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Educational Value of
Courses in Agriculture

by A.C. True

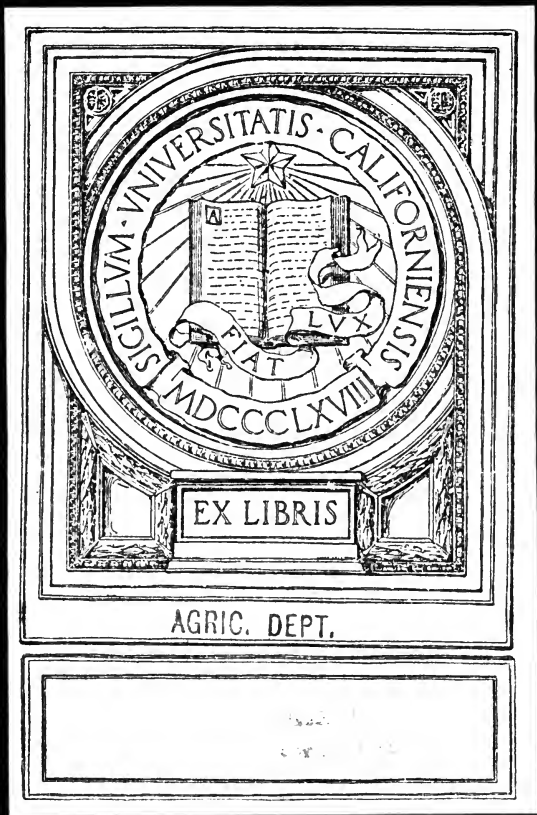
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Educational Values
of
Courses in Agriculture

1917

An Address

on the

Educational Values of

Courses in Agriculture

by

A. C. True, Ph. D.

**Director of the office of Experiment Stations of the U. S.
Department of Agriculture and Dean of the Graduate
School of Agriculture.**

with an introduction by

W. O. Thompson, D. D., LL. D.

President of the Ohio State University

Columbus.

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Introduction

The wider range of studies characteristic of modern education has grown out of the fact that new subjects have proved themselves to have a utility similar to that contained in the older curriculum in realizing the aims and results of education. The conclusion that education should embrace man's relation to all forms of human activity has been accepted. The technical and industrial have as clear a title to a place in any complete system of education as the literary or the professional. The paper read by Dr. True before the Graduate Summer School of Agriculture is an effort to set forth the claim of Agricultural courses to a place in our educational system and to justify their educational value. It is worth while to call attention to the popular misconception of these courses which amounts to a prejudice against them. The paper will, upon a careful reading, clear away many errors and give a clearer view of the current work in agricultural science. If the current opinion that nature study is a valuable element in the education of our children be accepted the conclusion that a wider study of nature through the avenue of the natural sciences would be increasingly helpful can not easily be resisted. The utter loneliness of a large proportion of our population in the presence of the Creator's universe of life and thought relations is a sufficient evidence of ignorance to warrant an attempt at its removal. Agricultural education aims to bring the student into intelligent and sympathetic cooperation with the world in which he must live and labor. Moreover this broader sympathy cultivated is not without its value in other than agricultural lines. An examination into the content of an agricultural course will reveal the fact that its students would be a decided acquisition to many of our secondary schools as teachers by reason of their training. In the interest of truth it may be well to note that an agricultural course as laid down in our colleges is no more exclusively of agriculture than the so-called philosophical courses are of philosophy.

Assuming that the end of education is to prepare men to live, it is proper to consider whether the subjects that directly engage a large proportion of our people and deeply affect many more ought not to have a place in our courses of study and competent teachers to present them. Dr. True's paper is a clear presentation of the claims of agricultural science and is worthy of a thoughtful reading by teachers.

W. O. THOMPSON.

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Address

By Dr. A. C. True.

In order to estimate correctly the educational values involved in instruction in the theory and practice of agriculture, we must first determine the standards by which these values are to be measured and then inquire how far they are affected by methods of instruction. It will also be necessary to consider the aims of such instruction and the relative place of agriculture in the curriculum.

According to Pres. Eliot of Harvard University there are six essential constituents of all worthy education—"constituents which make part of the educational process from first to last, in every year and in every stage."

