SCIENCE OBJECTIVES INCLUDED IN THE OKLAHOMA VOCATIONAL AGRICULTURE CURRICULUM AS COMPARED TO THE SUGGESTED LEARNER OUTCOMES FOR HIGH SCHOOL SCIENCE COURSES IN OKLAHOMA

By

LARRY DAVID GALLATIN

Bachelor of Science

University of Wyoming

Laramie, Wyoming

1967

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
July, 1987

SCIENCE OBJECTIVES INCLUDED IN THE OKLAHOMA VOCATIONAL AGRICULTURE CURRICULUM AS COMPARED TO THE SUGGESTED LEARNER OUTCOMES FOR HIGH SCHOOL SCIENCE COURSES IN OKLAHOMA

Thesis Approved:

Wesley Holley
Thesis Adviser

James P. Key

Robert Terry

Norman N. Durham
Dean of the Graduate College

ACKNOWLEDGMENTS

The writer wishes to express his appreciation to those who gave their cooperation and assistance that helped make this study possible. Appreciation is also extended to Lois Bagby, Dr. Roy Dick, Alfred Nelson, Sue Ann Schoenhals, and Jean Schwerdtfegen for taking the time to assist in rating the science objectives. The committee members were part of the original validators of the Suggested Learner Outcomes in Science for Oklahoma.

Appreciation is also expressed to the staff of the Department of Agriculture Education of the Oklahoma State University for helpful advice in preparing this study. A special thanks is expressed to Dr. Wesley Holley, thesis adviser, and to Dr. James P. Key without whose combined guidance and encouragement this study would not have been completed.

The author would like to dedicate this study to his wife, Carol, to his son, Tim, and to his daughter, Kelly, for the encouragement and support given during the development of this research study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

In the last few years public attention has been directed by the media to the lack of student competence in the field of science at the secondary school level. This has caused many states to mandate an increase in science credits needed for graduation. This increase in academic requirements for students has had a negative effect on numbers enrolled in vocational programs since students have tended to enroll in more science and math courses, according to Strickland and Elson (1987).

Vocational agriculture (Vo Ag) teachers are teaching many scientific concepts in various agricultural topics. This is taught as an applied science, where practically all major sciences are brought together creating a better understanding of their relationships to each other. The Oklahoma Core Curriculum was established as a standard format in the late 1960's and early 1970's for the development of instructional materials for all Oklahoma vocational agriculture programs. The Operating Policies of the State Department of Vocational Education (1985) states in section 4.8.A: "All teachers are required to include the basic core curriculum instructional units as developed by the State Department as part of their regular program." With this in mind, there was a need to identify the scientific objectives which

are included in the required core curriculum for vocational agriculture students in Oklahoma.

Statement of the Problem

Students may not have the choice of enrolling in vocational agriculture due to the increased requirements in science and mathematics for high school graduation. This increase in requirements has resulted in substitutions for science and mathematics for a specified number of units in vocational agriculture. As a result of these substitutions, appropriate data on what science concepts are available to be taught in vocational agriculture from the core curriculum should be gathered.

Purpose of the Study

The purpose of this study was to identify the science objectives found in the basic core curriculum for vocational agriculture in Oklahoma, and to compare the Vo Ag objectives to those science objectives identified in the Suggested Learner Outcomes: Science (SLO) (1985), as prescribed for instruction in high schools in Oklahoma.

Objectives of the Study

In order to accomplish the goals of this study, the following objectives were formed:

1. To identify the science objectives included in the basic core curriculum of vocational agriculture in Oklahoma.

2. To compare the science objectives found in the vocational agriculture program objectives prescribed by the State Board of

Education through the Suggested Learner Outcomes in science guidelines.

Scope of the Study

The study included all the objectives in Vo Ag I, II, III, IV, and Agriculture Mechanics I as provided teachers in the State of Oklahoma. It was necessary to limit those objectives to a selected number which were reviewed and identified as containing possible science concepts. The selected objectives were identified after a careful review of the Suggested Learner Outcomes booklet and each individual objective in each core. Those selected objectives were the limited number validated by the select committee of experts.

Definition of Terms

Suggested Learner Outcomes (SLO) Booklet in Science: In 1985 the Oklahoma State Department of Education produced a standardized booklet of stated objectives which teachers and administrators could use to build a solid curriculum in science for the students of Oklahoma high schools.

General Science: General Science is a course designed to be systematic in general knowledge and includes the following: General Physical Science (GSP), General Earth Science (GES), General Life Science (GSL), Earth Science (ES), and Physical Science (PS).

Biology I and II: The science of life in all its manifestations and of the origin, structure, reproduction, growth, and development of living organisms collectively (Biology I, BI; Biology II, BII).

Chemistry I and II: The science that treats the structure, composition and properties of substances and of their transformations (Chemistry I, CHI; Chemistry II, CHII).

Botany: Science course designed to help students acquire habits of critical and creative thinking about plants (Botany, BT).

Zoology: Science course designed to help students acquire habits of critical thinking about animals (Zoology, ZO).

Physiology and Anatomy: Designed to provide a detailed study of the structure and function of the human body (Physiology and Anatomy, PHA).

Physics: Designed to provide a basic understanding of the physical laws fundamental to all sciences (Physics, PHI).

Vocational Agricultural Core Curriculum of Oklahoma: Instructional units provided by the State Department of Vocational Technical Education (SDVTE) for standardized objectives to be used throughout the state by each teacher in the local program.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to present an overview of material for the reader which was related to the subject of this study. The review of literature in this study was subdivided into three basic sections and a summary which included (1) General Vocational Education Studies, (2) Similar Secondary Level Studies, and (3) Pertinent Secondary Science Studies.

General Vocational Education Studies

According to Dyrenfurth (1985), most of the response to his survey pointed towards a narrowing of the window of opportunity for students to take vocational education. Enrollment has declined from three to six percent nationally in vocational classes because of increased high school graduation requirements in mathematics, science, foreign language, or social science. Another trend was seen with movement towards separate requirements for a college preparatory diploma. This would limit students to one track systems and would not allow a college bound student to take any vocational courses or a vocational student to take any college preparatory classes. According to Dyrenfurth (1985), it looks as if America's decisionmakers have forgotten that one of the cardinal purposes of schooling is to prepare students for productive work roles.

Myrachek (1984) stated that now was the time for vocational education to take advantage of its hands-on approach and use it to enrich the math and science skills of our nations' technicians. It has been repeated by many industry leaders that knowledge of reading, writing, math, and science were essential to getting and holding the good, sought-after jobs. Myrachek (1984) contended that students needed to have theories followed by practical application in the major areas they were studying. The What Works (1986) report by the U.S. Department of Education found that: "Children learn science best when they are able to do experiments, so they can witness 'science in action'" (p. 23). This statement agreed with the applied science approach vocational agriculture has taken in teaching and supports more vocational involvement in science.

Parks and Henderson (1985) stated that the Carl Perkins Act contained 31 words that encouraged strengthening of the academic foundations of vocational education. Several ways were indicated as to how states could use the funds to enrich their vocational programs by teaching the fundamental principles of mathematics and science through practical applications. Parks and Henderson (1985) pointed out that business and industry had not requested more academic classes but that the academic concepts be applied into the vocational program. The U.S. Bureau of Census (1986) reported that, in 1985, 80 percent of all people 25 years and older had not finished four years or more of college. The concentration on academics or college prep students when only 20 percent graduate from four years of college has left 80 percent of the students following a course that will leave them short on the skills needed for employment.

According to Truxal (1984), one central problem to the crisis in math and science in our secondary schools was the low level of student interest in math and science. Instead of adding years to traditional courses taught the same way they have been, we must develop an educational system that reaches our educational goals. Truxal (1984) made the following statement:

> Our vocational education courses are frequently widely separated from the math/science courses, and our existing science and math courses fail to convey to most students the excitement of learning about the increasingly technological world in which we live and work (p. 24).

Carr (1984) reported that the Great Oaks Joint Vocational School District in Cincinnati, Ohio identified the problem in 1980 through a study by an independent research firm. After two years of work, they decided their program needed strengthening in mathematics, science, communications, and organizational skills. They also decided that these should not be isolated in a theory-based academic program, but be integrated into the basic real-life application in specific occupational fields. The program's preliminary evaluations indicated success and students seemed to be getting more understanding and application skills in both math and science, according to Carr (1984).

Similar Secondary Level Studies

As early as 1962 a study was made at Oklahoma State University about scientific concepts taught Oklahoma vocational agriculture students. The study by DeVaughn (1962) revealed that the teacher of vocational agriculture was teaching scientific concepts extensively in many areas of agricultural subjects. Even at this time much emphasis was placed on science and mathematics. DeVaughn (1962) found that

vocational agriculture teachers were teaching scientific concepts and that vocational agriculture should be recognized as an integrated science where all major sciences were brought together and applied.

A study by Gleim and Warmbrod (1986) of Ohio State University showed that vocational agriculture students tested were not more proficient at performing simple mathematical operations of addition, subtraction, multiplication, and division than they were at solving word problems. The study also pointed out that to have higher scores students needed to enroll in algebra, geometry and other advanced mathematic courses in addition to enrollment in vocational agriculture. Gleim and Warmbrod (1986) stated that vocational agriculture must include instruction in both cognitive and manual skills that would enable learners to develop basic competency in computational skills.

According to a study by Thomas and Groves (1986), there was a difference of opinion between the teachers of vocational agriculture and the university departments on what animal science concepts were necessary for teaching. This Colorado State University study showed a lack of unity between what teachers were being prepared for and what they perceived that they should have been prepared for in the animal science areas. Thomas and Groves (1986) found many scientific concepts being used in the animal science areas of vocational agriculture.

Pertinent Secondary Science Studies

Several states recently completed studies about identification of science concepts in vocational agriculture and the relationship to traditional science courses. These states included North Carolina,

Texas, Illinois, Missouri, Colorado, and Louisiana. The State of Montana finished a similar study while some other states have begun their own research about science concepts.

According to the Administrators Handbook for Elementary, Middle, Junior High, and High Schools (1986), the Oklahoma State Board of Education adopted a policy which allows the individual school district the option to waive a unit of credit in science and a unit of credit in mathematics if a student completed six units of credit in vocational agriculture. If a student completed three units of vocational agriculture, one unit of credit may be waived in either math or science. Oklahoma was one of the few states that allows this.

Moss (1984) in his research of Identification of Science Competencies Taught in Ornamental Horticulture and Introduction to Agriculture/Natural Resources in North Carolina identified 101 science competencies in these two vocational agriculture programs. Moss found that 24 out of the 60 competencies found in Agriculture/Natural Resources were identified as similar to competencies taught in high school science courses. Six of the 41 competencies in Ornamental Horticulture I were found to be directly related to competencies taught in Biology and Physical Science, according to Moss (1984).

Anderson and Boddy (1985) from Colorado State University, with their study on The Identification of Science Competencies Included in the Curriculum of Secondary Vocational Education Programs, added to the studies to confirm the importance of science competencies in vocational agriculture. They found that production agriculture and horticulture programs contained significant components of biology, chemistry, and physics related skills. In addition, Anderson and Boddy (1985)

pointed out that increased academic requirements for graduation have an adverse effect on enrollments in vocational programs.

Briers, Dayberry and Reap (1986) conducted a study to determine how vocational agriculture in Texas provided opportunities for students to develop concepts and skills in mathematics and science. A panel of science teachers found that 75 percent of the topics taught in vocational agriculture developed concepts and skills in science. Briers, Dayberry and Reap (1986) study supported the earlier research and the popular belief held by many that vocational agriculture contained large amounts of science-related instruction.

Moss (1987), in his research on Identification of Science Related Competencies Taught in Vocational Agriculture Programs in Louisiana, found 76 objectives were related to science. Moss concluded that a substantial number of science-related objectives included in the basic program of vocational agriculture in Louisiana were being taught both in Vocational Agriculture I and Vocational Agriculture II with most of the objectives occurring for the Environmental Sciences. Moss (1987) recommended substitute credit for completion of Vocational Agriculture I and Vocational Agriculture II for a science credit.

Summary

With the research thus far completed in several states, the evidence points towards vocational agriculture as being very strong in science competencies. A study completed by the Oklahoma State Department of Vocational and Technical Education (Patton and Sawatzky, 1985) reviewed all of the Suggested Learner Outcome (1985) statements and suggested which objectives were needed for success in vocational

courses. The review committee found 59 of 156 of the Suggested Learner Outcome (1985) objectives needed for success in vocational agriculture with the understanding that these objectives are not prerequisites for any student entering vocational agriculture. Studies in other states and previously mentioned in this review, found a high frequency of scientific competencies in high school science classes being applied in vocational agriculture classes. As a result of these studies and the study conducted in Oklahoma, the question was asked, "What science competencies are incorporated within the vocational agriculture curriculum?" It was determined that a specific study of the Vo Ag I-IV and Ag Mechanics I core curriculum specific objectives and their relationship to learner outcome objectives in science should be conducted.

