New teaching techniques are the products of a wide spectrum of research. The final test of all teaching techniques, however derived, is their application to a given classroom situation. The purpose of this study is to determine whether the "principle approach", a relatively new teaching method in agriculture, has been accepted by Oregon agriculture teachers for instruction of their basic agriculture classes.

Questionnaires were sent to all 117 teachers of agriculture in Oregon. Teachers teaching basic agriculture classes were compared in class presentation methods and course content areas. Comparison was also made between teachers having attended a curriculum workshop introducing teachers to the "principle approach" and teachers having no formal training in this area.

Over 50 percent of the teachers having had training in the "principle approach" teach all subject areas by this method. However, certain subject areas appear to have adopted the "principle approach" more readily than...
other areas. Participation and success in the use of the "principle approach" increases with training in this area.

As a result of this study, it is recommended that workshops be set up to train teachers in the presentation of the "principle approach" for instruction of basic agriculture.
WHAT OREGON AGRICULTURE TEACHERS SAY ABOUT TEACHING BASIC AGRICULTURE BY USE OF PRINCIPLES

by

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Typed by Roberta Way
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Special love and thanks are extended to my wife, Roberta, for her assistance, motivation and encouragement while the author was engaged in this study.

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CHAPTER I

INTRODUCTION

The 1963 Vocational Education Act has modified many aspects of our agricultural instruction by providing for the expansion of the vocational agriculture program in the public schools. Each of the new federally supported programs for education in this country comes with new requirements which must be met by educators in order to fulfill the particular program's specifications. Equally important are the new education bills that have stimulated educators in all subject areas to develop new and better teaching techniques.

New teaching techniques are the products of a wide spectrum of research. This spectrum ranges from the pure research of the scientist with his quality controls and specially designed environments and situations to the single teacher who works out a teaching pattern based on years of classroom experience. The final test of all teaching techniques, however derived, is their practical application to a given classroom situation.

The true value of a new idea or technique in education is often difficult to assess. Too often a new idea
The true value of a new idea or technique in education is often difficult to assess. Too often a new idea in education is accepted or rejected because of preconceived notions on the part of teachers, students, or the general public. It is suggested by many people that we are moving too fast whether it be in exploring space or in educating our children. These people question the desirability of making any changes in the present educational patterns or instituting any new ideas or teaching techniques. On the other hand, some critics feel the development of instructional programs has been too slow and are willing to accept any idea simply because it is new and appears to be moving forward. Certainly not all individuals can be satisfied nor would it be practical if it were conceivable to satisfy everyone. New ideas and inventions in education and other fields are the products of people not satisfied with the status quo. Therefore, the value of a new idea must be ascertained within the framework of the problem with which it deals and be free from outside prejudices.

One of the more recent innovations in teaching techniques for vocational agriculture is the use of the "prin-
ciple approach". The underlying idea of the "principle approach" is to teach an idea in such a manner that the student will be led to discover the basic principle for himself and then apply the principle to new ideas and situations. This teaching method, itself, is not new. In the early 1900's educators were concerned with teaching the student to discover facts for himself. The following is a quote taken from a 1905 article written by William C. Bagley, (10, p. 53) educator and exponent of the "principle approach".

The pupil is not to be told but led to see.... Whatever the pupil gains, whatever thought connections he works out, must be gained with the consciousness that he, the pupil, is the creative agent--that he is, in a sense at least, the discoverer.

It has only been within recent years that the "principle approach" has been considered as a teaching technique for vocational agriculture classes in the secondary schools in Oregon. This study is concerned with the use of this approach in the basic or introductory agriculture classes of the public high schools in Oregon.
Statement of the Problem

Educators in the biological fields and physical sciences in the last decade, have attempted to demonstrate that learning is achieved at a faster rate and retention is greater when a few well-defined principles are discovered by the students themselves. It has also been theorized that teaching with general principles helps to solve the problem of rapidly increasing quantities of material for students to learn because principles can be applied to new facts and situations. The biological and physical sciences have been taught quite successfully by this method for the past several years. Teachers of vocational agriculture in Oregon have been taking action so they too might use this same technique in their programs.

During the last several years, vocational agriculture teachers have had the opportunity to attend three summer workshops dealing with various aspects of teaching agriculture. These workshops were held at Oregon State University during the 1964, 1965 and 1966 summer sessions. Included in these workshops was the problem of teaching by the "principle approach". During these conferences emphasis was placed on agriculture as an applied science and the "principle approach" as a teaching technique using scientific methods. The 1964 summer session offered a two-week
"principle approach" as a teaching technique using scientific methods. The 1964 summer session offered a two-week workshop for agriculture teachers interested in learning some of the practices used by teachers of the biological and physical sciences teaching by the "principle" method. A great deal of work has been done to acquaint the Oregon vocational agriculture teachers with the trend toward teaching with principles. More work is planned for the near future.

However, little has been done to assess the success of this work. Have the vocational agriculture teachers of Oregon adopted the "principle approach" as a teaching technique for their vocational agriculture classes? If so, how much of their program is taught by this method? These are the problems with which this study deals.

Hypotheses

The following hypotheses are proposed by the investigator:

(1) That the Oregon agriculture instructors prefer teaching basic agriculture by the "principle approach".

(2) That the "principle approach" is preferred by Oregon agriculture instructors for
instruction of the scientific areas of the basic agriculture subject matter but not all areas of basic agriculture.

(3) That the majority of the agriculture teachers attending the 1964 summer workshop have had success with the "principle approach" for teaching basic agriculture.

Purpose of the Study

During the 1966 Agriculture Teachers' Conference at Gearhart, Oregon, curriculum ideas were discussed, and a central point was raised stating that recent teaching techniques should be shared by classroom teachers for their consideration. These teachers expressed a desire to learn more about the use of the "principle approach" for teaching basic agriculture.

The "principle approach" to teaching vocational agriculture has concerned teachers in this field for several years. Many teachers have implemented some aspects of this technique in their instructional programs. After reasonable usage, every new idea or teaching approach in education must undergo analysis of its actual value in the field. This study will be used to determine whether the "principle approach", which is a relatively new concept for teaching basic agriculture, has been accepted by agri-
culture teachers. Furthermore, this study will incorporate opinions of agriculture teachers in the state of Oregon as to whether this type of approach is acceptable in all subject matters taught to basic agriculture classes.

Specifically the purposes of this study are:

1. To determine the methods used by Oregon agriculture teachers in teaching basic agriculture.

2. To determine the impact of the 1964 curriculum summer workshop on the agriculture classes of those teachers attending the workshop.

