necessity for experimental work to foretell the result.”[26] These authors believe it is important to allow the student to read the directions of the experimental work and perform it without the guidance of the teacher. Conclusions are to be drawn only though the process of experimentation.[27] More specifically, the students are expected to develop the ability to transfer knowledge, make comparisons, make field-based observations, collect field-based samples, and demonstrate new knowledge and skills.

Transferring Knowledge. An important goal of student-centered instruction is the ability to transfer knowledge, that is, to gain knowledge in one context and apply it in another. Knowledge transfer is evident in two different textbooks that discuss the same concept. Hilgard and Osterhout, in the foreword to the teacher in *Agriculture for Schools of the Pacific Slope*, observe that "agriculture cannot be effectively taught if the pupils merely memorize the lessons and recite them" and further note that "it is vastly more important that their interest in the subject should be excited by demonstration and experiment before their eyes, and, so far as possible, that the experiments should be made by the pupils themselves whether in the schoolroom or garden."[28] Hilgard and Osterhout address "what plants need."[29] What follows is a prescriptive scientific method of comparing variables. For instance, one of the first questions in the chapter is, "Can seeds grow without air?" This question is answered by students who plant wheat seeds in both open and corked containers and observe the growth of the seeds over time.[30] It is not obvious that the seeds in the corked container will germinate nor that the presence of air is a basic condition for seed growth. Students use a comparative method whereby they witness the causal relationship between growth and the basic conditions needed for life. Their first-hand experience enables them to recognize the requisite conditions of plant biology. Their acquired knowledge is then to be transferred and generalized to all living organisms.

Making Comparisons. The goal of making comparisons is evident in many activities. For instance, to illustrate the effect on the moisture level of soil and growth rates, Hilgard and Osterhout have students measure different volumes of water that are added to soil containing wheat seeds.

> We take several tumblers of the same size, place them in a row, and fill them with earth which has been made fine and well dried. Now we add different amounts of water to the various glasses in order to see the effect on the wheat which we plant in them. Leave the first tumbler quite dry, put a little water in the second, still more in the third, and so on, increasing the amount of water so that the earth in the last tumbler will be very wet.[31]

The discovery for the students is to result from observing which wheat grows best over time. Hilgard and Osterhout take the experiment a step further by giving students a tactile experience by having them rub the soil between their fingers to get a better idea of the appearance and feel of the soil that contains the right amount of water.[32]

In the chapter titled "Soil Moisture and the Preparation of Soil," Jackson and Daugherty use a similar comparative model in teaching students, but they focus the lesson on drainage:

> (a) Take two eight-inch flower-pots and label them 1 and 2, respectively. In No.1 pour a sufficient amount of melted paraffin in the bottom to plug up the holes, so that no air may pass in through, and no water pass out through the bottom of the pot. In the bottom of No. 2 place a layer about an inch in depth of stones or pieces of broken pottery.
> (b) Nearly fill each pot with a mixture of three-fourths good soil, thoroughly pulverized, and one-fourth sand.
> (c) Place in each pot a young, healthy plant of the same size and kind.
> (d) Now carefully sprinkle each with water until the soil is saturated.
> (e) After a day or two put these pots in a sunny window.
> (f) In each place a thermometer, with the bulb at the depth of two inches.
> (g) Every two or three days note the temperature, and the condition of the soil and the plants in each pot.
> (h) At regular intervals … apply equal quantities of water to each of these pots.
> (i) In about five or six weeks remove the soil—plant and all—and note the depths to which the roots have penetrated.[33]

After the experiment has been completed, students are led through a series of guiding questions for their observations as related to "real world" conditions; for instance, "If these conditions of soil moisture existed in an open field in early spring, and were followed by drought, how would these root systems compare in aiding the plant to withstand it?"[34]

In these examples, the authors discuss the same phenomenon (the effect of soil moisture level on plant development), but they choose to study it through experimental methods with a different focus. In the first example, the students compare various moisture levels and track the best growth. Many constants are described: the containers, the seeds, the location of the plants, and the initial soil conditions. What is being manipulated is one variable—the quantity of water being added to the soil. In the second experiment, drainage is the variable being manipulated by sealing one pot with wax and adding material to the second pot that allows it to drain. It is important to note that the authors develop a prescriptive experimental design for activities related to the concepts being taught. They expect students to process and transfer that knowledge as well as generalize it to other environments.

While these two activities foster a sense of discovery, other textbook authors lead the student more explicitly to the correct answer. Consider Warren's laboratory exercise in the chapter titled "Soil Water—Drainage: Best Amount of Water."