CHAPTER III

DESIGN AND METHODOLOGY

The purpose of this chapter is to describe the methods and procedures used in conducting this study. To accomplish the objectives of the study, the basic curriculum guide for vocational agriculture and the basic objectives for science were examined to identify those objectives in vocational agriculture that were science-related.

Science Objectives Studied

The Suggested Learner Outcomes: Science (1985), grades nine through 12, was used for identifying the science competencies recommended to be taught in high school science programs. The Oklahoma State Department of Education established objectives for each area of science to be used for the State of Oklahoma. These objectives were divided into 11 course areas which were: General Science, Earth Science, Physical Science, Biology I, Biology II, Chemistry I, Chemistry II, Botany, Zoology, Physiology and Anatomy, and Physics. Each course area was further divided into objectives that were deemed necessary by the committee members that developed and validated the Suggested Learner Outcomes: Science (1985) guidelines. Each objective was followed by a descriptive statement helping to define the objective.

After the Suggested Learner Outcomes: Science (1985) was studied

by the researcher, it was decided to combine some of the course areas that were similar. The researcher, certified to teach General Science and Biology, and the thesis committee combined some areas together in order to simplify the comparison between Vo Ag objectives and the State science objectives. General Science was combined with Earth Science and Physical Science for one component. Biology I and Biology II were combined as Biology I and II. Chemistry I and Chemistry II were combined as Chemistry I and II. The remaining divisions were left as outlined in the SLO booklet. Seven component condensed areas were used for the rest of the study. These areas were:

1. General Science - which includes General Physical Science (GPS), General Earth Science (GES), General Life Science (GLS), Earth Science (ES), and Physical Science (PS).

2. Biology I and II - which includes Biology I (BI) and Biology II (BII).

3. Chemistry I and II - which includes Chemistry I (CHI) and Chemistry II (CHII).

4. Botany (BT).

5. Zoology (ZO)

6. Physiology and Anatomy (PHA)

7. Physics (PHI)

These areas utilized were the concept areas for study and comparison with Vocational Agriculture Objectives in Core I through IV and Agriculture Mechanics I.

The Oklahoma Core Curriculum for Vocational Agriculture I through IV and Agriculture Mechanics I (1973-1985) were used as sources for identifying the possible science agriculture objectives used in the

state high schools' Vo Ag programs. Since the State Department of Vocational and Technical Education has required all teachers to include the core curriculum in their regular programs, the 1,610 objectives included in the Vo Ag Core Curriculum should be available as standard throughout the State of Oklahoma. The 1,610 Vo Ag objectives were then compared one by one to the state science objectives found in the SLO (1985) booklet by the researcher. If it was determined that the Vo Ag objective was related to any science objective within the component areas as described by the SLO (1985) booklet, then it was selected as a Vo Ag objective for the study. A total of 437 possible Vo Ag objectives were selected by the researcher.

Development of the Instrument

In order to derive the information needed in meeting the objectives of this study, a survey instrument was developed. The instrument was developed using several questionnaires which were a part of research reviewed and detailed in the Review of Literature chapter. Due to the specific needs which were identified as a part of the study purpose, the questionnaire was organized so that all selected Vo Ag objectives could be marked as related to the appropriate science component area(s) (See Appendix).

The Vo Ag Core Curriculum Objectives used in the instrument were grouped into Vo Ag I, Vo Ag II, Vo Ag III, Vo Ag IV, and Ag Mechanics I to facilitate the analysis of data in Chapter IV of the study. After the questionnaire was developed, it was reviewed by faculty members of the Oklahoma State University Agriculture Education Department to determine its appropriateness and utility in gathering the data.

Administering the Instrument

The SLO (1985) booklet validators were suggested as participants for the study because of their unique knowledge and involvment with the objectives contained within each science area. Each validator of the SLO participated in determining the objective and identifying the criteria which further defined each objective. Since time and distance in traveling to each validator was a factor to the researcher and since all the validators were equally involved in the validation of the SLO, five validators were selected and called to see if they would agree to participate in the study.

The list of 19 validators was reviewed and five were picked to contact based on the distance from the researcher's home to limit the time involved in traveling to deliver the questionnaire. The phone numbers of their respective schools were found in a state school directory. The school was then called and the validator was told about the study, was asked to participate and a meeting was then scheduled. Each of the first five validators contacted agreed to participate in the study.

The researcher traveled to meet with each of the validators with the questionnaire, a complete set of Vo Ag core curriculum and spent the time with each while they rated the questionnaire to clarify or explain the Vo Ag objective. The researcher started each session with instructions for filling out the questionnaire. The validators were instructed to check each component area that the Vo Ag objective relates to using the State Department of Education booklet, Suggested Learner Outcomes: Science (1985) of which they were the validators.

Validators could check any number of component areas in which they felt that area fit into any of the science objectives for each Vo Ag objective. They could leave those blank if they did not believe the area related to science objectives or that the area was not within their area or expertise. The time involved ranged from one and one-half to two and one-fourth hours to finish the questionnaire. Each validator was allowed to ask questions or to request information about objectives in order to clarify content. Validators were allowed to check content of any objective to the actual information in the core materials in the curriculum.

Analysis of the Data

The data were collected from five validators who filled out the questionnaire. The data obtained were analyzed and all responses were calculated. Descriptive statistics were utilized to explain the information and results of the data collected.

Validation Process

Once the validators completed the process of reviewing and analyzing the objectives, a detailed analysis was completed to list and describe how and in what areas each of the objectives were validated.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This chapter deals with the presentation and analysis of data received from the responses of five of the original validators of the Suggested Learner Outcomes: Science (1985).

Tables and figures have been used where applicable to facilitate presentation of the data accumulated from the survey instrument.

Table I illustrates the self ratings the validators gave themselves when asked to rate themselves on training, education, expertise, and teaching experience in each component area. Validators were told to rate themselves on a scale of one to 10 with one being little training, education, or expertise in the area with a rating of 10 being expert in the subject area. All of the validators were teaching either in high school or college but all felt they were weaker in some component area than others. Only one teacher taught all of the science areas at the high school level.

These self evaluations by validators revealed differences in their expertise in each of the component areas. In analyzing the validators' self assessments in Table I, all the validators felt they had high levels of expertise in Biology (9.0), Zoology (8.0), Botany (7.6), Physiology and Anatomy (7.6), and General Science (7.4) on the average. When each individual validator was considered, they varied in the expertise they have in the seven science areas. Each individual

TABLE I

SELF RATING OF EXPERTISE BY VALIDATORS

Component Areas	Validators					Average Rating
	#1	#2	#3	#4	#5	
General Science	7	7	5	8	10	7.4
Biology I & II	6	9	10	10	10	9.0
Chemistry I & II	6	4	2	7	8	5.4
Botany	5	8	8	7	10	7.6
Zoology	5	9	9	7	10	8.0
Physiology & Anatomy	4	7	9	8	10	7.6
Physics	5	2	2	5	5	3.8

validator had one or more areas they identified as an area of high expertise, seven or above on the scale. Of the seven science areas, only one area was low on the expertise level by all five validators, that being Physics. Each of the remaining six science areas had one or more of the validators rating themselves as eight or above on the expertise scale.

Table II indicated the component areas that one or more validators found to be strong in science objectives were Biology I and II (79), Zoology (70), Physiology and Anatomy (68), and General Science (55) out of 82 selected Vo Ag objectives. On the other hand, Vo Ag I was found to be weak in Physics with only 6.10 percent validation. Vo Ag I was found to have a high number of the 82 selected objectives that related to the science objectives found in Oklahoma high schools.

Figure 1 represents the random sample of 10 percent of the selected Vo Ag I objectives and how they cross-reference to each science objective validated by the validators. The researcher matched the validated Vo Ag I objectives with the indicated component areas then went through the SLO (1985) and found the specific objectives that related to the Vo Ag objective. This is illustrated in Figure 1 and illustrates the validators' validation of Biology I and II, Zoology, and Physiology and Anatomy in Table II.

Table III deals with 159 selected Vo Ag II objectives that were presented to the validators for their evaluation. Vo Ag II was found to be high in General Science (139) and Biology I and II (136) according to one or more of the validators. All the other component areas related to the Vo Ag II objectices in moderation except Physics with only 17 validations.

TABLE II

EIGHTY TWO VO AG I SCIENCE OBJECTIVES

Component Area	Number of Objectives Validated By:					Total Objectives Validated	
	1 Validator	2 Validators	3 Validators	4 Validators	5 Validators	N	%
General Science	26	13	13	3		55	67.07
Biology I & II	32	21	9	15	2	79	96.34
Chemistry I & II	10	2	2	2	1	17	20.73
Botany	6		2	3	7	18	21.95
Zoology	10	42	9	9		70	85.37
Physiology & Anatomy	55	10	3			68	82.92
Physics		3		1	1	5	6.10

VO AG I

General Science

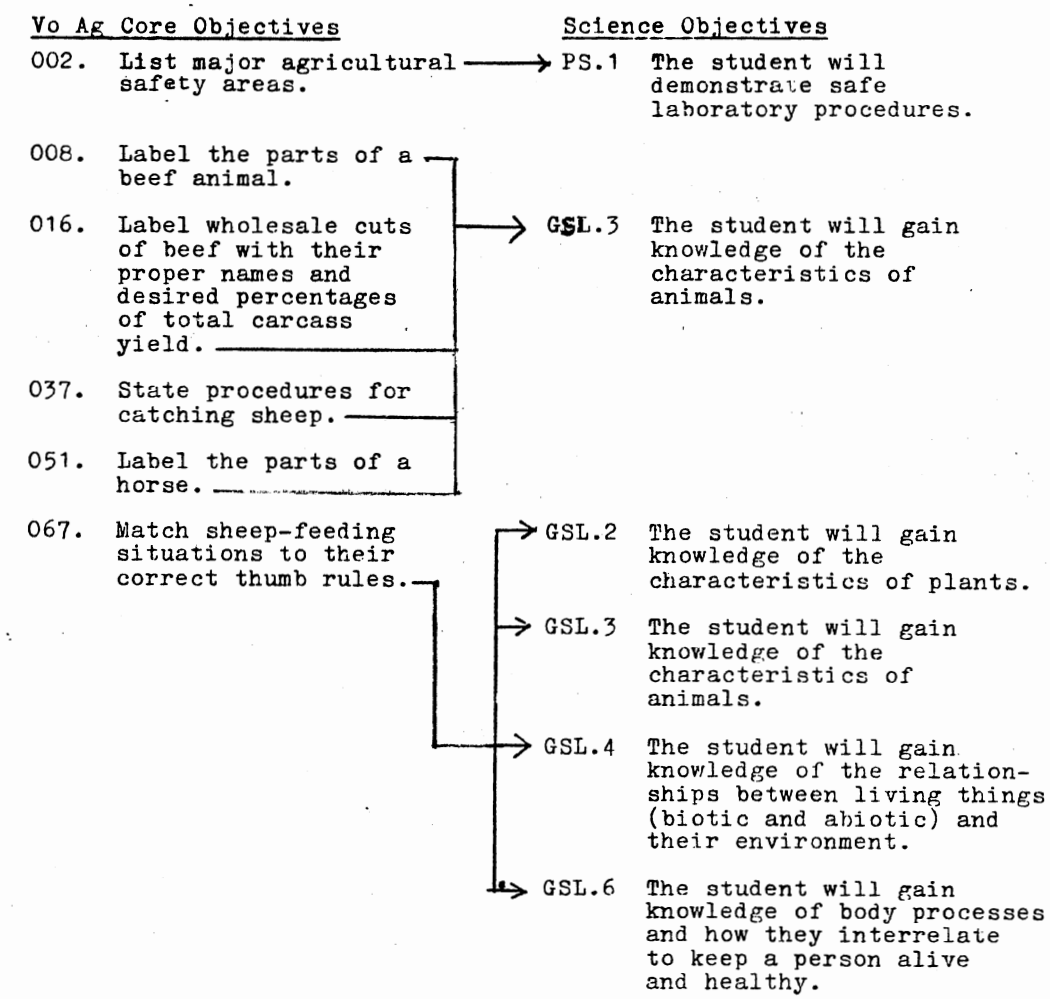


Figure 1. Relationship Between Vo Ag Core Curriculum Objectives and Science Objectives in Vo Ag I