3. To determine whether agriculture teachers teach by the "principle approach" in all subject matter areas of basic agriculture.

4. To determine which subject matter areas most successfully adopt the "principle approach" as a teaching method.

5. To determine whether there is a desire on the part of Oregon agriculture teachers to learn more about teaching basic agriculture by the "principle approach".

Limitations of the Study

This study will be limited to the following:

1. A study of the "principle approach" as applied to teaching basic agriculture students only.

2. Only those agriculture teachers presently teaching classes of basic agriculture will be referred to for information concerning the use of the "principle approach" as a teaching method for basic agriculture students.
(3) Agriculture teachers presently teaching in the state of Oregon.

(4) Teachers having had specific instruction in the "principle approach" and those who have not had specific instruction, who are now teaching basic agriculture in secondary programs.

**Procedures**

In order to fulfill the purposes of this study, the following procedures will be followed:

A comprehensive review of related studies will be completed to acquaint the author of this study with similar areas related to this subject. Following this, questionnaires will be sent to all teachers of vocational agriculture in the state of Oregon. From these questionnaires, the teaching methods of teachers of first-year agriculture will be tabulated. The teaching procedures of teachers attending the 1964 agriculture curriculum workshop at Oregon State University will then be compared to the teaching methods of teachers not attending this workshop. Follow-up letters to teachers having success with the "principle approach" will then be sent. Materials already prepared on the "principle approach", the experiences of educators, and the findings of this study will be incorporated in drawing
conclusions and recommendations.

**Definition of Terms**

**Advanced Agriculture.** This is the 36 week period preparing the student for a vocation in agriculture or in an agriculturally-related occupation. This instruction can take place in the eleventh or twelfth grade levels.

**Agriculture.** Agriculture is the science of food and fiber for life. Agriculture is more than farming. It involves all areas of agriculture active in the production, growing, harvesting, processing and marketing of agriculture products.

**Agriculture Subject Matter.** Agriculture subject matter is a core of technical material concerned with food and fiber taught in several fields. These fields include plant sciences, animal sciences, agriculture economics and agriculture engineering.

**Agriculture Science.** The 36 week course of agriculture dealing with biological and physical science areas. This course is normally taught at the eleventh and twelfth grade levels.
Basic Agriculture. The term basic agriculture refers to an exploratory course in agriculture for the ninth grade student and/or any student not having previously taken an agriculture course. The content consists of occupational and educational information, leadership training, mechanical applications in agriculture, biological and physical applications in agriculture and practices in decision making.

Biological Sciences. The science of living things, both plant and animal.

Curriculum Workshop. This is an educational training period where teachers and other personnel related to the subject areas get together to develop, discuss or change subject curriculum. The outcome of such curriculum workshops can range from discussion of new ideas to well-defined printed curriculum books. The time involved can vary, although the 1964 workshop referred to in this study lasted two weeks.

Decision Making. This is the six-week unit taught to basic agriculture students concerning the management areas involved in agriculture. Many agriculture programs require
the students have a project and keep records of this project in some sort of project record book.

**Deductive Reasoning.** The method of reasoning leading from the general to the specific. Concrete applications or consequences are deduced from general principles.

**Farm Mechanics.** This is the course unit of agriculture designed for instruction in the areas related to the mechanical aspect of agriculture. Farm mechanics areas involve welding, power training, hydraulics, surveying, farm carpentry and concrete.

**Forestry.** Many schools offer semester units concerned with all the aspects related to forestry. Common course content includes cruising, planting, harvesting, transplanting, processing and marketing of forest products.

**Inductive Reasoning.** The act or process of reasoning from the specific to the general statement of the principle results in inductive reasoning.

**Land Laboratory.** A section of land used for instructional purposes such as growing crops and taking soil samples. These may vary greatly in size.
Leadership. Public speaking and parliamentary procedure are stressed in most agriculture programs. It is felt that in order for the agriculturist to thrive he must speak for himself. The Future Farmers of America Organization is the showpiece for the leadership developed in the agriculture program.

Occupational Cruise. A type of program, normally at the eighth grade level, where vocationally-oriented students are exposed to several vocational fields during a year's time. The intent of this type of program is to aid the student in selecting a vocation before the tenth grade level.

Occupational Training. This is the unit of training where the student is prepared for a future vocation. Normally students are informed about agriculture occupations and criteria for selecting future occupations at the ninth or tenth grade level. Afterward the student pursues further knowledge in the vocation he selects.

Physical Sciences. Any of the sciences that deal with matter or energy.
**Presentation of Principles.** As used in this paper, presentation of principles will refer to writing the principle on the blackboard or giving the principle to the class with the hope that the students will associate it with facts and figures given later. This is not the same as the "principle approach".

**Principle.** A principle refers to a generalized statement arrived at from several instances which have exceptions, but which are used for evaluating recent programs and as guides for future action.

**Principle Approach.** As used in this paper, the principle approach will refer to the presentation of facts, figures, and specifics with the aim that the students will arrive at the underlying principle.

**Production Agriculture.** Production Agriculture is a class containing material which is essential for the understanding of how food and fiber is grown. This normally is taught at the tenth and eleventh grade levels.

**Work Experience.** This is the instructional program developed to enable the student to work for local indus-
tries. Normally this experience is offered at the eleventh and twelfth grade levels after the student has selected a vocation to pursue. This type of instruction has the benefit of allowing instruction in the true environment and normally occurs under the direction of personnel not usually available for classroom instruction.

**Vocational Agriculture.** Vocational agriculture is the part of the educational program where students are taught the science associated with the production of food and fiber.

Vocational agriculture began in the United States in the early 1900's for the purpose of providing present and future farmers knowledge and skills common to agriculture. The vocational agriculture program provides systematic instruction below the college level in public schools for students planning a vocation in agriculture.

The Smith Hughes Act of 1917, the George Barden Act of 1946 and the Vocational Act of 1963, all passed by the United States Congress, made available to the schools public money to help finance the program.
CHAPTER II

REVIEW OF RELATED LITERATURE

The use of "principles" as a teaching method for agriculture classes is a relatively new idea. Therefore, few references are available on the "principle approach" to teaching agriculture. This study will incorporate references and publications outside the area of agriculture whenever necessary for historical data and clarification of ideas. This will be done by observing related fields such as physical sciences, psychology, biology and others presently doing work associated with "principles" as a teaching method.