> *Materials.* - two flower-pots with soil; two geraniums or other flowers growing in pots. Set one geranium in a dish of water. Plant corn in two other pots, and stand one in a dish of water. Keep water constantly in the dishes under the two pots, and water the other two in the usual way. Notice the effect of the excess of water on the geranium and on the germination and the growth of the corn. If the corn in the wet pot grows, empty both pots and examine the roots.[35]

By using tentative language such as "if the corn in the wet pot grows" and negative descriptors such as "excess of water," the students are likely to come to a conclusion about the result of the experiment without ever having carried it to fruition. Warren works on the premise that students need to generalize the knowledge gained from the laboratory experience to the "real world." Thus, he includes guiding questions such as, "What is the effect of flooding on field crops? On trees? Some crops will live on soils that are so wet that other crops would be killed. What ones?"[36]

To illustrate an extremely teacher-centered approach for the same content, A. R. Whitson explains drainage in the discussion of the soil; however, he provides no laboratory exercise. The text simply states, "Fresh water falling as rain absorbs considerable oxygen from the air so that if there is a more or less constant movement downward of rainwater through the soil the roots of plants may develop readily in it though the soil is thoroughly saturated. It is the water-logged condition which is unfavorable to crops."[37] The author includes an image of an apparatus which could be used to test the capacity of soils to hold water. In this instructional example, the answer is readily provided by the author and the concept covered, but no experiential activity is included.

Making Field-based Observations. The textbooks in this study have two methods of field-based learning best described as (a) direct observation of agricultural practices and (b) the identification and classification of plant and animal life. Hilgard and Osterhout note the importance of field-based observation not as a supplement to the textbook but rather as inspiring students to read the text to supplement what they cannot see through direct observation:

> Short excursions to points in the neighborhood where agricultural operations are actually going on, or where the crops and implements are used in the cultivation can be seen and handled, will be vastly more effective in exciting the children's interest and causing them to read in the book what they cannot actually see than any amount of oral teaching.[38]

Further, H. P. Agee observes, "If sugar cane or syrup is manufactured in the neighborhood, the teacher should take the class out to such a place and require the pupils to take notes of harvesting, planting, fertilization, and manufacturing."[39] Direct observation in a practicing agricultural environment is the key to students' learning along with detailed note-taking on what they observe. These methods parallel research practices still employed today.

An example of the identification and classification of plant life through field-based observation is found in Warren's discussion of the plants' struggle for existence. Warren suggests taking a field trip in which students are required to go to a weed patch where they each are provided with one square foot of the area. Students are asked to count all plants within their designated square and account for the number of plants they believe will not form seeds,[40] thus illustrating the theory of natural selection.

Of particular interest is the advent of the prescriptive processes described when possible field experiences are limited. E.H. Jenkins' approach reflects social learning theory, defined by Samuel Dutton in 1897 as methods of instruction that are dominated by the idea that school is a social institution. [41] In the following example, a student with relevant knowledge and experience is encouraged to share with the other students.

> If tobacco is not grown in your locality, ask the pupils if they have ever seen this crop growing. If any of them are familiar with tobacco, have one of them explain the process of planting, cultivating, harvesting and curing. If tobacco is grown in the neighborhood the class should be taken to a prosperous farm and the crop studied.[42]

In the absence of immediate opportunities for observation, Jenkins draws on students' collective experiences to preserve a student-centered approach.

Collecting Field Specimens. Another activity described in the selected textbooks is collecting specimen materials. Jackson and Daugherty, when explaining the enemies of plants*,* suggest that "the class should make a field trip to study the habitat and the habitus of insects, and to collect their own material for laboratory work" using "a net, cyanide bottle, and empty bottles for the reception of live insects."[43] In order to study farm crops, A. D. Shamel suggests that students procure a corn plant and bring it to school and study its roots, stalk, leaves, and tassel. He also suggests that each student bring ten ears of corn and determine how to pick the best ear. The follow-up question is, "Which ear would yield the best crop?"[44] This activity returns to the thematic idea that through modern scientific practices in agriculture, more efficiency and higher crop yields can be gained.