"The first constituent is the careful training of the organs of sense, through which we get incessant and infinitely diversified communications with the external world, including in that phrase the whole inanimate and animate creation with all human monuments and records. Through the gate of accurate observation come all kinds of knowledge and experience. The little child must learn to see with precision the forms and letters, to hear exactly the sounds of words and phrases, and by touch to discriminate between wet and dry, hot and cold, smooth and rough. The organs of sense are not for scientific uses chiefly: all ordinary knowledge for practical purposes comes through them, and language too, with all which language implies and renders possible. Then comes practice in grouping and comparing different sensations or contacts, and in drawing inferences from such comparisons—practice which is indispensable in every field of knowledge. Next comes training in making a record of the observation, the comparison, or the grouping. This period may obviously be made either in the memory or in written form, but practice in making accurate records there must be

in all effective education. Fourthly comes training of the memory, or, in other words, practice in holding in the mind the records of observations, groupings, and comparisons. Fifthly comes training in the power of expression—in clear, concise exposition, and in argument, or the logical setting forth of a process of reasoning. This training in the logical development of a reasoning process is almost the consummation of education; but there is one other essential constituent, namely, the steady inculcation of those supreme ideals through which the human race is uplifted and ennobled—the ideals of beauty, honor, duty and love.

These six I believe to be essential constituents of education in the highest sense: we must learn to see straight and clear; to compare and infer; to make an accurate record; to remember; to express our thought with precision; and to hold fast on lofty ideals."

"There is also," he says, "general recognition of the principle that *effective power in action* is the true end of education rather than the storing up of information or the cultivation of faculties which are mainly receptive, discriminating, or critical." According to Prof. Hanus, professor of education in Harvard University, the educational values of different subjects consist (a) in the scope, kind, strength, and permanence of the *incentives* to activity; and (b) in the kind, degree, and permanence of the *power* to think and to execute that these subjects may develop.

Incentives are intellectual, aesthetic, moral, or constructive. *Power* is (a) specific—depending on the particular data with which the subject deals; (b) general—depending on the extent to which the same or similar data are found in other subjects and the extent to which the method of one subject may be applied to other subjects. Power is developed for the sake of cultivating desirable habits of thought, expression (in words or in some other appropriate way), achievement, and conduct. The conditions under which strength and permanence of power are developed are continuity and intensiveness in the pursuit of any subject based on interest. The subjects of instruction in the modern school course of study deal with the institutions, ideals, and conduct of men, and with external nature; namely: (1) Languages and literature, (2) social studies—history (including the history of industry and commerce as well as political history), government, descriptive economics; (3) art (including the history of art, as well as drawing, painting, modelling, music); (4) mathematics; (5) physical and biological science; (6) manual training.

The first two subjects (i.e. language and literature and social studies) and some forms of art have an *ethical* content and the incentives growing out of the ideals they portray are therefore higher than all others. Hence when these subjects develop *interest* they have a higher educational value than all others. Without interest these subjects can have only a moderate educational value in spite of their content; for they cannot be economically employed to develop desirable habits of thought, achievement, and conduct that give promise of permanence. But even without interest they have a moderate educational value since all may be influenced to some extent by the higher ideals of the race and need ethical and social enlightenment. Hence all pupils should be required to give a certain amount of attention to them.

The other subjects (mathematics, natural science and manual training)

either have no social or ethical content whatever, or involve social and ethical incentives only incidentally; and mathematics is especially narrow in the range of its possible incentives: Hence without interest, these subjects have only feeble educational value of any sort. With interest these subjects may be advantageously used for the development of habits of efficiency, *i. e.* of thorough and successful achievement. Such habits render their possessor useful and usually happy; and hence the subjects which develop these habits possess an educational value dependent on the kind and degree of usefulness and happiness which they develop. But the theoretical educational values of different subjects as thus determined are greatly modified by certain factors inherent in the pupil and his environment. One of these is the individuality of the pupil. This should be considered of more and more importance as the pupil advances in age and maturity. For each pupil will naturally develop certain tastes and capacities which will tend more and more to dominate his mental life and thus to furnish the permanent incentives which should guide him in the choice of his life's occupation and on which his highest usefulness and happiness will depend. It is one of the notable things in the educational progress of our times that there is a growing appreciation of the importance of determining and developing the individuality of the pupil in his school life. And it is one of the great advantages of the wide range of studies and the elective system in school and college that they open the way to the just consideration of this individuality. The growing complexity of civilization with its myriad forms of industry may contribute to the development of strength, beauty and variety in human lives and will do so when we have learned to measure human careers by broader and more comprehensive standards than those which are set by the traditions of a hoary but narrow past. At any rate it is true that as the pupil's individuality emerges the relative educational values of different subjects correspond for each pupil more and more to the relative degrees interest of they develop. School courses, especially above the elementary school, *i. e.* in the high school and college, should especially promote the development of each pupil's dominant interests and powers; and further should seek to render these interests and powers subservient to life's serious purposes, and also to the possibility of participation in the refined pleasures of life. The serious purposes of life are (1) self-support, or some worthy form of service; (2) intelligent active participation in human affairs. The refined pleasures of life are found in the ability to participate with intelligence and appreciation in the intellectual and aesthetic interests of cultivated men.