Background of the Principle Approach

Teaching by the "principle approach" is not a new concept. An article entitled "Who Discovered Discovery" by Mauritsz Johnson appearing in the Phi Delta Kappan solves several questions concerning the history of the "principle approach" as a means of classroom instruction. Johnson (10, p. 53) quotes an 1897 article by Frank and Charles McMurry as stating, "It is not...the business of
the teacher to retail ready-made general notions. General truths should be taught after individuals." Johnson backs this article by claiming the McMurrys recognized that discovery can occur both inductively and deductively and that this was incorporated into their "Development Method" which they describe as follows: (10, p. 54)

Put the question to the child before the answers have been presented. ...the child is expected to conceive these answers himself; he is systematically required to make discoveries, to judge what might reasonably follow from a given situation, to put two and two together and to discover the results.

Johnson also referred to an article by David Page, the first principal of the first normal school in New York State. According to Page (10, p. 54) in this article entitled "Theory and Practice of Teaching":

There is great satisfaction in discovering a difficult thing for one's self—and the teacher does the scholar a lasting injury who takes the pleasure from him. The teacher should be simply suggestive....

Johnson further quotes another educator in an article entitled "The Teaching of Mathematics". This 1906 article written by J. W. Young (10, p. 54) goes on to say:

...it is the function of the teacher and the text to present the things to be done, so to propose the problems to be solved that they require real discovery on the part of the
pupil; that at the same time the steps are within his power, and that he attains in the end a good view of the whole subject.

Johnson also refers to several much earlier educators specifying the Heuristic style, a teaching style based on the Socratic method which is teaching by asking questions.

The author of this article concludes: (10, p. 54)

...it is not true that students can only be induced to learn what is already of interest to them, what is familiar and "life-like", what is the actual case.... What motivates the learning is not the commonplace but the unexpected and the unexplained, which pique the curiosity and imagination.

The Use of the Principle Approach in Fields Outside Vocational Agriculture

One of the keys to learning is the stimulation of the students' imagination. Stella Van Petten Henderson in her book, An Introduction to Philosophy of Education, suggests that the creative imagination is the supreme power in man. Henderson further states that imagination and reasoning are complimentary and work together on the highest level on which intelligence operates. Continuing, Henderson (9, p. 297) states, "To assist in the development of creative imagination is much more difficult than to help children
acquire knowledge." Henderson claims it is creative imagination that has been responsible for man's inventions—that they were not merely stumbled upon.

Joseph A. Leighton, a writer in the field of philosophy, details one of the ways man's imagination is developed. In his book *Social Philosophies in Conflict* (11, p. 223), Leighton states that man is not only an animal but a spiritual being when he says: "Man does not merely reproduce his past experiences. He can break up the images which arise from the traces of past experience and form them into new combinations."

One of American education's early advocates of teaching by building upon the students' interests was John Dewey. In a magazine presenting an article on education, *Newsweek*, (7, p. 75) Dewey's ideas were illustrated with the following paragraph:

Where other schools enforced corporal punishment and drill sergeants, Dewey encouraged freedom of the classroom. Where other pupils learned by rote, Dewey's learned by doing. Six-year-olds, for example, learned biology by planting wheat in the school yard, harvesting it, grinding it, and baking it into bread.

John Dewey was a researcher in his field of education. Much credit is to be given to a man of his character if for
no other reason than the fact that he was striving to find new ideas to better aid the learning process of classroom students.

Educators of today elaborate on Dewey's idea of the value of teaching the child to discover the basic truths for himself. The following references are taken from works published by men engaged in the field of education today. They support the theory that the "principle approach" is a superior method increasing the students' motivation, learning capacity and retention. In an article entitled "After John Dewey, What?", Jerome S. Bruner, professor of Psychology at Harvard claims: (1, p. 58)

Insofar as possible, a method of instruction should have the objective of leading the child to discover for himself. Telling children and then testing them on what they have been told inevitably has the effect of producing bench-bound learners whose motivation for learning is likely to be extrinsic to the task at hand--pleasing the teacher, getting into college, artificially maintaining self-esteem. ...discovery and the sense of confidence it provides are the proper rewards for learning. They are rewards that moreover strengthen the very process that is at the heart of education--the disciplined inquiry.

Lee Cronback, professor at the University of Illinois, claims reasoning is improved through practice in reasoning.
Cronback further states (5, p. 392):

A principle is learned faster, is retained longer, and is applied more effectively when it is meaningful. ...meaning also contributes to motivation.

In another part of his book, Cronback states all behavior is problem solving, for one must select appropriate responses and adapt them to the immediate situation. Reason is the process by which the individual decides on one of several courses of action or principles which satisfy the problem. Cronback states (5, p. 385): "Some responses can be taught only by confronting the student with the different kinds of problems he will meet."

Some have said that one of the faults of teaching by the "principle approach" is that students have been taught by other methods too long and cannot adapt to this type of instruction. According to Gustave Alef, professor at the University of Oregon's School of Social Sciences (15, p. 6):

Most freshmen are used to memorizing, to copying outlines, learning "correct" answers. During that first critical year you must change their thinking patterns.... You need to explain that not every fact is necessarily a relevant fact, that some facts are more important than others. ...gradually, students learn what generalizations are all about. Then they are on the road to an understanding of knowledge, kenetic knowledge.
In essence, Alef is saying that high school students are not taught "principles", and when they go to college, it is a hardship to both the professor and the student to change their thinking patterns.

Francis Chase, well known educator, wrote an article entitled "Implementing Recent Research Findings in Secondary Education", School Journal (4, p. 140-142). Chase claims current methods of managing the learning process in American high schools are not equal to present-day demands on education. This suggests secondary schools should set themselves to the task of producing mature learners by stimulating students to develop their ideas and to reflect upon ideas which they encounter in books and elsewhere.

Alexander Calandra, professor of physics at Washington University at St. Louis, suggests the "principle method" be used in some kinds of learning. Calandra claims that this approach has been used all along by many good teachers. In an article "How is Science Being Taught?", PTA Magazine (2, p. 3), Calandra writes: "The class is given excitement when the principle is learned." Calandra's suggestion seems to have had an impact on the science areas as these were among the first to adopt the "principle approach" for
teaching high school students. This is due primarily to the very nature of the "principle approach" which utilizes inductive reasoning—the form of reasoning most common to the scientific method.

The Use of the Principle Approach in Vocational Agriculture

Educators in the field of vocational agriculture have become increasingly concerned with utilizing the "principle approach" in high school agriculture classes. In the last four years, there has been more research done on adapting this method to vocational agriculture classes than occurred during the previous 25 years. The following references are from men presently concerned with this adaptation.