Biology

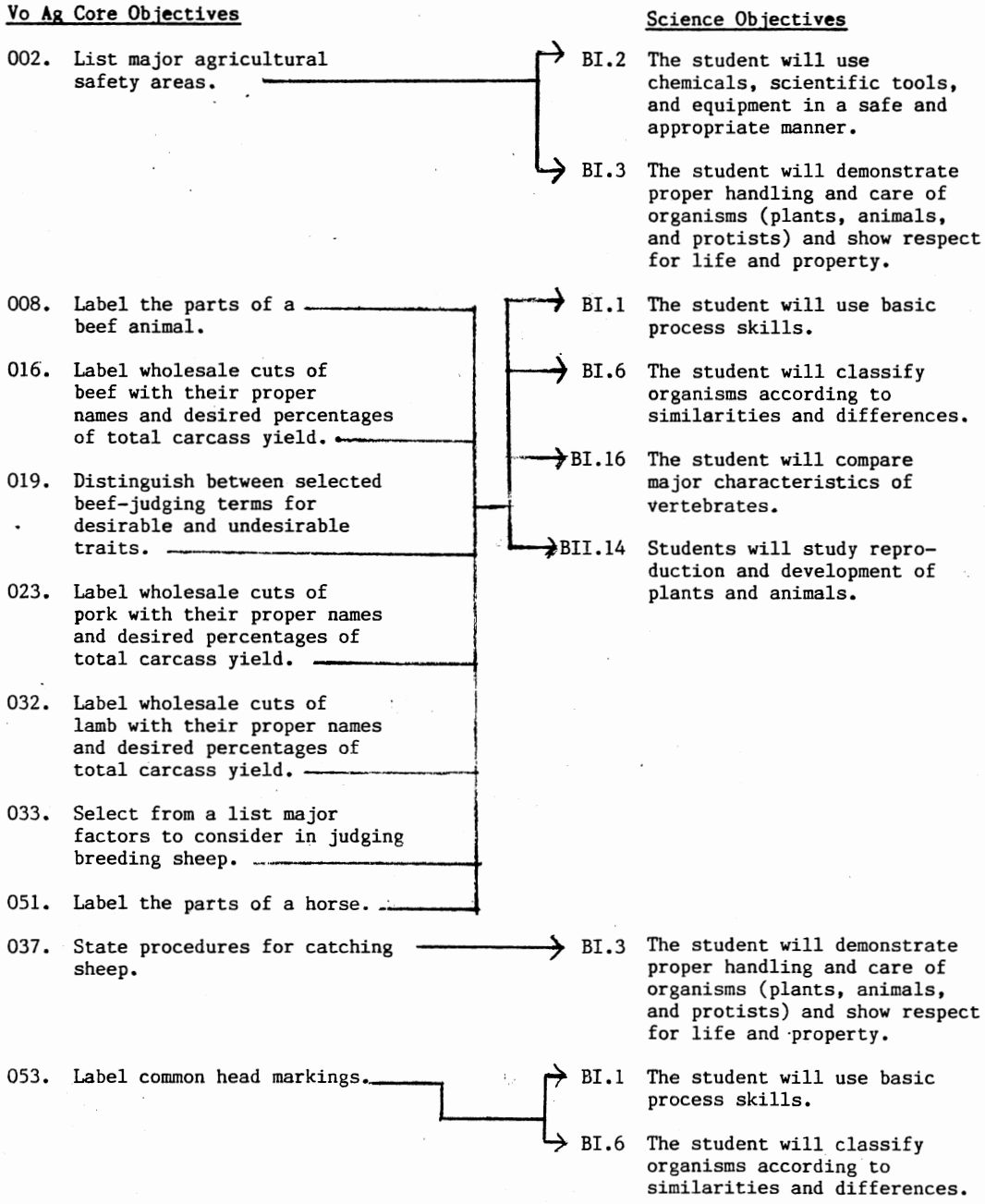
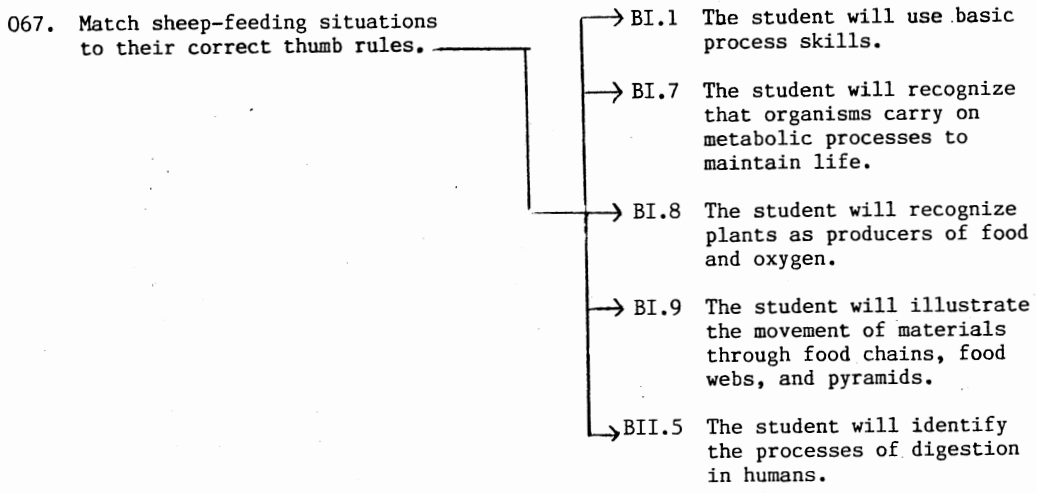


Figure 1. (Continued)



Chemistry I and II

Vo Ag Core Objectives		Science Objectives
002. List major agricultural safety areas	→	CHI.1 The student will demonstrate laboratory procedure and safety.
067. Match sheep-feeding situations to their correct thumb rules.	→	CHI.3 Mathematical skills will be used by the student to solve problems in chemistry.

Botany

Vo Ag Core Objectives		Science Objectives
002. List major agricultural safety areas.	→	Introduction-Develop skills with laboratory equipment.

Figure 1. (Continued)

Zoology

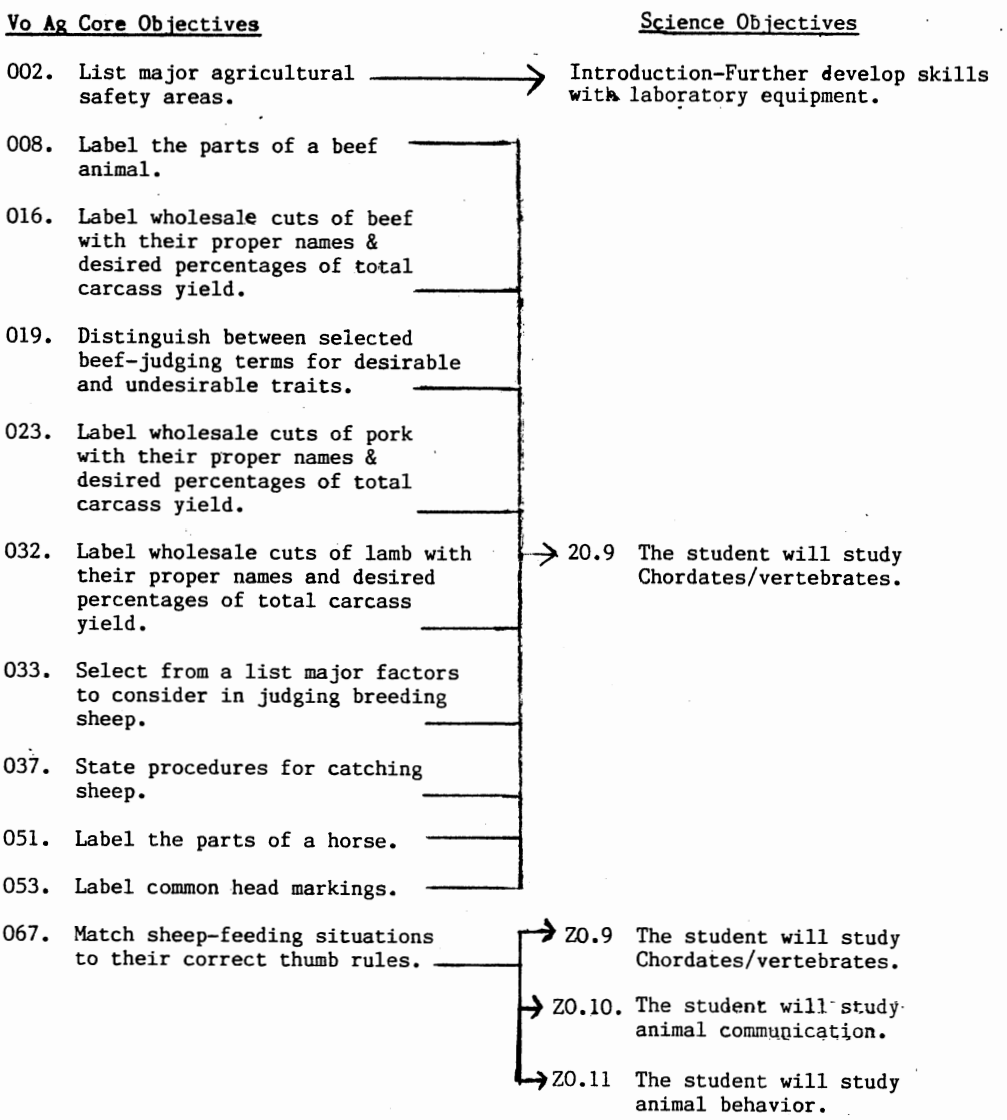
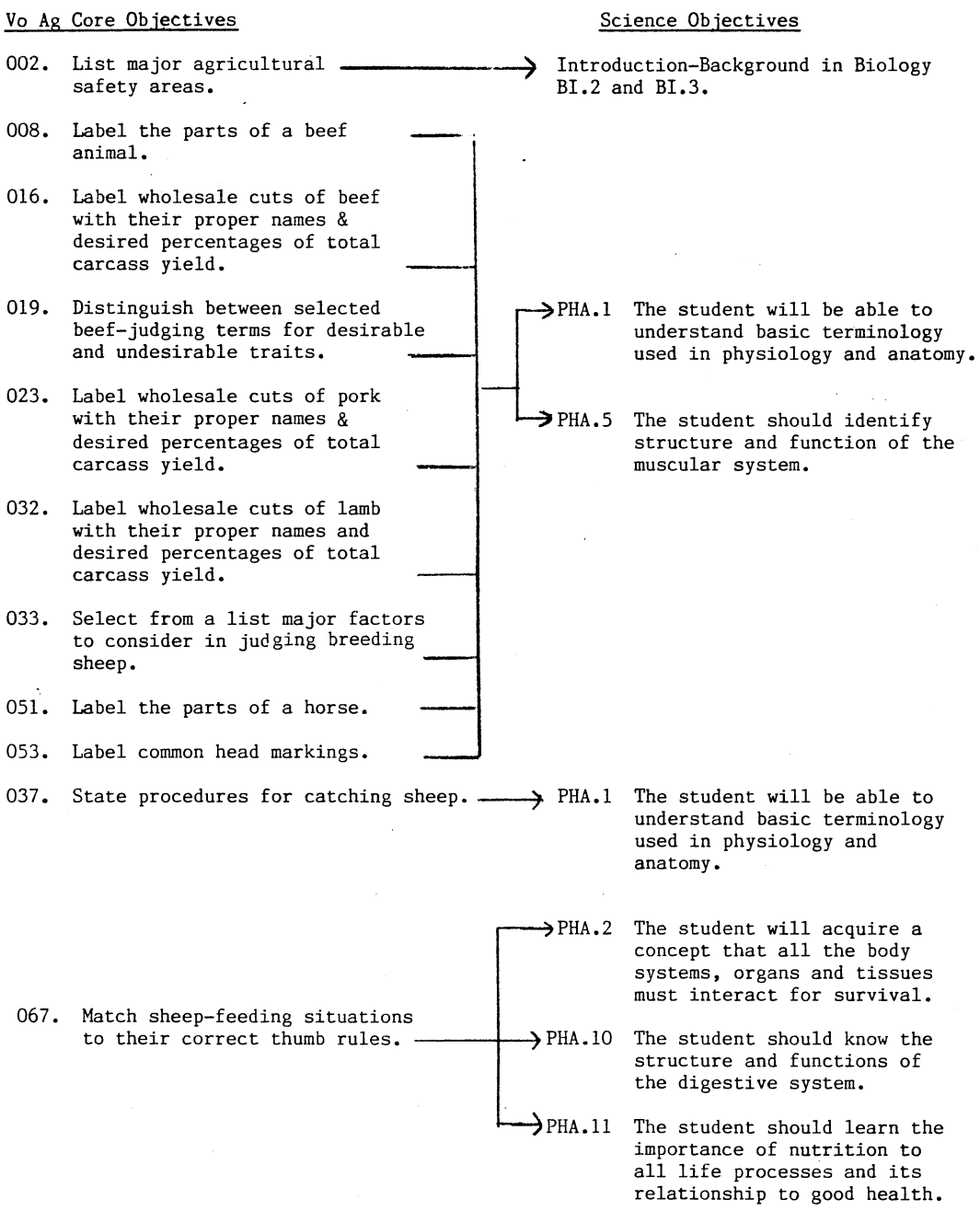