The college course, which we are now especially considering, should then allow the student the largest liberty in the choice of studies consistent with making him a man of culture and an intelligent and active citizen, while at the same time preparing him for the successful practice of that vocation for which his tastes and capacities best fit him. Doubtless the relative amount of attention which the pupil should give to studies directly relating to his chosen vocation will depend to a considerable extent on the length of his course, *i. e.* whether he expects to stop his school studies at the end of his college course, as is now ordinarily done, or to continue them in university or professional school.

It is becoming clearer as we study the educational problems of our times that the social, aesthetic and vocational studies are, or may be, interrelated in

such ways that we do well to unite them in courses of study from whatever standpoint the pupil approaches. If the student's dominant interest is along industrial lines we may make this the central feature of the course and at the same time lead him to take interest in other studies because of their relations to his chosen vocation.

In these statements of general principles we have been following Prof. Hanus as an authority and will now quote from his work on "*Educational Aims and Educational Values.*"

"For example: The future artisan will be interested in the history of his craft; thence easily in the history of industry; thence in its effect on the progress of civilization; thence in the political as well as industrial history of his race; that is to say, in the evolution of modern society, with its contemporary industrial, economical, and political problems. History, economics, and government thus become interesting, because they may be shown to have obvious relation to his dominant interest. Through history, the pupil may become interested in other peoples, with their literature and languages, and thus foreign languages may be and should be brought within the range of his interests. The obvious dependence of the thorough comprehension and pursuit of any trade on mathematics and natural science, leads to these sciences.

"Again, the future merchant or manufacturer, whose business interests outweigh all other incentives to activity, should easily be led to take an interest in the business relations of his own city, town, or State with other cities, towns, and States, and thence, by an easy transition, to the commercial relations of his own country with foreign countries, and to the leading interests of foreign nations. Before long the dependence of commercial and industrial activity on the form and structure, the physical features of the earth's surface, the raw materials of commerce and manufactures, which his commercial interest finds worthy of consideration, may be used to lead the pupil to natural science. Machinery for manufacture and for transportation are incidentally interesting at first, because they constitute a part of the vast commercial activity to which the future merchant feels himself irresistably drawn. Ere long, however, he finds that a comprehension of them depends on a satisfactory knowledge of mathematics and physical science. Everywhere money and credit are used to carry on commercial enterprises. Banks and banking appear as important phases of commercial activity; so also are the relations of labor and capital, and contemporary schemes of cooperation. The government which furnishes the necessary guarantee of peace, and protection of property for the uninterrupted pursuit of all these commercial and industrial activities, is of interest because, once more, it is necessarily associated with his dominant commercial interest; and so the youth is led to study economics and civil government. Moreover, the history of commerce and industry lead easily and naturally to the history of civilization.

"Commercial relations with other nations make clear the value of foreign modern languages, and these, when once pursued, for whatever cause, may come to possess an interest of their own. A command of the mother-tongue as the means of all communication for business purposes, may be utilized to extend the knowledge of its literary resources, and thus bring to bear on the future merchant its far-reaching influences on aims, character, and

tastes. Similarly the future artist, with his dominant aesthetic interest, may be led to take an interest in science, in mathematics, in history, and in language, because he finds in each of these subjects important assistance toward the civilization of what he has most at heart.