Bryan Michelson, in an article entitled "Teaching Basic Principles—A Definition", Agriculture Education Magazine (12, p. 255), claims that teaching principles has been going on in the academic institutions for ages. Michelson suggests, "The end results of all education should be to get at the basic principles". Michelson also adds, "It matters little how you get at the principle". Michelson claims that a person who learns the simple what and how of a skill situation without the basic principle is
extremely limited educationally and that a person who knows a few related whys and cannot relate them to what and how is equally deficient. Michelson continually states that, "Disagreements disappear when agreement is reached on definition of words and/or principles".

In a manual, Biological Principles Related to Agriculture, developed by the University of California, Davis, (3, p. 1-116), 22 biological principles which can be taught in agriculture are given with specific demonstrations and questions for each principle. According to the author of this manual (3, p. 2), the "principle approach" was selected "because it lends itself to the instruction for understanding essential to the ability to make appropriate application".

In the preface of this manual, it is claimed that principles should be taught with applications and the relationship of biological principles and their application to agriculture will result in a close association.

One of the early unpublished booklets in the state of Oregon containing agricultural material to be taught by the use of "principles" was prepared by Dr. H. A. TenPas, Ronald Daugherty and Daniel B. Dunham at Oregon State Uni-
The authors of this publication state in the introduction that principles are the heart of any program especially in teaching vocational agriculture where application of some fundamental truths or considerations are to be made. (17, p. 1) This paper contains an abundance of content in such a form that principles can be easily deducted for use in the teaching of soils and plant nutrition units.

Another source of information concerning the use of agriculture principles published at Oregon State University is entitled "Soil Science Laboratory Exercises for High School Students". Authors M. B. Dawson, L. A. Albon, and L. Boersma claim the field of soil science offers many opportunities to young men and women training in the sciences of chemistry, physics, geology, biology and botany (6, p. 2). They further this by stating that this booklets exercises and projects demonstrate scientific principles through the media of soil science and in a broader sense relate science to agriculture (6, p. 3). There are two manuals to this set presenting a step by step approach to laboratory exercises for teaching soil units.

In a progress report by Sid S. Sutherland and W. E. Sams, professors of Agriculture at the University of
California (16, p. 2), it is stated that studies show biological principles do have a relationship to agriculture. The 1962 report, entitled "Biological Principles Related to Agriculture: A Progress Report", suggests that serious consideration of principles in areas other than specific biology be developed.

Daniel B. Dunham, high school vocational director at Lebanon, Oregon, has taken action toward the "principle approach" of teaching agriculture. In his thesis Subject Matter Principles Basic to Organizing and Teaching Fundamentals of Plant Science (8, p. 52), Dunham recommends the studies of animal science, agriculture economics, farm management and farm mechanics be developed into a "principle approach". Dunham's study contains the development of subject matter principles for organizing and teaching fundamentals of plant science. This report was developed with the aid of several agriculture staff members at Oregon State University.

Dunham has found the "principle approach" successful with the basic agriculture classes under his supervision. In a personal letter received from him, he states:

The principle approach to teaching first-year agriculture is successful if properly handled
by the instructor...it is motivational in nature. Follow-up is meaningful and smooth transition from the physical to the factual is possible....

A curriculum class held during the summer of 1964 at Oregon State University under the direction of Dr. Henry TenPas, head of the Agriculture Education Department, was one of the first steps toward the application of principles to agricultural instruction in Oregon. During the two-week class, 34 workshop instructors were divided into six groups after basic instruction was given on the development of sound principles. The result of this class was the designation of 27 principles and steps for their presentation for use by instructors of basic agriculture (18). This study was compiled and is used currently by many teachers of basic agriculture. Examples from this study are found in the appendices of this paper.

Summary

It is concluded from this survey of related literature that ideas associated with instruction by the use of principles are not new. Many articles were written around the turn of the century about this type of instruction. Philosophers, psychologists and other educators seem to agree that instruction by the "principle approach" aids
learning. Some of the values noted are that it is motivational and helps in problem solving.

The use of the "principle approach" for instruction in agriculture is a new approach. Several manuals and papers have been developed for teaching by the use of principles. Agriculturists associated with teaching vocational agriculture suggest the use of the "principle approach". A workshop was held at Oregon State University in 1964 during which agriculture teachers were initiated to the "principle approach" as a means of teaching. One of the outcomes of this course was a list of principles for use in teaching agriculture.
CHAPTER III

FINDINGS

There are 99 public high schools in the state of Oregon presently offering courses in vocational agriculture. Collectively these 99 high schools employ 117 teachers actively engaged in some phase of teaching vocational agriculture. In the fall of the 1966-67 school year, questionnaires were sent to these 117 teachers to determine their use of the "principle approach" as a teaching method in their vocational agriculture program. A copy of this questionnaire is found in the appendices.

One hundred seven agriculture instructors returned completed or partially completed questionnaires accounting for more than a 91 percent response.

Background of Teachers Responding to Questionnaire

Several things are apparent from the questionnaires regarding the vocational agriculture teachers as a group. First, vocational agriculture teachers are relatively young. The majority are between the ages of 26 and 30. Only 17 percent of those responding to the questionnaire are over
45. Secondly, most of these teachers have had experience in the vocational agriculture departments of two or more high schools. Finally, it is apparent that most agriculture instructors teach entirely within the agriculture department. Less than 20 percent teach subjects in areas outside of the vocational agriculture department.

**Subject Areas and Teaching Methods Used**

**Table I**

Subjects Taught By Agriculture Instructors

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Number</th>
<th>Percent of 107</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Agriculture</td>
<td>97</td>
<td>90.7</td>
</tr>
<tr>
<td>Production Agriculture</td>
<td>82</td>
<td>76.6</td>
</tr>
<tr>
<td>Agriculture Science</td>
<td>73</td>
<td>68.0</td>
</tr>
<tr>
<td>Farm Mechanics</td>
<td>67</td>
<td>62.5</td>
</tr>
<tr>
<td>Advanced Agriculture</td>
<td>43</td>
<td>40.1</td>
</tr>
<tr>
<td>Forestry</td>
<td>15</td>
<td>14.0</td>
</tr>
<tr>
<td>Others</td>
<td>20</td>
<td>18.7</td>
</tr>
</tbody>
</table>

From the 107 returned questionnaires, 97 were used in this study. These were from instructors teaching an introductory course in agriculture. Of the ten rejected questionnaires, three were from two-man departments; four were
from three-man departments; one teacher taught only farm mechanics and farm forestry; and two teachers taught only horticulture courses. These findings indicate that more than 90 percent of all agriculture teachers responding to the questionnaire teach an introductory course in agriculture.