Figure 1. (Continued)

Physiology and Anatomy



Physics

Vo-Ag Core Curriculum Objectives	Science Objectives
002. List major agricultural safety areas	PHI.2 The student will demonstrate safe and appropriate use of laboratory techniques and equipment

Figure 1. (Continued)

TABLE III

ONE HUNDRED AND FIFTY NINE VO AG II SCIENCE OBJECTIVES

Component Area	Number of Objectives Validated By:					Total Objectives Validated	
	1 Validator	2 Validators	3 Validators	4 Validators	5 Validators	N	%
General Science	36	36	30	20	17	139	87.42
Biology I & II	36	27	21	24	28	136	85.53
Chemistry I & II	40	9	12		1	62	38.99
Botany	42	10	9	9	24	94	59.12
Zoology	14	35	15	2	5	71	44.65
Physiology & Anatomy	13	23	11	13		60	37.74
Physics	11	2	4			17	10.69

Figure 2 illustrates the randomly selected objectives strong in General Science and Biology when Vo Ag II objectives were matched to the specific science areas. Many of the randomly selected Vo Ag II objectives were matched with more than one of the science objectives found in the SLO (1985).

Table IV indicates that out of the 157 Vo Ag III selected objectives for the validators to evaluate, 108 were validated in General Science, 120 were validated in Biology I and II, 83 were validated in Botany, and 80 were validated in Zoology. Physics with only 22 validations was the least relevant to Vo Ag III objectives. A look at Botany and Zoology component areas showed just over one-half of the 157 Vo Ag III objectives being validated by the validation committee.

Figure 3 illustrates that most of the random selected Vo Ag III objectives as relating to more than one science objective. Again the strong areas of General Science, Biology I and II, Botany, and Zoology found in Table IV ended up with the most representation in those component areas in relation to Vo Ag III selected objectives.

Table V deals with the 15 Vo Ag IV objectives selected for the committee to validate. The most validation was found in General Science and Botany with all 15 or 100 percent validated by the committee. Other strong validation derived from Table V was the 14 validations out of 15 for Biology I and II and Chemistry I and II or 93 percent. This is the only Vo Ag course that 93 percent or more of the selected Vo Ag objectives were validated in four component areas to have science objectives.

Figure 4 illustrates that only two of the 15 selected Vo Ag IV objectives were randomly selected. The two randomly selected Vo Ag IV

VO AG II

General Science

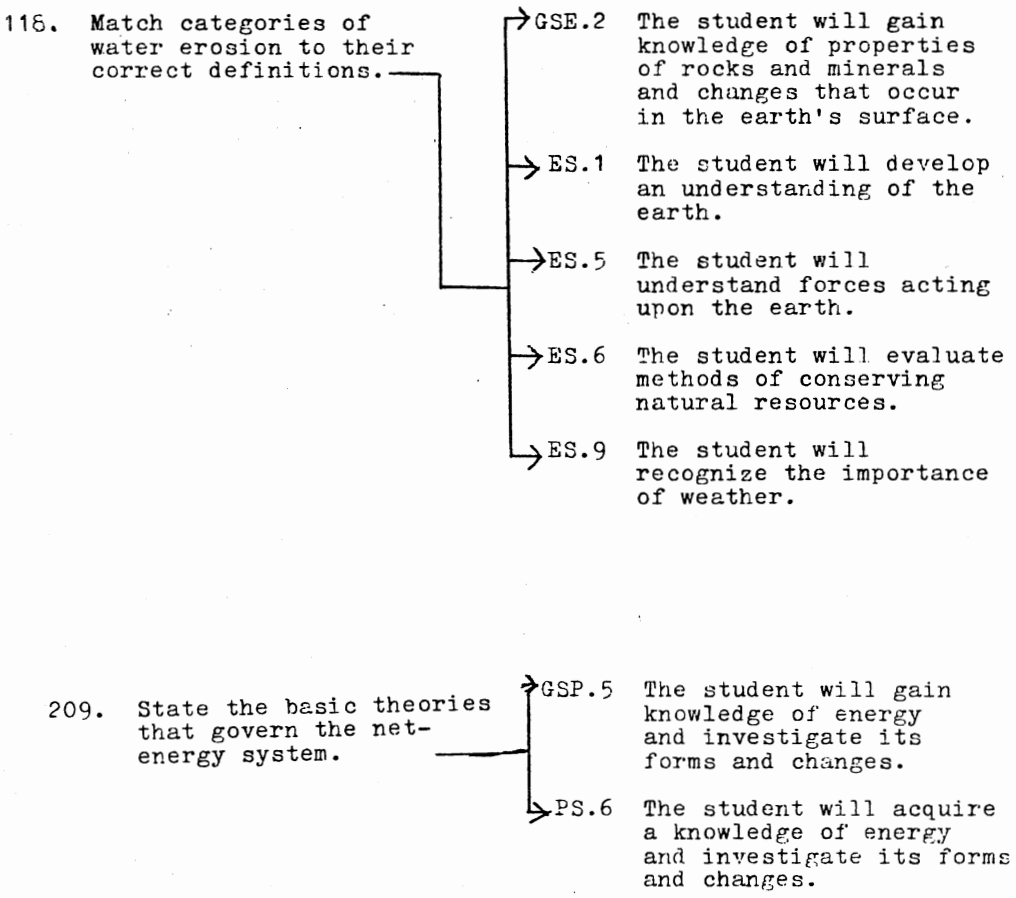


Figure 2. Relationship Between Vo Ag Core Curriculum Objectives and Science Objectives in Vo Ag II

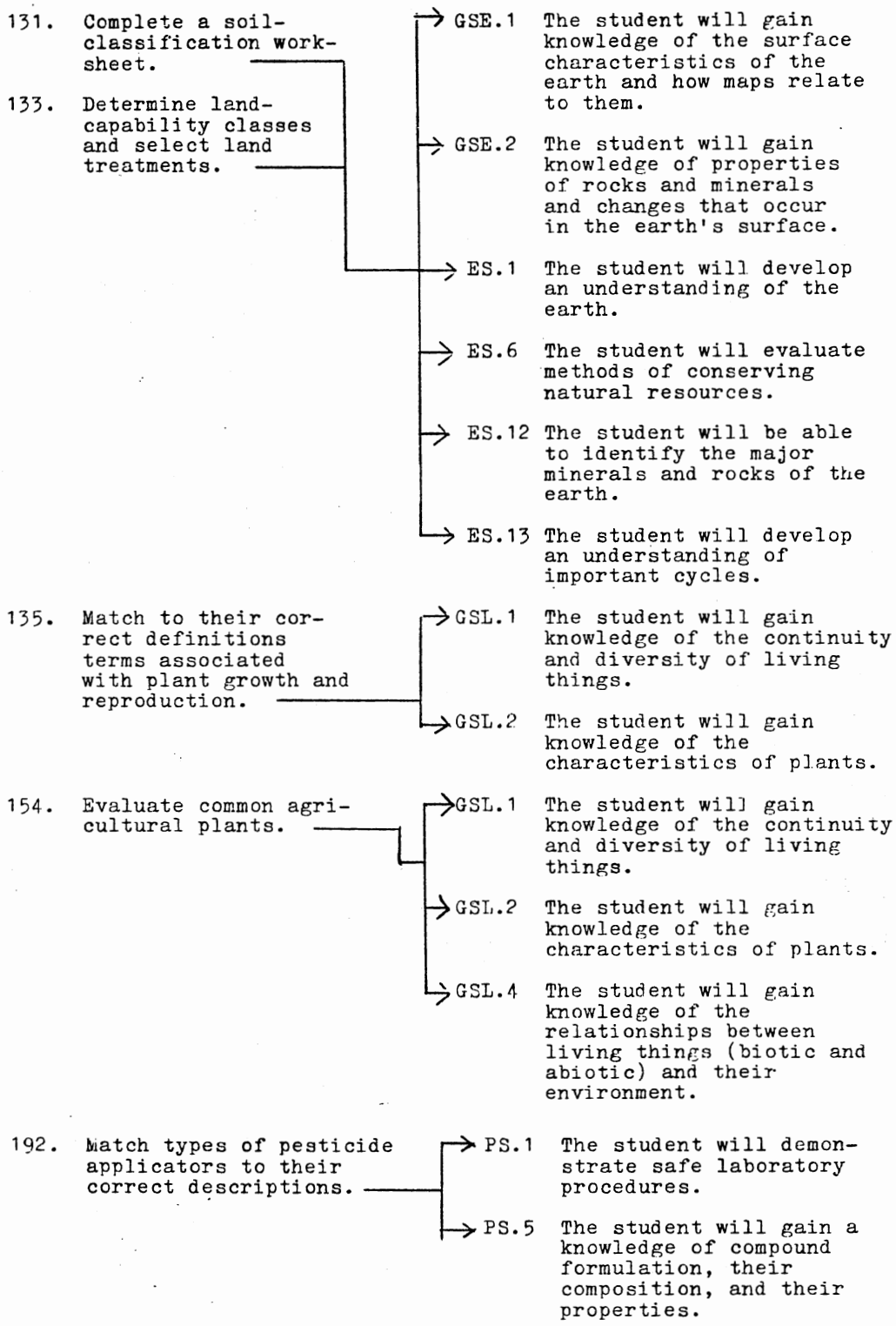


Figure 2. (Continued)

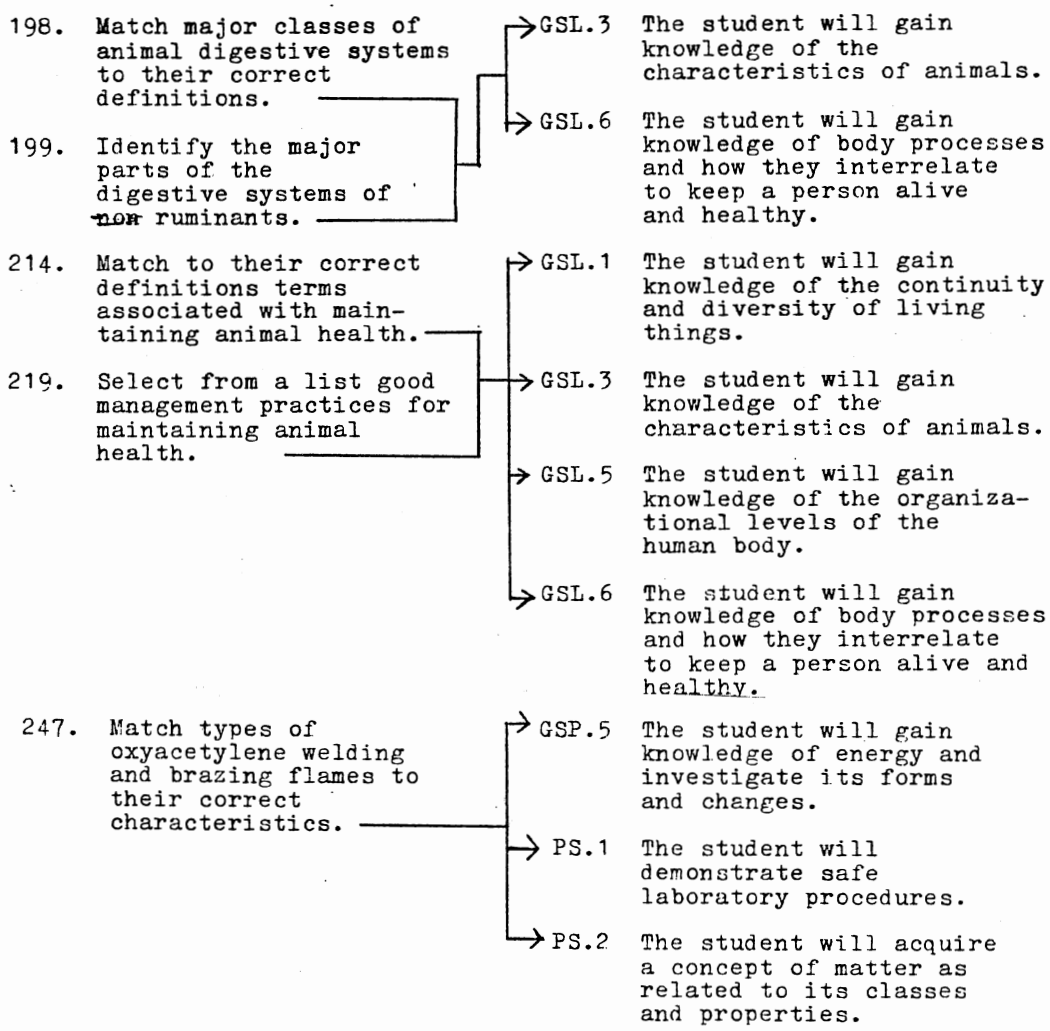


Figure 2. (Continued)