"Thus, by judiciously grouping the various subjects about a youth's vocational interests, he may be led, naturally and with the least resistance, to substantial achievement in all the fields of study open to him. He may be led to general culture, because these fields of study are shown to minister primarily to his vocational interests; because they make clearer the part he desires to play in the world, and strengthen his growing ability to sustain his part well, to do his chosen work well, and to find his way with increasing certainty through the complex affairs of modern, social and political life. But also, before long, we may hope, in most cases, because they afford that satisfaction which every human being feels in the enlargement of his mental horizon—because they bring within reach the disinterested pleasures of science, history, literature, and art, and enable him to pass through the world alive to its beauties, its marvelous system, and its unsolved mysteries."

I have dwelt on these general considerations regarding educational values because I believe it is very important that we should consider instruction in agricultural science and practice in the light of an educational problem differing in no essential particular from the problem involved in education in mechanic arts, engineering, natural science, or medicine. And just as any course in those subjects should be constructed with reference to the general needs of pupils for instruction in languages, literature, social studies, art and mathematics so the course in agriculture should be constructed. Emphasis must be laid upon this because the courses given at agricultural schools and colleges are often thought of as purely industrial in their scope and aim—"bread and butter" courses pure and simple. Arguments for a "practical" education are often heard which if taken literally would seem to imply that money-getting is the highest aim for a man to pursue and that therefore, all studies which do not directly prepare the pupil for the practice of an industry are to be tabooed. In this case of agriculture, in particular, it is often urged that pupils pursuing this study should be separated from those pursuing the classics, law or medicine or other culture studies lest the mind of the student of agriculture should be diverted from practical ends or he should be overcome by the contempt of his fellow students. Against this low, and to my mind, false view of agricultural education I most earnestly protest. And in opposition to it I lay down the thesis that instruction in agriculture properly arranged and given may be made to have a high educational value, that agriculture as a science has its vocational, scientific and social sides, and that in a properly constructed college course agriculture may be so joined with other studies *i. e.* literary, social, aesthetic, mathematical and scientific, studies that the graduate from an agricultural course may have a breadth and finish of culture comparable with that of the graduates from any other course.

Coming now directly to the discussion of agricultural courses I have decided to present as a concrete example of a four-year college course that recommended by the Committees on Entrance Requirements and Methods Teaching of the Association of American Agricultural Colleges and Experiment Stations. This includes the following subjects and number of hours.

AGRICULTURAL COURSE FOR BACHELOR'S DEGREE

| | | HOURS | | | |
|-----------------------|----------|--------------------------------------|----------|-----------------|-----|
| CULTURE STUDIES | } | Language and Literature—English..... | 200 | | |
| | | Modern Languages..... | 340 | | |
| | | Social Studies—General History..... | 80 | | |
| | | Political Economy..... | 60 | | |
| | | Constitutional Law | 50 | | |
| | | Ethics..... | 40 | | |
| | | Psychology..... | 60 | | |
| | | Art—Drawing | 60 | | |
| | | Mathematics—Algebra..... | 75 | | |
| | | Geometry..... | 40 | | |
| | | Trigonometry..... | 40 | | |
| | | | 1045 | | |
| | | | 34 p.ct. | | |
| | | PURE SCIENCE | } | Physics..... | 150 |
| | | | | Chemistry | 150 |
| Botany | 180 | | | | |
| Zoology..... | 120 | | | | |
| Physiology..... | 180 | | | | |
| Geology | 120 | | | | |
| Meteorology..... | 60 | | | | |
| | 960 | | | | |
| | 32 p.ct. | | | | |
| VOCATIONAL STUDIES | } | Agriculture..... | 486 | | |
| | | Horticulture and Forestry..... | 180 | | |
| | | Veterinary Science..... | 180 | | |
| | | Agricultural Chemistry..... | 180 | | |
| | | | 1026 | | |
| | 34 p.ct. | | | | |