One school offers agriculture at the ninth-grade level in what is considered an occupational course. This type of program involves exposing the student to several vocational fields during a year's time. The aim of this program is to aid the student in selecting his predicted vocation before the tenth-grade level. Because of the short time involved with students in a program of this nature and because of the different goals involved, this school's questionnaire was not used in tabulations concerning basic agriculture classes. However, comments from this questionnaire were used when applicable to this study.
Table II

Areas of Basic Agriculture Taught

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Number</th>
<th>Percent of 97</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>87</td>
<td>89.6</td>
</tr>
<tr>
<td>Farm Mechanics</td>
<td>81</td>
<td>83.3</td>
</tr>
<tr>
<td>Occupational Training</td>
<td>75</td>
<td>77.3</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>71</td>
<td>73.1</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>71</td>
<td>73.1</td>
</tr>
<tr>
<td>Decision Making</td>
<td>64</td>
<td>64.5</td>
</tr>
</tbody>
</table>

The subject areas appearing in Table II are those suggested by the Oregon State Department of Agricultural Education (13, p. 2) for the instruction of basic agriculture classes. This list of six subject areas was used in this study because most teachers of basic agriculture teach all or several of these areas. All six subject areas listed are taught by over 60 percent of the responding teachers as indicated in Table II. These subject areas were also used in the 1964 summer curriculum workshop at Oregon State University.

As shown in Table II, the majority of the teachers surveyed emphasized leadership and farm mechanics in their basic agriculture classes. The physical and biological
sciences are taught by only slightly over 70 percent of basic agriculture instructors.

Table III

Instructional Methods Used by All Oregon Agriculture Teachers

<table>
<thead>
<tr>
<th>Method</th>
<th>Number</th>
<th>Percent</th>
<th>Preferred</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Discussion</td>
<td>96</td>
<td>98.8</td>
<td>36</td>
<td>37.1</td>
</tr>
<tr>
<td>Presentation of facts and/or figures</td>
<td>80</td>
<td>82.5</td>
<td>33</td>
<td>34.0</td>
</tr>
<tr>
<td>Presentation of Principles (deductive)</td>
<td>75</td>
<td>77.3</td>
<td>25</td>
<td>25.8</td>
</tr>
<tr>
<td>Work Experience</td>
<td>1</td>
<td>1.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Giving specific illustrations and helping students associate them with a general statement (inductive)</td>
<td>84</td>
<td>86.4</td>
<td>28</td>
<td>28.8</td>
</tr>
</tbody>
</table>

Bearing in mind the six subject areas taught to basic agriculture classes, the teachers were requested to indicate those teaching methods they use and prefer. Table III compiles the methods most often used by teachers in their basic agriculture classes. The most commonly used
method is that of group discussion. Nearly 99 percent of all basic agriculture teachers use this method. The method ranking second in use by basic agriculture teachers is the "principle approach"—giving specific illustrations and helping the students associate them with a general statement. However, only slightly over 86 percent of the teachers indicated they use this method. The presentation of facts and/or figures is used quite frequently. Only one instructor uses work experience as a method of teaching.

These same instructors were asked which methods they prefer to use to teach basic agriculture. Their responses are tabulated in Table III. Group discussion and presentation of facts and/or figures are the two teaching methods preferred by the majority of basic agriculture teachers. The use of "principles" as a teaching method either utilizing the inductive method or the deductive method is preferred by fewer teachers. Table III indicates that less than one out of every three agriculture teachers teaching with "principles"—using either the inductive or deductive method—prefers to use "principles".

These teachers were asked to comment on their experi-
ences with the "principle approach". Comments from these teachers pertaining to the problem areas of teaching by the "principle approach" appear below. These comments provide insight into why some teachers look to other instructional methods for their basic agriculture students.

1. Three instructors claim that the city boy profits more than the country boy.

2. Three instructors state that the "principle approach" is more demanding and time consuming for the teacher.

3. Five instructors claimed that students are not accustomed to this type of instruction. Teachers must prepare them before this instruction becomes effective.

4. Five instructors stated that the "principle approach" is good for only some subjects and four instructors claimed that they have had good results with the better students.

5. Three teachers claim that success depends on the accuracy and simplicity of the principles and the examples used.

Basic Agriculture Instructors Attending 1964 Summer Workshop

Thirty-four agriculture instructors from the state of Oregon, one instructor from the state of Washington, and one instructor from Hawaii attended the two-week agriculture curriculum workshop held at Oregon State University in 1964. Tabulation of the returned questionnaires showed
only 22 instructors or approximately 22 percent of the 97 responding basic agriculture instructors had attended the 1964 workshop. These 22 teachers were asked what areas of agriculture they teach in their basic agriculture classes. It is significant that over 95 percent of these teach an area in biological sciences. The area of decision making was reported to be taught by only approximately 63 percent of the 1964 workshop teachers.

Table IV

Agriculture Teachers Attending 1964 Curriculum Workshop

<table>
<thead>
<tr>
<th>Areas of Basic Agriculture</th>
<th>Number Teaching</th>
<th>Percent of 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>16</td>
<td>72.8</td>
</tr>
<tr>
<td>Occupational Training</td>
<td>19</td>
<td>86.4</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>19</td>
<td>86.4</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>21</td>
<td>95.5</td>
</tr>
<tr>
<td>Farm Mechanics</td>
<td>18</td>
<td>81.8</td>
</tr>
<tr>
<td>Decision Making</td>
<td>14</td>
<td>63.6</td>
</tr>
</tbody>
</table>

Comparison of Tables II and IV indicate that those teachers attending the 1964 summer workshop emphasize the biological and physical sciences. Leadership and farm mechanics received considerably less emphasis. As indi-
cated on Table II, the opposite situation is true among the group as a whole. Leadership and farm mechanics were the areas receiving the most emphasis while the biological and physical sciences were taught by fewer teachers. Decision making was taught by only 63 percent of all teachers in both groups--those attending the 1964 workshop and the total group of 97 basic agriculture instructors.

As indicated by the review of literature, the greatest amount of research done on teaching agriculture classes by the "principle approach" has been accomplished in the science areas. It is interesting to note that those teachers showing interest in the "principle approach" and participating in the curriculum workshop emphasize those areas that most easily adopt the "principle approach" as a teaching method.

Analysis of the Effectiveness of the 1964 Oregon State University Curriculum Workshop

All instructors attending the 1964 curriculum workshop were consulted concerning the effectiveness of teaching by the use of the "principle approach". As indicated earlier in this paper, the teachers at this workshop developed a set of principles they could use in teaching all areas of
basic agriculture. Based on the fact that the 1964 workshop teachers had been exposed to the method of teaching by the use of "principles", while most other teachers of agriculture have had limited formal training in this area, an analysis of the method of instruction preferred by both groups is shown below in Table V.