Like Jackson, Daugherty, and Shamel, several other authors suggest students go into a field and bring back samples to the classroom. In the study of manures as fertilizing materials, for example, J. E. Halligan recommends that students bring sand, clay, and farm manure to the classroom. The intent is to measure how farm manure, when mixed with sand and clay, helps with the retention of water in the soil. Students are asked to record the amount of time it takes for water to pass through the soil mixtures.[45]

Jackson and Daugherty provide another example related to the study of leguminous plants:

> (a) Collect specimens of various leguminous plants, taking great care to procure the root systems intact.
> (b) Look for tubercles or nodules on the roots. Where found?
> (c) Note the relative size of nodules upon different kinds of plants, and upon the same kind of plants grown in different soils.
> (d) Do you find any legumes which have no nodules? If so, test the soil in which they were grown for acid. If any acid is present, what would you advise? If no acid is present, what?[46]

Demonstrating New Knowledge and Skills. Several forms of assessment are discussed in the textbooks reviewed. While some questions rely on responses that can take the form of oral presentation or written work, others ask students to observe and research a topic in their community. For example, in asking students to apply knowledge gained through the activities in the text, C. P. Halligan writes that students should:

> Select a site in your locality that you believe would be an ideal one for an orchard. Explain your reasons for this selection. Is there an orchard in your locality that you think is poorly situated? Why? Explain the proper method of planting a tree. How far apart are the apple trees planted on your farm or in an orchard in your locality? Do you think that this distance is the most desirable? Why is it necessary to prune the branches on the tree after it has been transplanted? How many farmers in your locality till their orchards? How many do not? Which are the more successful in producing good crops or fruit? Why is a cover crop advisable? Describe some harmful insects or diseases that you have seen on the apple. How could these have been prevented?[47]

Halligan is clearly asking students to apply the analytic skills acquired as a result of following the text and surveying possibilities and current realities within their own locale.

In another example, Warren takes a different approach to assessment of knowledge and skills. He asks students to do the following:

1. Make a sketch of a hen house adapted to your region.
2. What diseases of poultry are most common in the section? What is done to control them?
3. From feeds used in the region, prepare a ration for 100 laying hens, each averaging 3.5 pounds in weight.
4. How are eggs sometimes tested by egg-dealers?[48]

First, the students are directed to create an artistic rendering of something observable. Next, they must perform research to see what diseases are more common in a very finite area of the region and what is being done to control the diseases. Third, students are asked to find out what local feeds are used and then to perform the mathematical computation to feed one hundred laying hens of a determined weight. Finally, students are directed to find out how eggs are being tested. All components in this example require a degree of field research tied to the locality where the students live. In essence, students have to research local conditions for evidence of disease, local feeds, and tests of eggs, all of which require learners to leave the classroom.

Finally, in an example grounded in problem-based learning, G. E. Stone describes an exercise in which students are asked to find local trees “that have been injured by gas or electricity.”[49] Further, students are asked to analyze the trees to see if they fit the description of the trees in their textbook. As an outcome of the activity, students have to produce a list with the names of the trees on their street that have telephone or telegraph wires running through their branches and determine the best way to fix the situation. This example demonstrates that students are required to use lower-level thinking (identification of a tree at risk of being killed by a current of electricity), and higher-level thinking (creating a solution for the problem).

Conclusion

This review of the selected textbooks from 1905-1915 reveals an explanation for a perceived need to include agriculture in the country school curriculum. While this curricular development is justified as training future generations of farmers, what lies beneath this surface explanation is the evolution of agriculture as grounded in the sciences. The indicated textbooks share a common thread of the application of the scientific method and controlled laboratory work as well as field-based observation and practices tied to classroom and book learning. Of particular interest are the varying approaches among the texts to reach the same fundamental outcomes in understanding the science of agriculture. These approaches are demonstrated as a spectrum that moves from teacher-centered to experiential student-centered learning. In this latter case, students are expected to go into the field and community to gather samples and data and to analyze and apply what they have gathered.

By 1912, agriculture was a required subject in the country school curriculum in at least sixteen states. This movement resulted from both legislation and the natural growth of agricultural clubs for school-aged children.[50] Reformers argued that effective education should reflect the needs of the community. For farm communities, agriculture was the primary industry, and therefore rural education should be agricultural in nature.[51] City and rural life were similar until towns became large manufacturing and commerce centers. At this point, teachers trained in those centers were unprepared to meet the needs of farming communities.[52] As a result, teachers had to seek further professional development or rely on textbook based instruction as a "means of substituting agricultural information for real agricultural instruction."[53]

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* However, Fuller devotes much attention to various teaching methods in country schools. See Wayne Fuller, "The Teacher in the Country School," edited by Donald Warren, *American Teachers: Histories of a Profession at Work* (New York: Macmillan, 1989), 98, 104-117.

Notes

[1] J. Orville Taylor, *The Farmer's School Book* (Ithaca, NY: Mack, Andrus, and Woodruff, 1837), 7.

[2] Ibid., 3.

[3] Frederick Rudolph, *The American College & University: A History* (Athens, GA: University of Georgia Press, 1990), 248.