It appears then that the agricultural college course recommended by these committees is two-thirds culture and scientific studies and one-third agricultural science and its applications to the art of agriculture. We need not, therefore, discuss the educational values of two-thirds of this course for these are well established. It is the remaining one-third about which some may be in doubt. It will perhaps help us to determine more accurately the educational values of this agricultural portion if we divide it into two sections. A large part of it consists of the study of the different branches of the science of agriculture. Essentially these have educational values as scientific studies, varying according to their nature and scope. In their entirety they cover quite a wide range, since they include materials drawn from physics, chemistry, various biological sciences, engineering and economics. Leaving out for the present the manual operations which we desire to consider separately as the second section of the agricultural division of the college course, agricultural science embraces all the other lines of instruction laid down by Prof. Hanus, except language and literature that is, it includes (1) physical and biological science, mathematics, art and social study. Properly taught, the student of agricultural science will "see straight and clear; compare and infer; make an accurate record; remember; express his thought with precision; and hold fast on lofty ideals." From the complex nature of the agricultural sciences they should have high educational values along these different lines. The objects, facts and phenomena brought before the student of agricultural science are of such a kind as to test his capacity to "see straight and clear" in a very high degree. Whatever previous training he has had in this line will doubtless aid him in this new and higher field of science but however good his previous training he will find very much to train and develop his perceptive powers in observing the complex things involved in agricultural science. The soil, cultivated plants, domestic animals—are not simple and elementary things, easy to be apprehended and comprehended. If we are to know them in any accurate sense we must see straight and clear and long. These agricultural subjects also furnish innumerable opportunities for comparisons, most of which will be far from simple and the problems of correct inferences in this line of study are as difficult as they are multitudinous. The classification of soils and the determination of their relative fertility and adaptation to different crops; the judging of livestock on the broad basis of their fitness for particular uses. What opportunities in such studies "to compare and infer." Considered merely as "mental gymnastics" a class in stock judging may have as much exercise as a class puzzling over the mysteries of the Latin or Greek subjunctive mood. That is, if our agricultural students are *taught* and not *lectured*. No one would dispute that the agricultural subjects give ample opportunity for exercise in "making an accurate record" of what is learned. Memory certainly need not lack for exercise amid the innumerable multitude of items included in these agricultural subjects. It is undoubtedly a pity that memory training is too much neglected in our modern educational schemes, but this is not for lack of materials on which to work; it is oftener a lack of proper selection of things to be remembered or the misguided effort to remember too many unimportant items. And if ever there were subjects in which it was desirable to express our thoughts with precision it is these agricultural sub-

jects. If only agricultural writers and teachers and students would learn to do that so that we might distinguish between their actual knowledge and their theories it would be a great gain for the cause of truth and science. And the expression of the thought may come through language or mathematics or the graphic arts.

Before considering whether the study of agricultural subjects may contribute to aid the student "to hold fast on lofty ideals" let us briefly consider the educational advantage which comes from the addition of manual operations to the scientific study of agriculture. The educational authorities to whom I have referred lay much emphasis on the principle that "*effective power in action* is the true end of education." And they do not limit action to mental processes only but recognize that effective power of mind may just as well be expressed through bodily action. It has long been agreed that thought in its highest forms may be expressed through the hand of the sculptor, artist or architect but it is only of late that our schoolmen have come to see that within appropriate limits fine and accurate thinking may be expressed just as truly through the hand that molds the clay or works the wood or iron or performs the operations of the farm. The straight furrow, the rapid and efficient handling of farm machinery, the nice manipulation of butter-making have their educational values for the accuracy of thought and efficiency of mental action they represent but they also have additional and peculiar educational value because of the manual training they involve. This is an item we should not lose sight of in constructing a college course in agriculture. It may be true that students will not come to college to learn the operations of the farm but it is also true that they will not be thoroughly cultured agricultural graduates if during their college course they have not engaged in farm operations. No portion of the agricultural course deserves more pains-taking attention from teachers than that which relates to the manual exercises or practicums which should accompany the teaching of the science of agriculture. It is narrowing the range of agricultural education and reducing, rather than raising, the educational values of agricultural courses to leave out manual training in agriculture.

Finally, may courses in agriculture be so constructed as to have an educational value because they inculcate "those supreme ideals through which the human race is uplifted and ennobled, the ideals of beauty, honor, duty and love"? In the answer to this question is involved the great problem of the right conception of a civilization based on a righteous and rational industrial system. As long as industrial pursuits are regarded as a curse or drudgery and the ennobling pursuits are philosophy and statecraft and war there is naturally little chance that industrial pursuits will be conducted on any higher basis than that of a gross materialism *i. e.* for the money there is in them. For ages the ideal state as portrayed in Plato's Republic has actually in one form or another been the ideal which has moulded the thought and activity of men. To reach a condition in which manual or other severe labor is unnecessary and to have leisure for philosophy, politics, war, and pleasure as the real business of life has been the aim of the individual man. To set over against the large mass of the workers a small privileged class to enjoy the fruits of their labor has been the actual goal of society's aim, even when this has not been acknowledged. But in these