Table V

Comparison of Workshop Teachers to Teachers Not Attending the 1964 Curriculum Workshop

<table>
<thead>
<tr>
<th>Instructional Method</th>
<th>Preference of Non-Workshop Teachers</th>
<th>Preference of Workshop Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Group Discussion</td>
<td>29</td>
<td>38.7</td>
</tr>
<tr>
<td>Presentation of facts and/or figures</td>
<td>31</td>
<td>41.3</td>
</tr>
<tr>
<td>Presentation of Principles</td>
<td>14</td>
<td>18.7</td>
</tr>
<tr>
<td>Work Experience</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Giving specific illustrations and helping the students associate them with a general statement</td>
<td>25</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Some teachers indicated that they prefer to use more
than one instructional method. However, as can be seen in Table V, teachers exposed to the use of the "principle approach" prefer this method of instruction. While only 33 percent of the teachers not attending the curriculum workshop chose the "principle approach", 50 percent of those attending the 1964 workshop prefer this type of instruction.

Table VI

Subject Areas Preferred for Teaching By the Principle Approach

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Non-workshop Teachers' Preference of Principle Approach</th>
<th>Workshop Teachers' Preference of Principle Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
</tr>
<tr>
<td>Leadership</td>
<td>23</td>
<td>30.6%</td>
</tr>
<tr>
<td>Farm Mechanics</td>
<td>7</td>
<td>9.3%</td>
</tr>
<tr>
<td>Occupational Training</td>
<td>19</td>
<td>25.4%</td>
</tr>
<tr>
<td>Physical Science</td>
<td>17</td>
<td>22.6%</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>16</td>
<td>21.4%</td>
</tr>
<tr>
<td>Decision Making</td>
<td>16</td>
<td>21.4%</td>
</tr>
</tbody>
</table>
A relatively small number of non-workshop teachers prefer teaching the specific areas listed above by the "principle approach". The "principle approach" is preferred for all areas of instruction by teachers attending the 1964 workshop indicating that if teachers are given information and some direction they can teach all areas of agriculture by the use of "principles". However, over 50 percent of the teachers made the notation they felt teachers must be taught how to teach by the "principle approach". This indicates that the teacher as well as the student must first be conditioned to this type of instruction, stressing the point that educational media are needed if all teachers are to learn how to teach by this method. Those teachers commenting that it takes longer to teach an area by the "principle approach" than by other instructional methods, also indicated in their questionnaires that they felt the material taught by the "principle approach" was retained longer.

Follow-up letters to 12 teachers who indicated outstanding success in teaching basic agriculture by the "principle approach" on the questionnaire were sent in order to answer why they liked the "principle approach" and why they had better success with this type of instruction as compared to other types of instruction.
Of the ten letters answered, all agreed they felt the "principle approach" is a good method of instruction if handled correctly by the instructor. The main reason for the success of the "principle approach" appears to be because it is motivational and allows the students to participate. Almost all the instructors made the comment that because it is motivational and there is student participation, once accustomed to being taught by the "principle approach", most students prefer being taught by this method as compared to other instructional methods.

Although no actual study comparison between students taught by the "principle approach" and students taught by other methods was made, eight of the responding teachers did indicate they felt the students learned more by the "principle approach".

**Interest in the Principle Approach**

In checking the questionnaires sent out to Oregon teachers of basic agriculture, the question of whether teachers really wanted to find out more about teaching by
the "principle approach" was asked.

Table VII

Agriculture Teachers Interested In Learning More About Teaching Basic Agriculture By the Principle Approach

<table>
<thead>
<tr>
<th></th>
<th>All Teachers</th>
<th>Non-workshop Teachers</th>
<th>Workshop Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>Interested</td>
<td>73</td>
<td>75.5</td>
<td>53</td>
</tr>
<tr>
<td>Not Interested</td>
<td>21</td>
<td>21.5</td>
<td>19</td>
</tr>
<tr>
<td>No Comment</td>
<td>3</td>
<td>3.0</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>97</td>
<td>100</td>
<td>75</td>
</tr>
</tbody>
</table>

As indicated by Table VII, over 90 percent of the teachers who attended the workshop stated they would like to learn more about the "principle approach". This indicates a desire to further perfect the method they had earlier said they preferred. Two teachers indicated they were not interested but did not state why they were not seeking further education in this area.

Over 75 percent of the teachers not attending the
summer workshop stated they were interested in learning more about teaching basic agriculture by the "principle approach". This indicates that there is a trend toward this type of instruction at this time. This same fact was exposed in another question asking for proposed instructional aims. Eight agriculture teachers not attending the workshop indicated they were planning to teach by the "principle approach" next year.

A need for preparing teachers to teach by the "principle approach" was indicated by comments from teachers attending the 1964 curriculum workshop and from teachers who had not attended the workshop. Table VIII, shown below, lists various means by which agriculture teachers are kept aware of the changes taking place in teaching methods. The three-day summer conference held early in June for all Oregon agriculture teachers was preferred by over 80 percent of all responding teachers for keeping abreast of curriculum changes. Only the workshops held during the summer received greater preference. Slightly over 56 percent of those not attending the 1964 summer workshop preferred this method as a means of keeping abreast of curriculum changes. However, a marked increase was
noted among those attending the 1964 workshop. Over 95 percent of these teachers sought it as a means of further curriculum training. This indicates that those who had attended a workshop had successfully gained, while those who had not attended should somehow be initiated to the benefits of the various workshops held in the state.

Table VIII

Aids Preferred for Keeping Abreast of Curriculum Changes

<table>
<thead>
<tr>
<th></th>
<th>All Teachers #</th>
<th>%</th>
<th>Non-workshop Teachers #</th>
<th>%</th>
<th>Workshop Teachers #</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Conferences</td>
<td>90</td>
<td>92.8</td>
<td>70</td>
<td>93.4</td>
<td>20</td>
<td>91.0</td>
</tr>
<tr>
<td>Summer Workshops</td>
<td>60</td>
<td>61.9</td>
<td>39</td>
<td>52.0</td>
<td>21</td>
<td>95.5</td>
</tr>
<tr>
<td>Old Yeller-OVATA Newsletter</td>
<td>35</td>
<td>36.1</td>
<td>33</td>
<td>44.0</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>State Newsletter</td>
<td>17</td>
<td>17.5</td>
<td>15</td>
<td>20.0</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>Newsletters from OSU (Not presently offered)</td>
<td>3</td>
<td>3.1</td>
<td>3</td>
<td>4.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agriculture Education Magazine</td>
<td>33</td>
<td>35.1</td>
<td>31</td>
<td>41.3</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>District Agriculture Teachers' Meeting</td>
<td>24</td>
<td>22.6</td>
<td>20</td>
<td>27.7</td>
<td>4</td>
<td>18.2</td>
</tr>
</tbody>
</table>

CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The 1963 Vocational Act has modified many aspects of agriculture instruction by providing for the expansion of vocational agriculture departments and asking for rigid specification for each program initiated.