[4] Act of July 2, 1862 (Morrill Act), Public Law 37-108, which established land grant colleges, July 2, 1862; Enrolled Acts and Resolutions of Congress, 1789-1996; Record Group 11; General Records of the United States Government; National Archives, 1.

[5] Rudolph, *The American College & University.*

[6] Jonas Viles, in Frederick Rudolph, *The American College & University*, 252.

[7] United States Statutes at Large (1887). Hatch Act of 1887. Vol. 24, 49th Cong., Sess. II, 440-442.

[8] G. F. Warren, *Elements of Agriculture* (New York: The MacMillan Company, 1915), viii.

[9] Willet M. Hayes, *Farm Development: An Introductory Book in Agriculture* (New York: Orange Judd Company, 1912), iii.

[10] C. R. Jackson and Mrs. L. S. Daugherty, *Agriculture Through the Laboratory and School Garden: A Manual and Text-book of Elementary Agriculture for Schools* (New York: Orange Judd, 1905).

[11] For example, see Myrna Grove, "Writing Nonfiction About Country Schooling," in *More Than 200,000 Country Schools: A Guide to Research, Preservation, and Education,* ed. Lucy Forsyth Townsend (League City, TX: Country School Association of America, 2016), 124.

[12] Michael Quinn Patton, *Qualitative Research & Evaluation Methods* (Thousand Oaks, CA: Sage Publications, 2002).

[13] Benjamin Marshall Davis, "Agricultural Education: Textbooks," *The Elementary School Teacher* 11 (June 1911): 517-527.

[14] Patton, *Qualitative Research & Evaluation Methods.*

[15] E. W. Hilgard and W. J. V. Osterhout, *Agriculture for Schools of the Pacific Slope* (New York: The MacMillan Company, 1910), 6.

[16] Warren, *Elements of Agriculture*, vii.

[17] Jackson and Daugherty, *Agriculture Through the Laboratory and School Garden,* 101.

[18] Kenyon L. Butterfield, "Introduction," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911), xiii.

[19] Hays, *Farm Development*, 18.

[20] Ibid, viii.

[21] Ibid, vii.

[22] Davis, "Agricultural Education: Textbooks," 517-527.

[23] Grace Martin Smith, "Teaching Agriculture," *The Journal of Education* 76 (September 1912): 299.

[24] Davis, "Agricultural Education: Textbooks," 517-527.

[25] L. H. Bailey, in Warren, *Elements of Agriculture*, vi.

[26] Jackson and Daugherty, *Agriculture Through the Laboratory and School Garden,* vii.

[27] Ibid.

[28] E. W. Hilgard, and W. J. V. Osterhout, *Agriculture for Schools of the Pacific Slope* (New York: The MacMillan Company, 1910), ix.

[29] Ibid., 1.

[30] Ibid.

[31] Ibid., 17.

[32] Ibid.

[33] Jackson and Daugherty, *Agriculture Through the Laboratory and School Garden*, 64.

[34] Ibid., 65.

[35] Warren, *Elements of Agriculture*, 107.

[36] Ibid., 107.

[37] A. R. Whitson, "The Soil," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911), 18.

[38] Hilgard, and Osterhout, *Agriculture for Schools of the Pacific Slope,* ix.

[39] H. P. Agee, "Sugar Cane," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911), 158.

[40] Warren, *Elements of Agriculture*.

[41] Samuel Dutton, *My Pedagogical Creed* (Chicago: E.L. Kellogg & Co., 1897), 2.

[42] E. H. Jenkins, "Tobacco," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911), 164.

[43] Jackson and Daugherty, *Agriculture Through the Laboratory and School Garden,* 293.

[44] A. D. Shamel, "Corn," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911).

[45] J. E. Halligan, "Farm Manures," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911).

[46]Jackson and Daugherty, *Agriculture Through the Laboratory and School Garden,* 126.

[47] C. P. Halligan, "The Planting and Care of the Orchard," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911), 208.

[48] Warren, *Elements of Agriculture*, 368.

[49] G. E. Stone, "The Injury of Gas and Electricity to Trees," in *Fundamentals of Agriculture*, ed. James Edward Halligan (New York: D. C. Heath and Company, 1911), 226.

[50] Benjamin Marshall Davis, *Agricultural Education in the Public Schools: A Study of Its Development with Particular Reference to the Agencies Concerned* (Chicago, Illinois: University of Chicago Press, 1912).

[51] Harold W. Foght, "The Country School," *The Annals of the American Academy of Political and Social Science: Country Life* 40 (March 1912): 149-157.

[52] Ibid.

[53] Davis, *Agricultural Education in the Public Schools*, 117.