last days we are coming to see that this is a false aim. The belief is growing that civilization should seek the good of the greatest number, that through and in the various industries by which nature is controlled and fashioned to man's uses the workers may find not only a livelihood but also the means and opportunity for wide mental activity and refined pleasure; for beauty, honor, duty and love. These are the new revelations to our age. And the problem before us is to establish agriculture, as well as our other industries, on this new basis. The author of a remarkable book, entitled *Western Civilization*, has endeavored to show that our civilization differs from that of the pagan nations in that the center of dominant interest has shifted from the past or the present where it formerly was to the future where it will remain. And it seems true as regards the educational world that something like this is transpiring. Hitherto the chief aim of education has been to learn and remember and apply what the past or the present has taught us. It is true that with the revival of learning after the Middle Ages and with the opening up of the reservoirs of classical literature there came into Western Europe a flood of ideas new to Western civilization. These were necessary to bring the Western peoples into the world current of civilization but they were after all old ideas and they turned the thoughts of men back to the past. In considering the classical literatures we should always remember that for a long time men in Europe and America studied them primarily for the ideas which they contained. It was new knowledge they sought in the pages of Greek and Roman authors, not mental gymnastics or literary style. This movement had hardly spent its force when the new natural sciences appeared and began their claims for incorporation in the educational system. Their day is now and they have greatly broadened the scope and range of our educational activities. Their chief aim is to define the constitution of things as they exist and show the method of their development. They lack the ethical element except as this is involved in the love and pursuit of truth. This has since been supplied by their application to the needs of man. Industrial education based on these sciences has its dominant interest in the bettering of human environment and in the future enlargement and refinement of human activities. The teaching of agriculture, or of any industrial art, under these conditions does not reach its highest level unless it embraces this ethical element. We should teach men in our agricultural colleges to be intelligent farmers not simply that they may thus make a better living but rather that they may be leaders in making agriculture a live, progressive art, which in the future shall provide a more stable and satisfactory basis for thrifty, intelligent, refined and happy rural communities, as well as a stronger guarantee for the manufactures, commerce, art, literature and science of a higher civilization in which industrial and civil peace and not war shall be the established order. It is because industrial education, broadly conceived and planned, adds to its other merits this high ethical content of a dominant future interest that I claim for it a high educational value, and predict for it an increasing space in the educational scheme of the future.

In thus claiming an ethical content for properly constructed agricultural courses I do not of course make this in any comprehensive and exclusive sense. Other subjects which should be included in the scheme of a college curriculum and are included in the curriculum we are considering,

are more essentially and broadly ethical studies and should be pursued especially for their ethical content.

There can, I think, be no doubt that taken in their entire range agricultural subjects furnish an abundance of materials from which to construct a sound and strong educational system. But good materials are not enough to guarantee a substantial and convenient building. There must be a good architect and well-trained builders. No courses of study can have a high educational value unless they are planned and taught in accordance with sound pedagogical principles. This is something college teachers are especially prone to forget. They are so interested in the subject matter of their specialties that they are very apt to make the fatal mistake of supposing that all they have to do is to present this subject matter as rapidly as possible and let their students absorb it. The method or even the order of presentation, is practically deemed of little account. It is a pouring out of information from beginning to end. I fear that the lecture system so common in our colleges has much to answer for in this regard. Really good teachers are much rarer than they ought to be in our colleges. I sometimes think that research with all its advantages has tended to lower the quality of teaching, especially in the lower college classes, by laying a wrong emphasis on methods of work for which the more immature student is not prepared. It is after all one thing to investigate and a different thing to teach well.

The relative educational value of agricultural courses will depend largely on the methods of teaching. Let us therefore briefly consider some of the pedagogical principles on the application of which the educational value of these courses will depend.