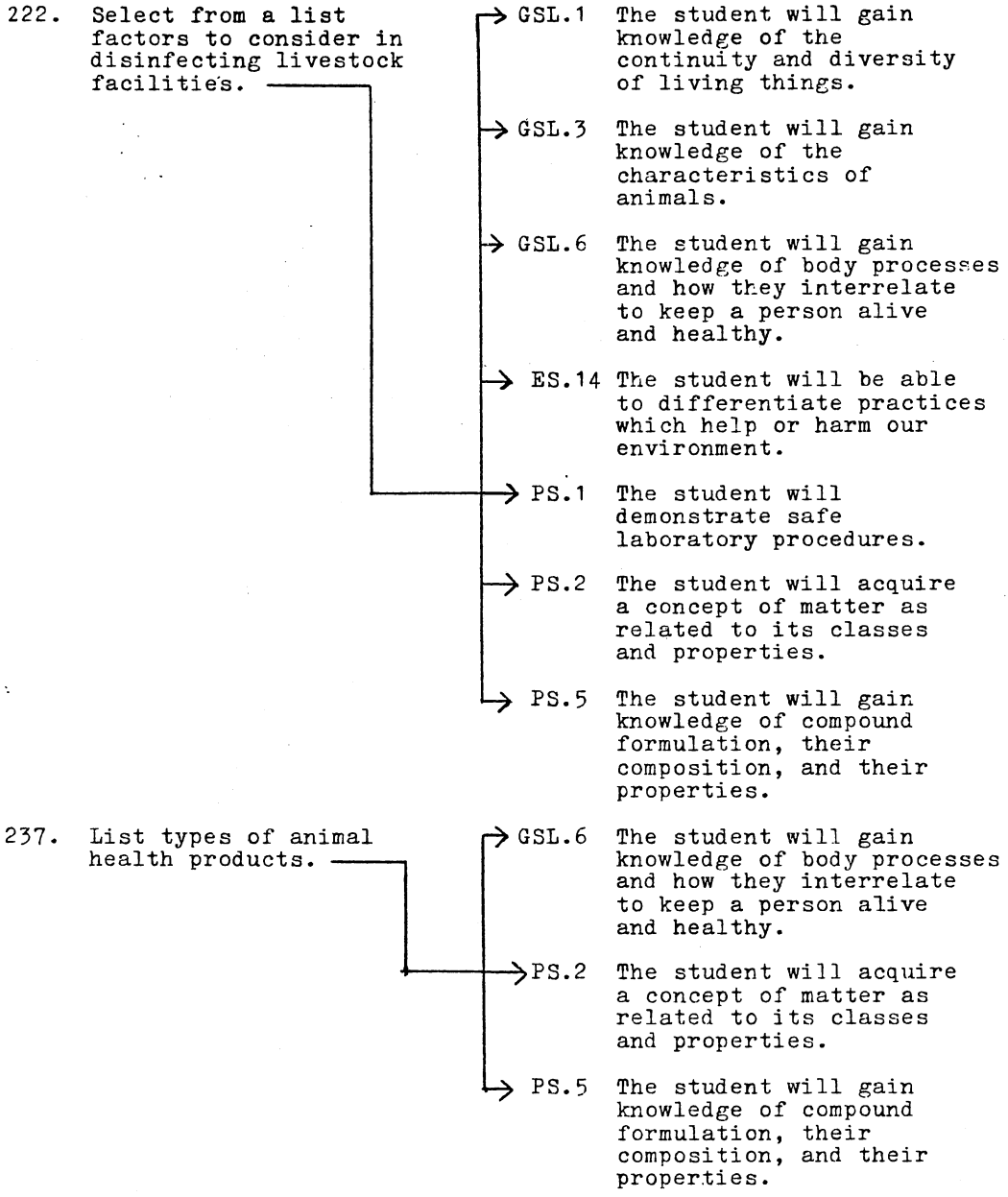


Figure 2. (Continued)

Biology I and II

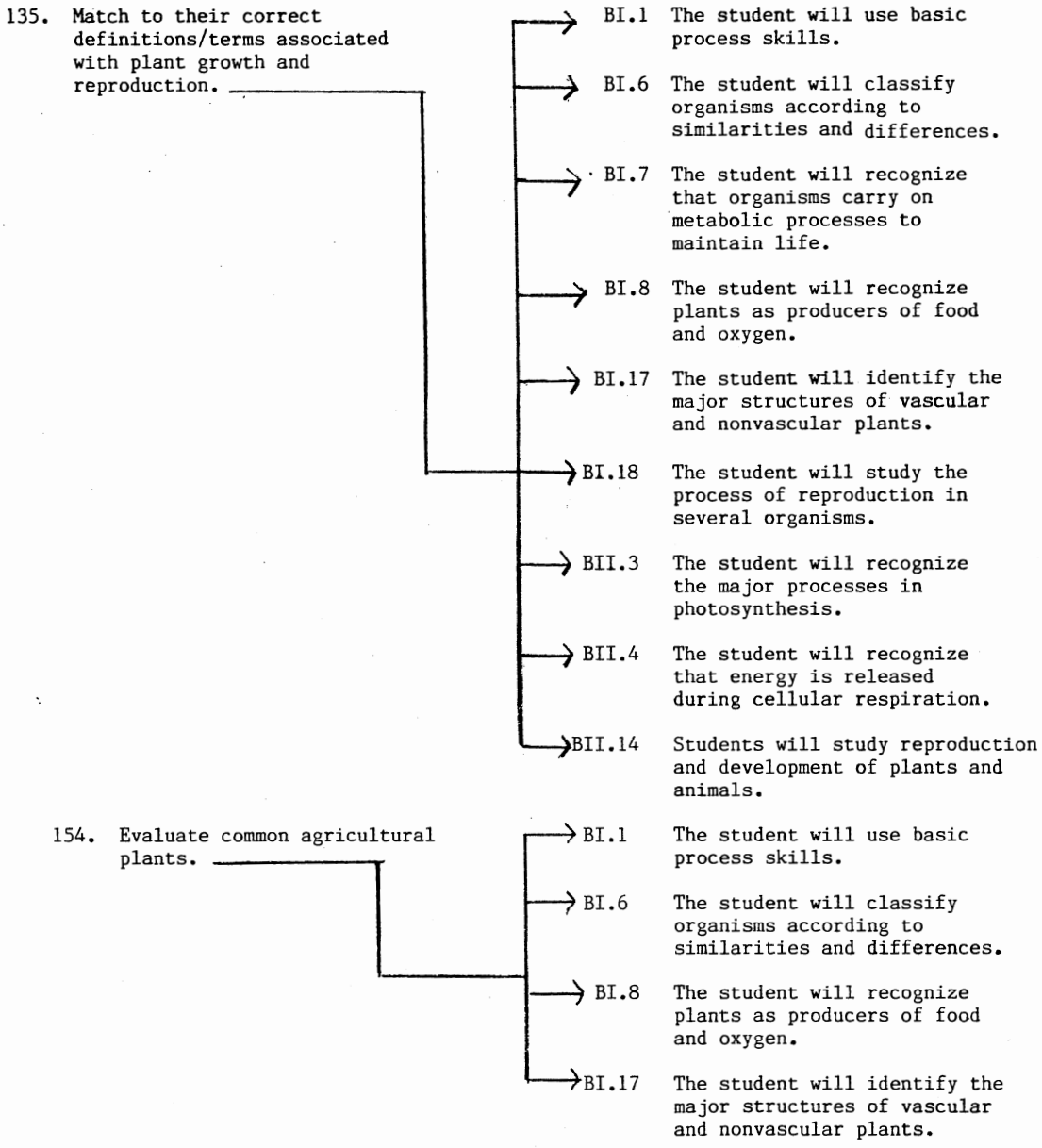


Figure 2. (Continued)

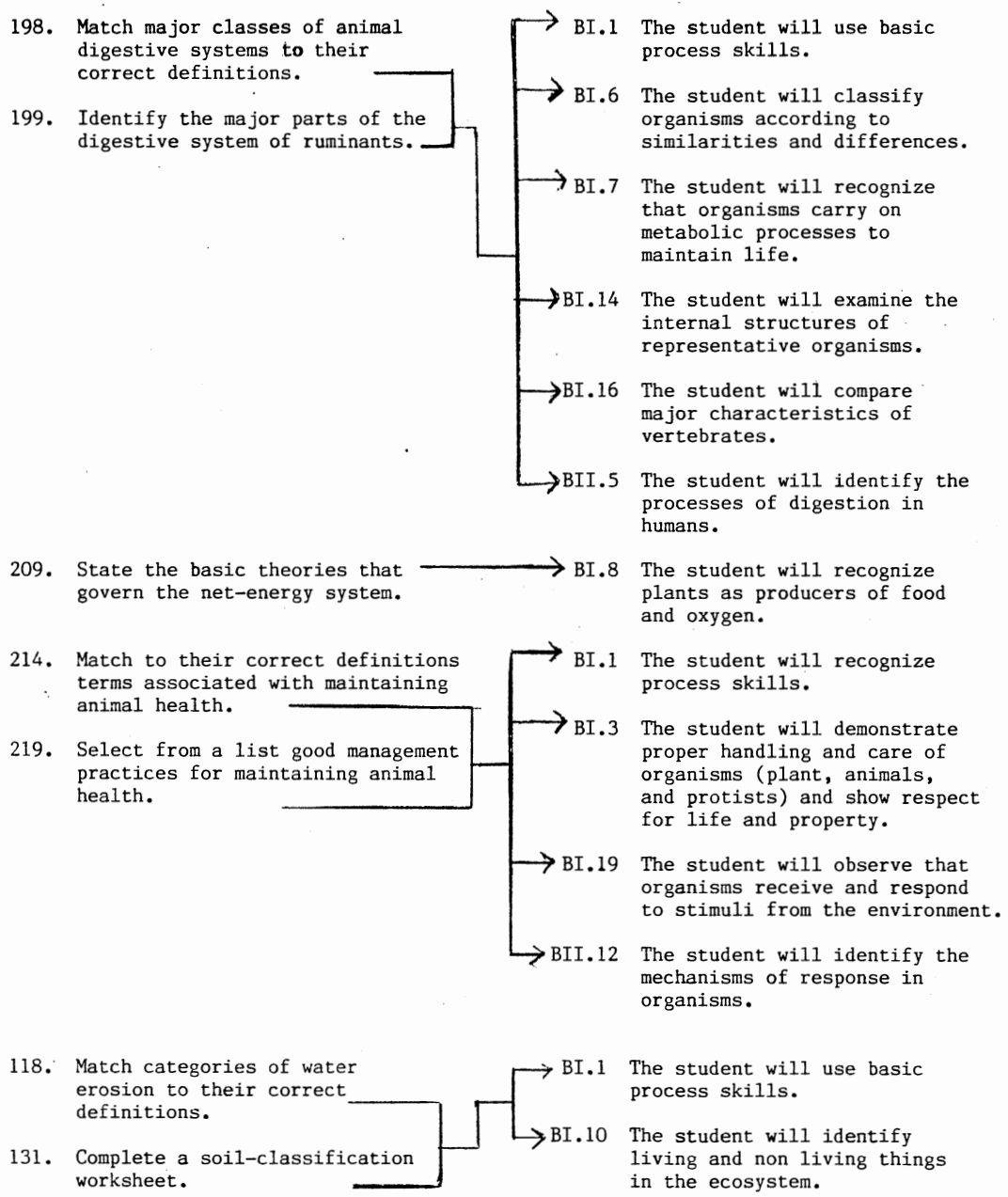


Figure 2. (Continued)