The agriculture program has been affected by the 1963 legislation and previous acts and because of the rapidly changing teaching techniques. One of the recent innovations in teaching methods for vocational agriculture classes is the use of the "principle approach". The underlying idea of the "principle approach" is to teach specifics in such a manner that the student will be lead to discover the general principle for himself and apply the principle to new specifics.

Interest in developing an instructional method utilizing a "principle method" is found in literature of the turn of the century. The fields of educational psychology and philosophy theorized that all learning could be stimulated with the use of the "principle approach". However,
the first fields to put this theory into practice in modern education were those of the physical and biological sciences. During the last four years, educators in the field of vocational agriculture have shown increasing interest in developing the theory of the "principle approach" in education into a workable plan for high school vocational agriculture classes. It is felt that agriculture is an applied science and can profit from the same instructional methods used successfully by the "pure" sciences of biology, physics, and chemistry.

After a survey of other fields doing work in this area was completed, 117 questionnaires were sent to all teachers of vocational agriculture in the state of Oregon. Ninety-seven of these questionnaires were used in this study because these were from instructors teaching a basic agriculture class.

The questionnaires from the 22 basic agriculture teachers attending the 1964 Oregon State University curriculum workshop were used both in the tabulations of Oregon agriculture teachers as a group and as a basis for comparison with those teachers not attending the workshop. This was done in order to determine the interests and preferences of those instructors receiving formal training and guidance
in the use of principles.

One of the purposes of this study was to determine the curriculum areas taught in the basic agriculture classes and the application of the "principle approach" to these areas. In order to cover the greatest number of curriculum areas as possible, the six general areas of leadership, decision making, farm mechanics, biological sciences, physical sciences and occupational training were used.

The survey indicated the areas of leadership and farm mechanics were the two subject areas taught during the introductory course that received the most emphasis in over 80 percent of the basic agriculture classes. The area of biological sciences was taught in over 95 percent of those classes instructed by teachers attending the 1964 curriculum workshop. The areas of physical sciences and occupational training were taught in over 86 percent of the classes.

The teachers emphasizing farm mechanics and leadership also preferred to use group discussion and the presentation of facts and figures as teaching methods. The teachers emphasizing the biological and physical sciences and occupational training preferred to use the "principle approach"
and group discussion.

Over 50 percent of the teachers attending the curriculum workshop used the "principle approach" in all of the six curriculum areas. None of the six subject areas were taught by the "principle approach" by more than 30 percent of those teachers who did not attend the workshop.

There was a great deal of interest shown by teachers of basic agriculture to learn more about the "principle approach". Over 70 percent of the teachers who did not attend the curriculum workshop expressed a desire to learn more about the "principle approach" as did over 90 percent of those teachers attending the workshop.

The teachers were asked which professional publications and meetings they found most helpful in keeping abreast of changes in the educational field. Most of the teachers stated they found the state agriculture teachers' conference most helpful. Summer workshops were ranked second to the summer conference with all teachers but those attending the 1964 workshop who listed it ahead of the summer conference.
Conclusions

It may be concluded from this study that a teacher's success in the use of the "principle approach" is more likely if the teacher has attended a workshop or otherwise been prepared for this type of instruction. Basic agriculture is taught by various methods but group discussion and presentation of facts and figures are preferred by agriculture teachers who have not had training in the use of the "principle approach" as an instructional method.

However, over 50 percent of the teachers attending the 1964 curriculum workshop indicate they prefer to teach all six subject areas of basic agriculture by the "principle approach". There are certain areas of basic agriculture which appear to be better suited to instruction by the "principle approach". These are the biological and physical sciences and the occupational training areas. A possible reason for the success of the "principle approach" in these areas is because more work has been done in adapting the "principle approach" to these fields, as indicated by the review of literature. Two areas, farm mechanics and decision making appear to be less adapted to the "principle approach".

There appears to be success for those teaching agriculture by the "principle approach". However, most teachers indicate they use other methods of instruction to
supplement this approach. There is common agreement among instructors teaching by the "principle approach" that in order to have success in this area of instruction, the teacher should first have some preparation in how to teach by the "principle approach".

The majority of Oregon agriculture teachers wish to learn more about the fundamentals of the "principle approach". The means by which information concerning the use of the "principle approach" can be most successfully disseminated appears to be, first, the Oregon Vocational Agriculture Teachers' Conference and, second, summer workshops.

Recommendations

Since this study was begun, several things have transpired to indicate further interest in the "principle approach" for teaching basic agriculture. In the spring of 1967 ten agriculture teachers representing the ten agriculture districts in Oregon had a two-day seminar regarding the use of the "principle approach" for teaching basic agriculture. Also curriculum workshops have been organized to meet in all ten districts of Oregon so as to further acquaint all Oregon agriculture teachers with the use of the "principle approach". Noted speakers are to lecture at the 1967 Vocational Agriculture Teachers'
Conference at Bend, Oregon and at the ten district workshops held during June, 1967.

It is recommended as a result of this study that further educational opportunities be made available for instruction in the "principle approach". This has been recommended by teachers having some training in this area.

It is further recommended that prepared booklets and detailed materials on the "principle approach" be made available to all teachers of agriculture. Strong emphasis should be placed on the farm mechanics, leadership and decision making areas.

It is also recommended that more research on teaching the fundamentals of agriculture in the areas of "special education" by the "principle approach" be undertaken. This research could involve such areas as teaching the gifted or retarded child.


APPENDICES
Dear [Name]:

Would you take a few minutes from your busy schedule to answer the questions on the enclosed questionnaire? You will also find a self-addressed envelope for your convenience in returning the questionnaire to me.

The purpose of this questionnaire is to provide me with your ideas on using the principle approach to teaching agriculture in your classes. These answers will be used in conjunction with research I am doing for my thesis on agricultural education, which is intended to be a follow-up study on previous curriculum studies done at Oregon State University.

Your cooperation is appreciated.

Sincerely,

Bob Way
Agriculture Instructor
Creswell High School

Enclosures (2)
QUESTIONNAIRE

Please fill out the following questions and return in the self-addressed envelope as soon as possible.