1. The foundation of educational success in agricultural courses must be laid in the interest of the student. On this such authorities as Prof. Hanus, and others who follow the leadership of Herbart, very strongly insist. In this I believe they are right, provided they do not make too much of it. Without doubt the teacher should secure the interest of the pupil at the outset and hold it to the end of the course in agriculture and in other subjects; but this is not all he should do. There may be much interest without much instruction. The stump speaker often excites his hearers to the highest pitch of interest without giving them any useful information. I have seen pupils in a school room kept in an excited state of mind all day without making any material progress in learning.
2. There should be careful selection and systematic arrangement of topics to be taught in a given course. Obviously only a relatively small number of the vast array of items included in Agricultural Science can be profitably brought before a class in the limited time assigned to agriculture in even a four-year college course. The choice of topics for instruction is therefore an important matter, and more so as the science increases in range and bulk. In making this choice the needs and interest of the student, rather than the fancy and preference of the teacher, should control. Logic is an old-fashioned and somewhat discredited study nowadays. Nevertheless it were well for teachers of agriculture to follow its principles in the arrangement of the topics they select to teach. The inter relations of the topics should be carefully considered and as

- far as practicable the student should be put in possession of a system of truth regarding agriculture as the result of his college training in this subject. To the disjointed, helter-skelter teaching of many college instructors must be charged the frequent failure of students to grasp and hold in a firm and permanent way what they attempt to learn in college courses.
3. The methods of teaching agricultural courses should be such as to afford the opportunity and impose the necessity on the student of exerting himself strenuously to gain the mastery of these subjects. Hence the advantage of the so-called laboratory methods as contrasted with lecturing. Much educational value is added to courses through which the student learns how to study and is compelled to perform mental labor, aside from the acquisition of any definite amount of knowledge. This was one of the rightful claims to high pedagogic value put forth in behalf of the old classical courses. In connection with them even the laziest student had to perform a considerable amount of mental effort to pass. Though he rode a "pony" all through the course instead of toiling on foot, he got much exercise of mind. There is plenty of opportunity for making agricultural courses of high pedagogic value in this regard but they will not be such if the agricultural instructor is content with lecturing or simply pointing out things to the student with the aid of lantern slides or objects. He must be a *teacher* in some real way.
 4. To give a high educational value to agricultural courses attention must be paid to the time element in education. I do not now refer to the duration of agricultural courses but to the relative amount of mental activity compressed into a given time through skilful teaching. One great pedagogical advantage which the languages will always have as subjects of instruction is that they furnish within a very limited area a large amount of varied material for purposes of instruction thus enabling the skilful teacher to put the student through a relatively large number of mental exercises in a comparatively brief time. When language is taught on the basis of the science of philology the words and sentences are the objects; their inflections and syntax relations furnish the means of scientific classification, comparison, induction and deduction. And within a single page there are so many elements of philological science that the pupil has abundant opportunity for constantly learning new facts and principles and reviewing old ones. In a single recitation period he may be kept continuously in a high state of mental activity and have very varied mental exercises. In teaching the sciences on the other hand by the laboratory method the instructor must be constantly on the alert to prevent the time from slipping away with only an inconsiderable amount and variety of mental effort on the student's part. Hence the necessity of much attention to the devising of laboratory methods of instruction which will permit rapid and varied work, the previous preparation of materials so that there may be no delays in the class room, and the holding of the student to strenuous effort from first to last. All pupils recognize a vast difference between teachers in this regard and lazy pupils have a keen instinct for detecting "soft" courses.
 5. The educational value of courses in agriculture will also depend on the

extent to which they are made the means for developing originality and executive capacity in the students. It is not enough that through such courses the student shall gain much exact and useful knowledge or correct methods of activity. He should acquire ability to seek and find new truth, and to guide and control the activities of other men in practical and scientific lines. The college graduate is not the man he ought to be unless he is capable of adding to the sum of human knowledge and becoming a leader in human progress. The quality of the future work of our experiment stations and departments of agriculture will depend on the original power developed in the graduates from our agricultural courses. The progress of the practical agriculture of this country in competition with the world will depend very largely on the quality of the leadership of the graduates from these agricultural courses; and the organization of the agricultural industries on right lines, as well as the betterment of the social conditions of agricultural communities, should naturally depend very much on the leadership of the agricultural colleges and their graduates. The signs all point to the wider and stronger influence of educated men in the large affairs of industry and public business, including the narrower range of public business which we ordinarily call the government. In these broad lines there will be abundant opportunities for agricultural graduates to make for themselves honorable and useful careers. Their success in this direction will depend largely on the quality of the teaching they receive in agricultural courses.





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 - Renewals and recharges may be made 4 days prior to due date.
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