Biology I and II

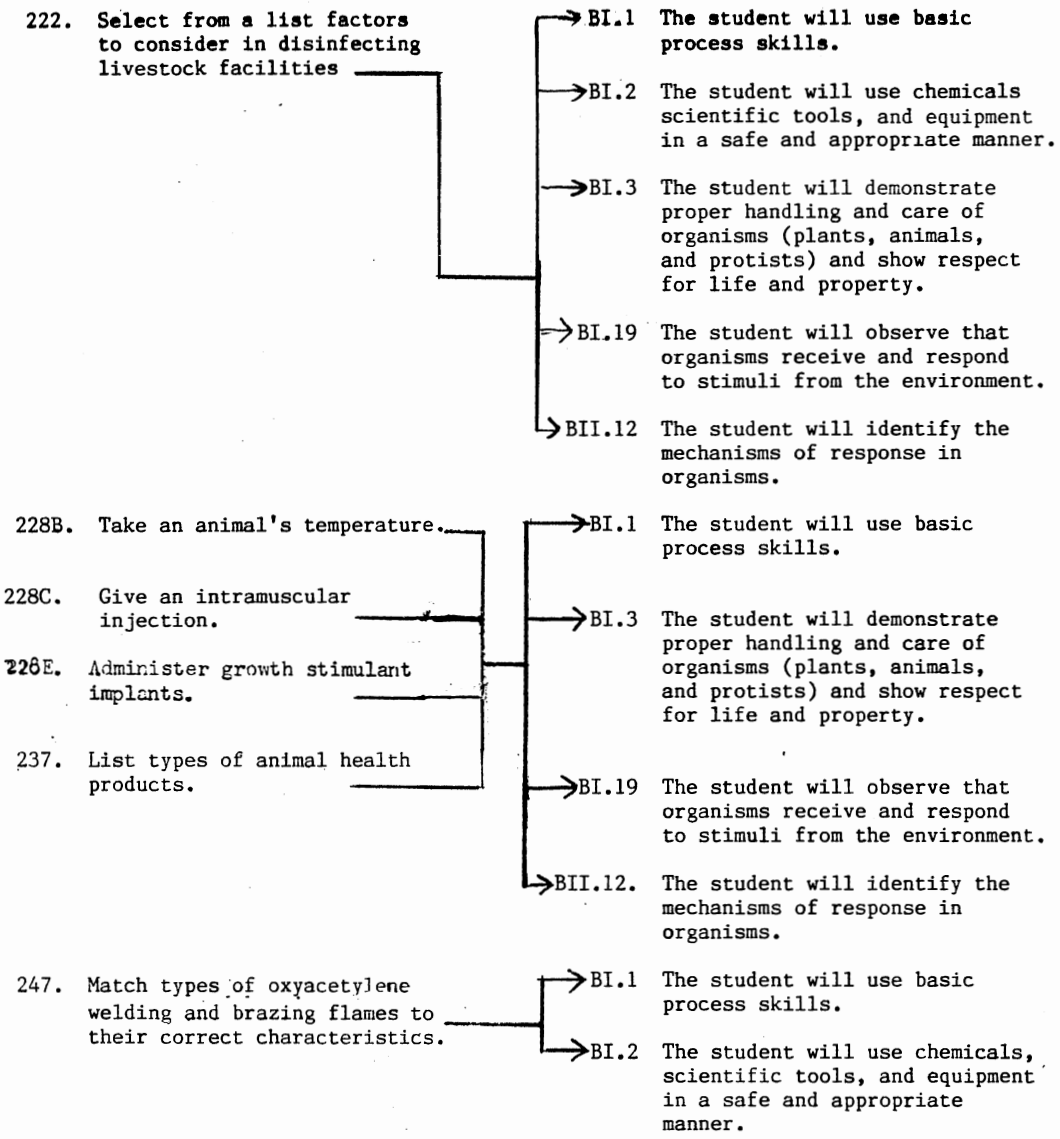


Figure 2. (Continued)

Chemistry I and II

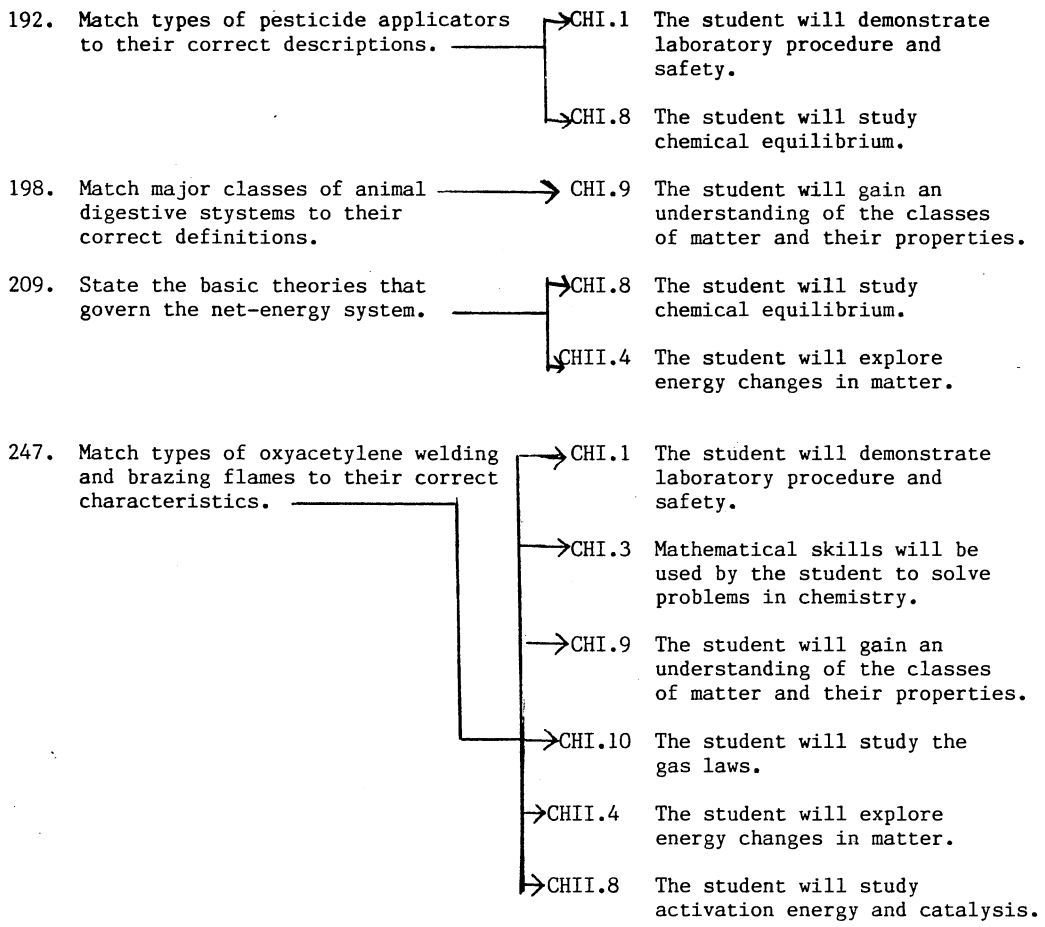


Figure 2. (Continued)

Botany

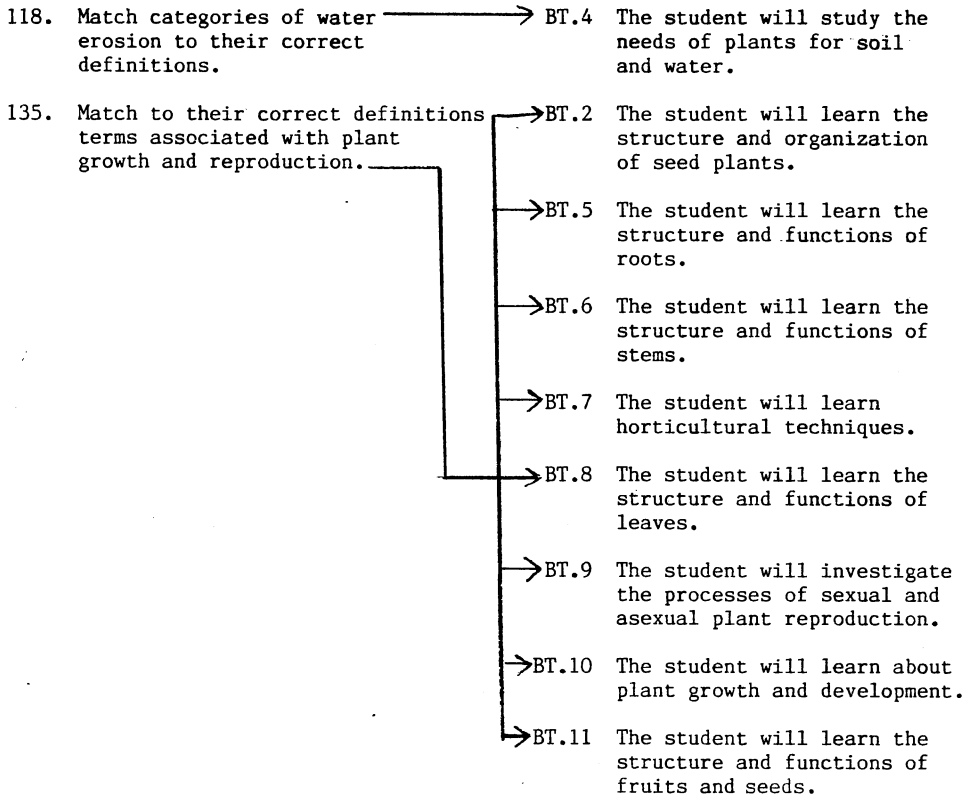


Figure 2. (Continued)

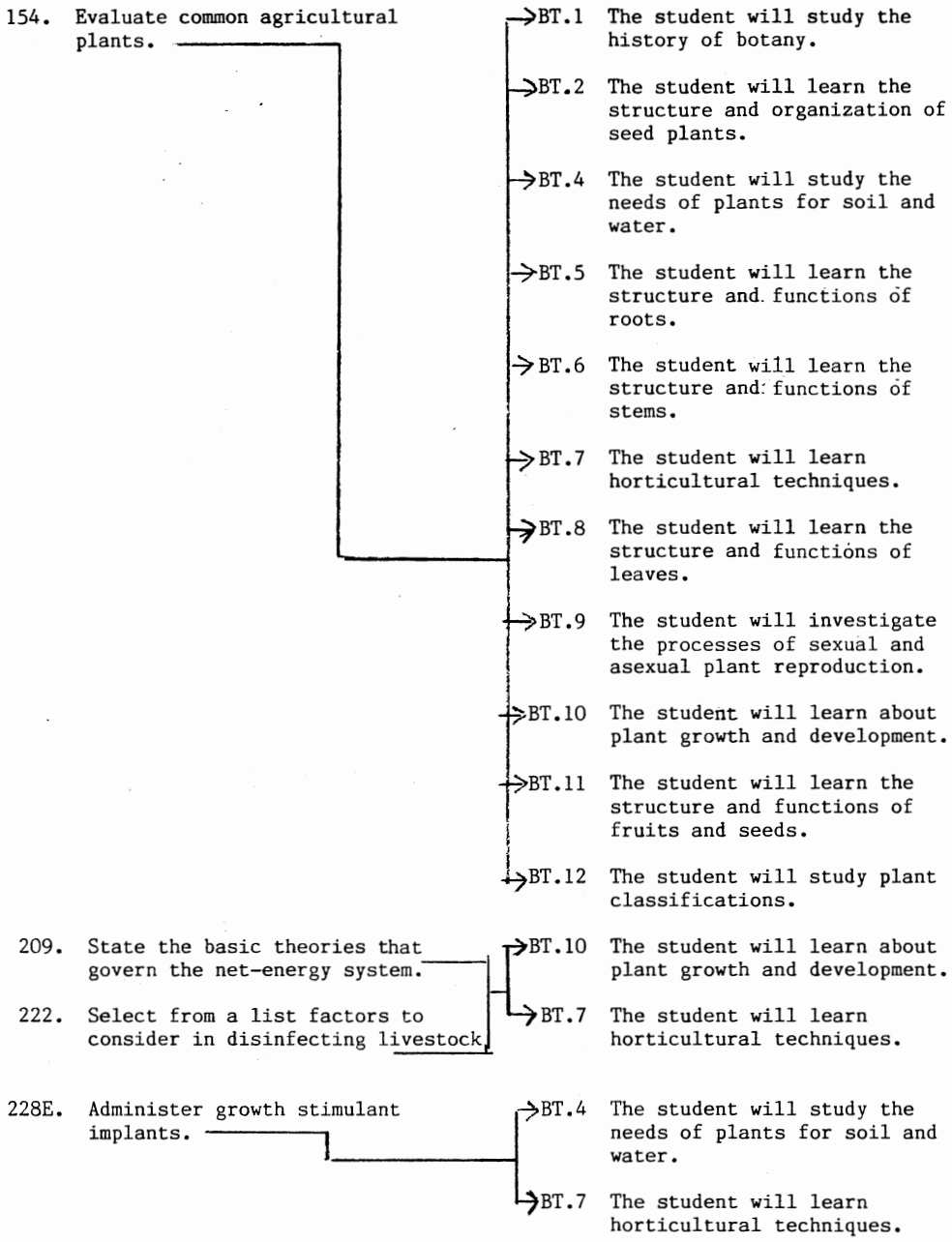


Figure 2. (Continued)