Name ___________________________ Age ________

Address __________________________

1. How long have you been a teacher of agriculture?
   ___ a. 1 - 5 years     ___ c. 11 - 15 years
   ___ b. 6 - 10 years    ___ d. over 15 years

2. How long have you been teaching agriculture in Oregon?
   ___ a. 1 - 5 years     ___ c. 11 - 15 years
   ___ b. 6 - 10 years    ___ d. over 15 years

3. How long have you been teaching agriculture at your present school?
   ___ a. 1 - 5 years     ___ c. 11 - 15 years
   ___ b. 6 - 10 years    ___ d. over 15 years

4. What classes do you teach? (Check appropriate areas)
   ___ a. Introductory agriculture (Basic Agriculture)
   ___ b. Second-year agriculture (Production Agric.)
   ___ c. Agriculture Science (Juniors and/or Seniors)
   ___ d. Advanced Agriculture
   ___ e. Forestry
   ___ f. Farm Mechanics
   ___ g. Other: Specify _______________________

5. If you teach Basic Agriculture (Introductory course), how do you present new ideas to the students? Check those that apply.
   ___ a. Group Discussion
   ___ b. Presentation of facts and/or figures
   ___ c. Presentation of Principles
   ___ d. Work Experience
   ___ e. Giving specific illustrations and helping the students associate them with general statements (Principle Approach)

6. Underline the item in question No. 5 that you prefer.

7. Do you foresee changing your method of teaching Basic Agriculture?
   ___ a. Yes
   ___ b. No
If your answer is yes, please specify how you plan to change.

8. Did you attend the 1964 summer workshop for agriculture teachers held at Oregon State University?
   ___ a. Yes
   ___ b. No

9. What aids have you found helpful in keeping your program abreast of changing curriculum methods?
   ___ a. Summer Conferences ___ d. Old Yeller
   ___ b. State Newsletter ___ e. Summer Workshops
   ___ c. Newsletter from OSU ___ f. Others: Specify

10. Check the subject areas you teach to your Basic Agriculture class.
    ___ a. Leadership
    ___ b. Occupational training
    ___ c. Physical Sciences
    ___ d. Biological Sciences
    ___ e. Farm Mechanics
    ___ f. Decision Making
    ___ g. Others: Specify

11. Do you present specific illustrations to your students with the aim that the students will be able to grasp general statements to any of the above subjects.
    ___ a. Yes
    ___ b. No

   If yes, please underline the above subjects you teach this way.

12. If you teach or have taught Basic Agriculture by the principle approach, please write a short paragraph on what results you have had with this type of teaching method. __________________________
13. Are you interested in learning more about teaching Basic Agriculture by the principle approach?
   ___ a. Yes
   ___ b. No

Thank you for your help!!

Bob Way
February 21, 1967

Mr. Bob Way
Vocational Agriculture Instructor
Creswell High School
Creswell, Oregon

Dear Bob:

The principle approach to teaching first year Agriculture is successful, if properly handled by the instructor, primarily in that it is motivational in nature. High interest levels in agriculture early in the school year can be successfully capitalized upon by the teacher using this approach. Follow-up is meaningful and smooth transition from the physical to the factual is possible. Student involvement helps us achieve the goal of individual self-expression and cooperative attitude development.

Sincerely,

/s/ Daniel B. Dunham
Instructor in Agriculture
Lebanon Union High School
APPENDIX C

Examples of Principles Established by the Oregon State University 1964 Curriculum Workshop

SUBJECT AREA: **Biological Principles**

Subject: Photosynthesis

Activities:

1. Experiments
   a. dark vs. ordinary sunlight
   b. sunlight vs. artificial light
   c. various light paths and spectrums
   d. iodine for starch analysis
2. CO₂ experiments
   a. low amounts (plastic bag)
   b. high amounts (blow into plastic bag or container)
3. Useful applications of photosynthesis
   a. pruning fruit trees
   b. mulching for weed control
4. Undesirable effects of photosynthesis
   a. green on carrots and potatoes
5. Observe and discuss animal roughages

**PRINCIPLE:** Life on earth, both plant and animal, depends upon photosynthesis, the process by which plants use energy from the sun in manufacturing food.

SUBJECT AREA: **Decision Making**

Activities:

1. Inventory of my physical and mental abilities and interests.
2. Determine if my school success measures up to my abilities.
3. View and discuss Problem Drinkers.

**PRINCIPLE:** The greatest economic waste today is human ability not used to the best and highest use.
SUBJECT AREA: Occupational and Educational Information

Student Activities:
1. Survey the natural resources of the area.
2. Determine the services people buy in your community.
3. Let students explain why some types of employment are available in the area and others are not.
4. Study comparative advantage.

PRINCIPLE: The place and kind of work in the community is dependent on the services, goods, natural resources and productivity of the area.

SUBJECT AREA: Leadership

Student Activities:
1. a_ered _om _a_les _o _he _u_or. Have students work as a group and find the letter (t).
2. Plan a program of work for the FFA or as a class project.
3. Work out problems assigned by the teacher as a group by own method.
   a. Determine average number of years for members of the class.
   b. Determine total investment of students in the class.
4. Watch a ball game and then write a paper on team work.
5. Develop a list of 8 or 9 activities for FFA recreation.
6. Write a short paper on: How can I become a worthwhile contributor as a group member?

PRINCIPLE: Group action plays an important part in our culture.

SUBJECT AREA: Mechanical Principles
Subject: Mechanical Advantage

1. Observe the lever being used in each of the three ways that it can work.
2. Move a large object across the shop without any mechanical assist except muscle power. Now move the same object across the shop with the aid of wheels. What is the difference, if there is any?
3. Lift an anvil from the floor up to the top of the work bench. Pull the same anvil up an inclined plane rolling it on pipe up to the top of the bench. Pull the same anvil up an inclined plane to the bench top. Measure the difference in pull with a pair of dairy scales.

4. Observe a gear in action and determine the basic machines working to give us the ability to do more work than possible without the machine. (Lever and wheel)

PRINCIPLE: The use of the basic machines increases our mechanical advantage.

SUBJECT AREA: Physical Principles

Subject: Heat transfer

Activities:

1. Cook eggs as follows: With a heat lamp; boiling water; and on the end of a piece of metal with the opposite end being heated.

2. Hold the end of a piece of copper and a piece of steel which the opposite end of each is being heated. Discuss the differences observed and felt.

3. Observe the direction that smoke flows when it is near a heat source.

PRINCIPLE: Heat flows away or towards a body depending on that body's relative temperature and this heat is transferred in three ways: convection, conduction, and radiation.