Zoology

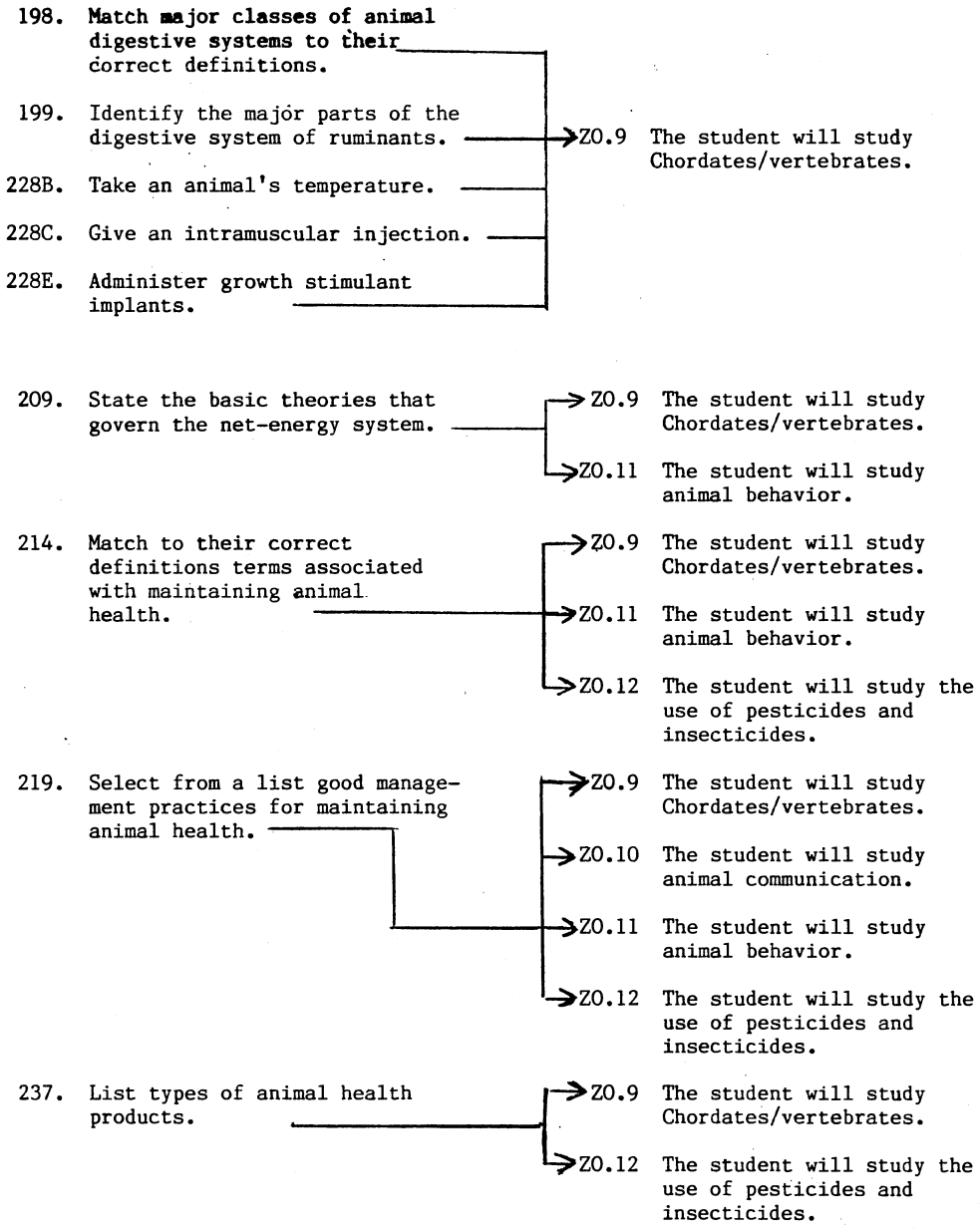


Figure 2. (Continued)

Physiology and Anatomy

198. Match major classes of animal digestive systems to their correct definitions.
199. Identify the major parts of the digestive system of ruminants.
209. State the basic theories that govern the net-energy system.
214. Match to their correct definitions terms associated with maintaining animal health.

→ PHA.2 The student will acquire a concept that all the body systems, organs, and tissues must interact for survival.

→ PHA.10 The student should know the structure and functions of the digestive system.

→ PHA.11 The student should learn the importance of nutrition to all life processes and its relationship to good health.

219. Select from a list good management practices for maintaining animal health. → PHA.2 The student will acquire a concept that all the body systems, organs, and tissues must interact for survival.

237. List types of animal health products. → PHA.11 The student should learn the importance of nutrition to all life processes and its relationship to good health.

228B. Take an animal's temperature.
228C. Give an intramuscular injection.
228E. Administer growth stimulant implants.

→ PHA.1 The student will be able to understand basic terminology used in physiology and anatomy.

→ PHA.2 The student will acquire a concept that all the body systems, organs, and tissues must interact for survival.

Physics

209. State the basic theories that govern the net-energy system

→ PHI.8 The student will gain an understanding and describe mathematically the conservation of energy, matter, and momentum

→ PHI.9 The student will gain an understanding of the relationship between work, power, and energy

247. Match types of oxyacetylene welding and brazing, flames, to their correct characteristics → PHI.17 The student will investigage the relationsip of pressure and temperature to the volume of gasses

Figure 2. (Continued)

TABLE IV

ONE HUNDRED FIFTY SEVEN VO AG III SCIENCE OBJECTIVES

Component Area	Number of Objectives Validated By:					Total Objectives Validated	
	1 Validator	2 Validators	3 Validators	4 Validators	5 Validators	N	%
General Science	44	40	21	3		108	68.79
Biology I & II	32	34	24	11	19	120	76.43
Chemistry I & II	22	13	9		1	45	28.66
Botany	4	29	33	12	5	83	52.87
Zoology	43	18	7	12		80	50.96
Physiology & Anatomy	9	21	17	6	8	61	38.85
Physics	5	1		2	14	22	14.01

VO AG III

General Science

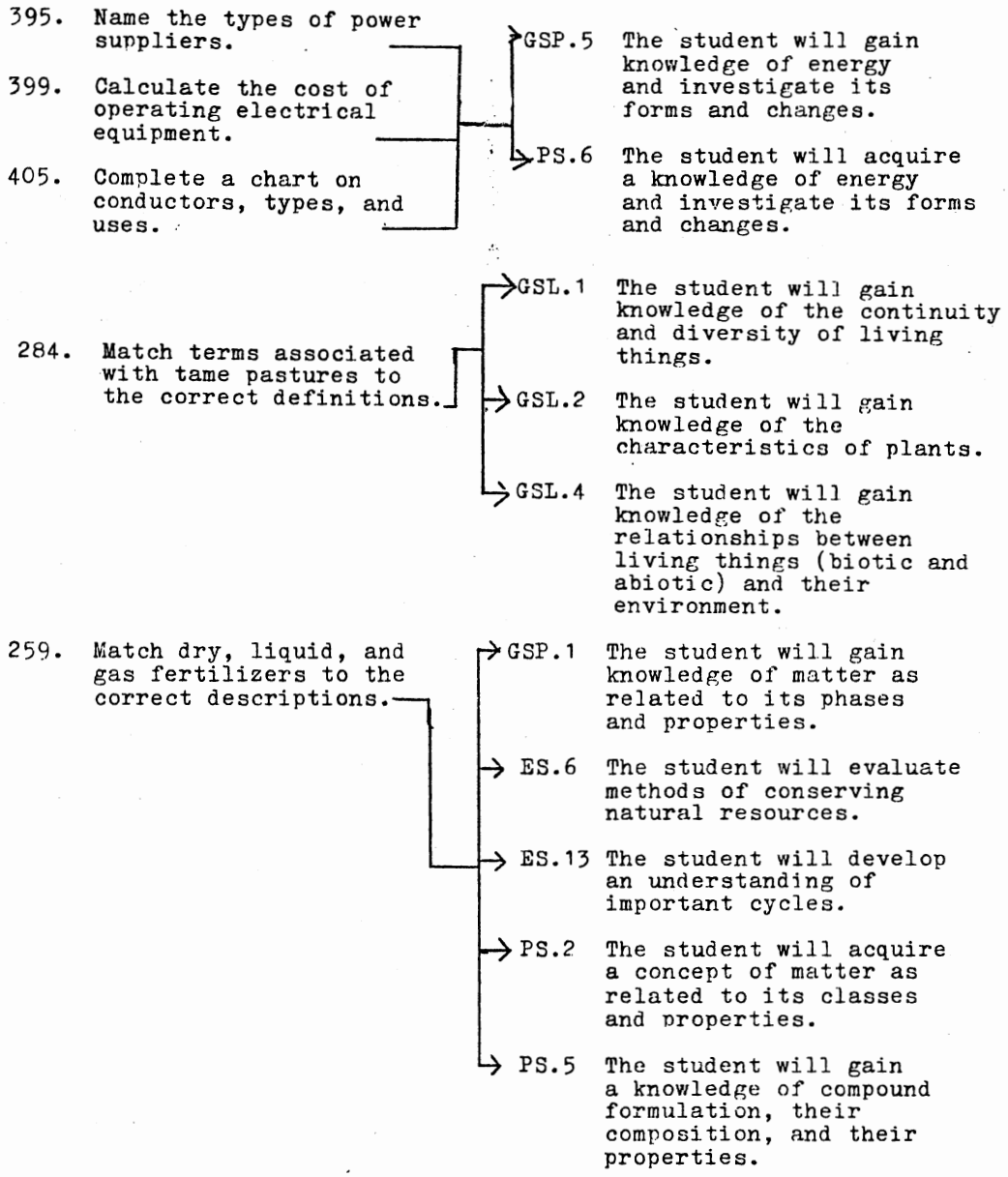


Figure 3. Relationship Between Vo Ag Core Curriculum Objectives and Science Objectives in Vo Ag III

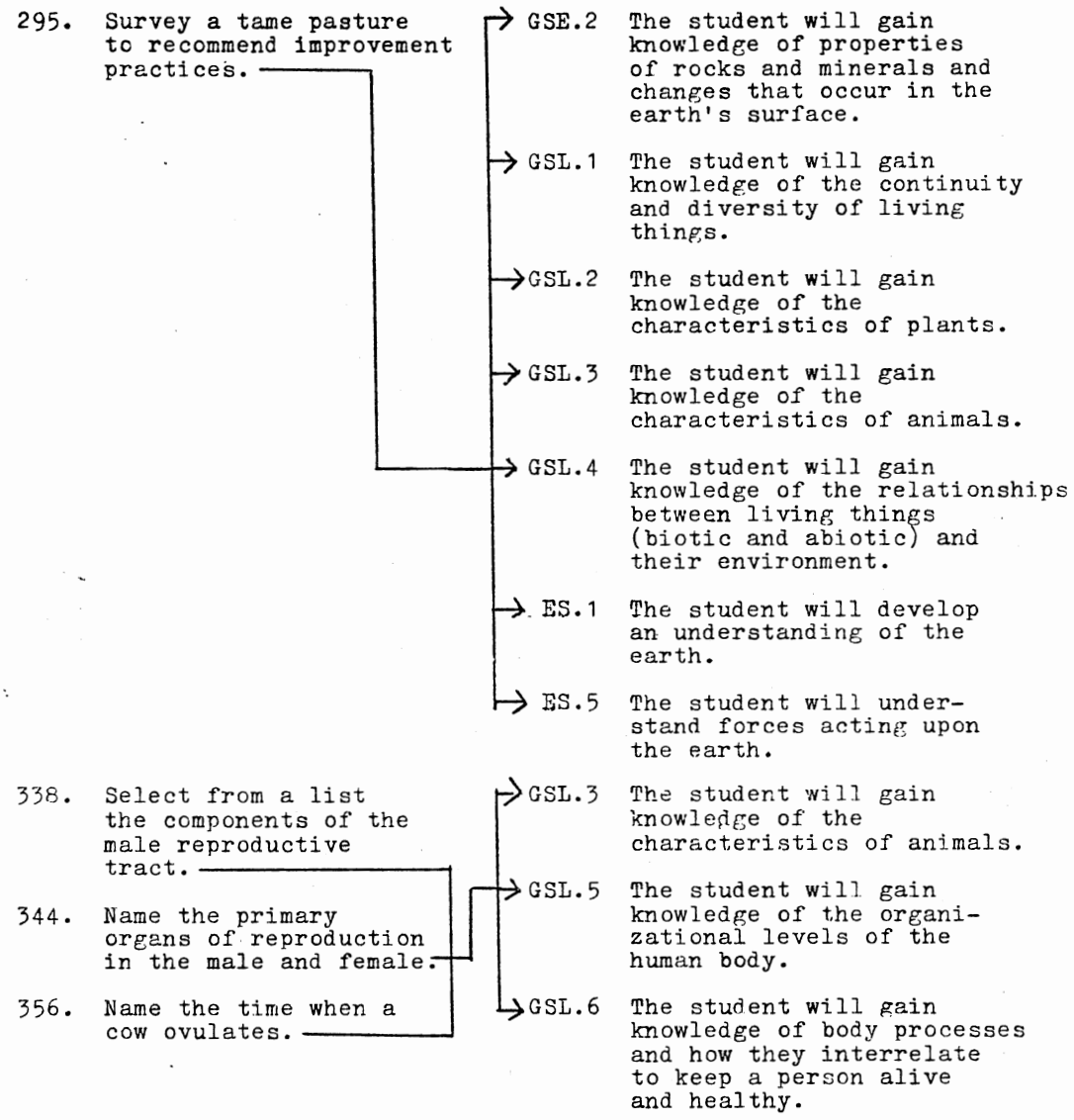


Figure 3. (Continued)

Biology I and II

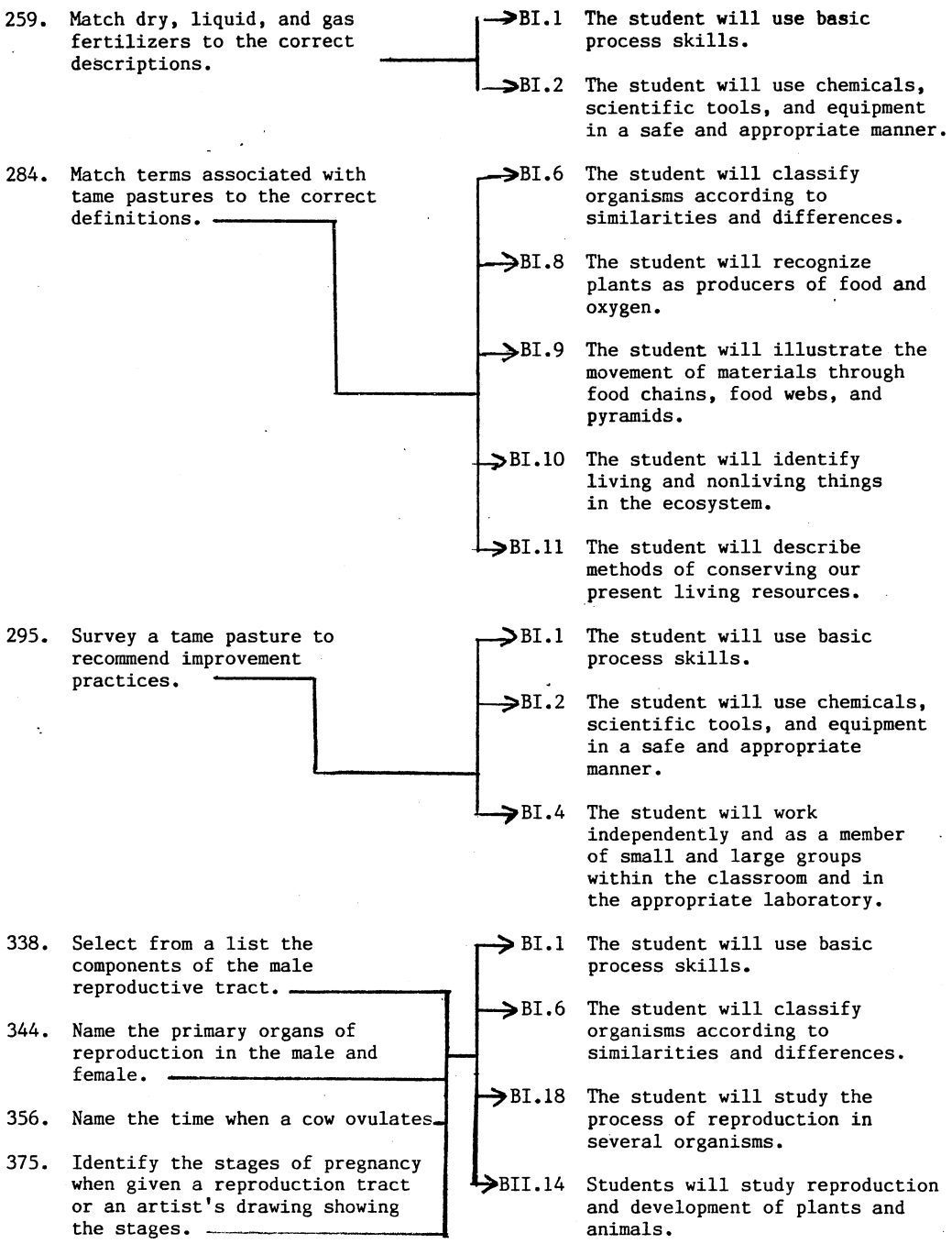


Figure 3. (Continued)

Chemistry I and II

259. Match dry, liquid, and gas fertilizers to the correct descriptions.

- CHI.1 The student will demonstrate laboratory procedure and safety.
- CHI.3 Mathematical skills will be used by the student to solve problems in chemistry.
- CHI.9 The student will gain an understanding of the classes of matter and their properties.
- CHI.10 The student will study the gas laws.

395. Name the types of power suppliers. → CHI.15 The student will become aware of some of the practical applications of electrochemistry.

Zoology

338. Select from a list the components of the male reproductive tract.

344. Name the primary organs of reproduction in the male and female.

356. Name the time when a cow ovulates.

375. Identify the stages of pregnancy when given a reproduction tract or an artist's drawing showing the stages.

→ Z0.9 The student will study Chordates/vertebrates.

295. Survey a tame pasture to recommend improvement practices.

- Z0.9 The student will study Chordates/vertebrates.
- Z0.11 The student will study animal behavior.
- Z0.12 The student will study the use of pesticides and insecticides.

Figure 3. (Continued)

Botany

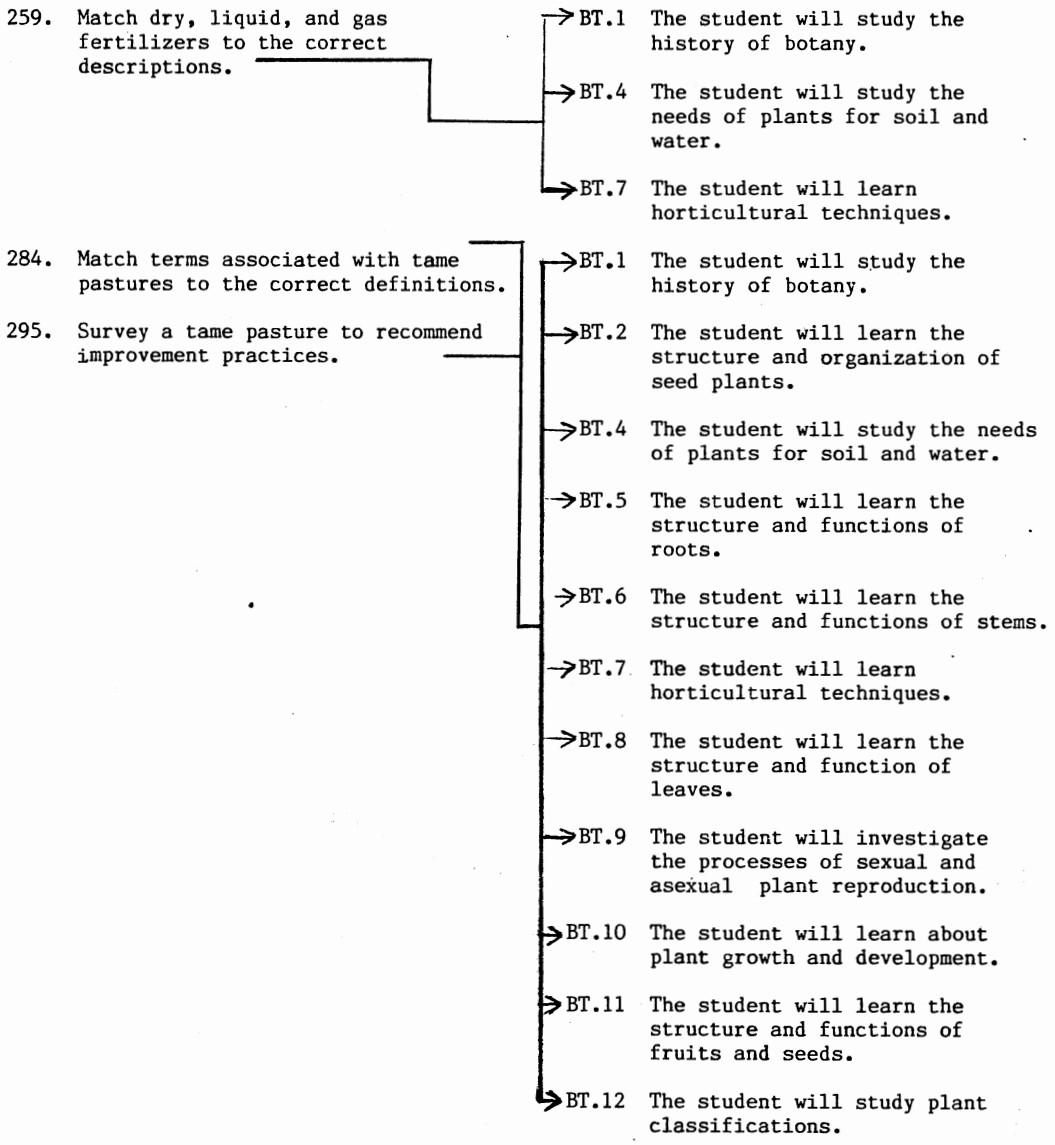


Figure 3. (Continued)

Physiology and Anatomy

338. Select from a list the components of the male reproductive tract.

344. Name the primary organs of reproduction in the male and female.

356. Name the time when a cow ovulates.

375. Identify the stages of pregnancy when given a reproduction tract or an artist's drawing showing the stages.

→ PHA.1 The student will be able to understand basic terminology used in physiology and anatomy.

→ PHA.13 The student should study the structure and functions of the reproductive system, reproduction, differentation, and embryonic development.

Physics

395. Name the types of power supplies

399. Calculate the cost of operating electrical equipment

405. Complete a chart on conductors, types, and uses

→ PHI.13 The student will study electrical charges and the interactive forces between them

→ PHI.14 The student will gain an understanding of electrical currents

→ PHI.15 The student will be able to describe properties permanent magnets, electromagnets, and their magnetic fields

→ PHI.16 The student will be able to diagram and contrast simple electrical electrical circuits and apply Ohm's and Ki

Figure 3. (Continued)

TABLE V

FIFTEEN VO AG IV SCIENCE OBJECTIVES

Component Area	Number of Objectives Validated By:					Total Objectives	
	1 Validator	2 Validators	3 Validators	4 Validators	5 Validators	N	&
General Science		2	7	1	5	15	100.00
Biology I & II	9	1			4	14	93.33
Chemistry I & II	8	2			4	14	93.33
Botany	8	3		3	1	15	100.00
Zoology				3	1	4	26.67
Physiology & Anatomy				1	3	4	26.67
Physics	1			1	3	5	33.33

VO AG IV

General Science

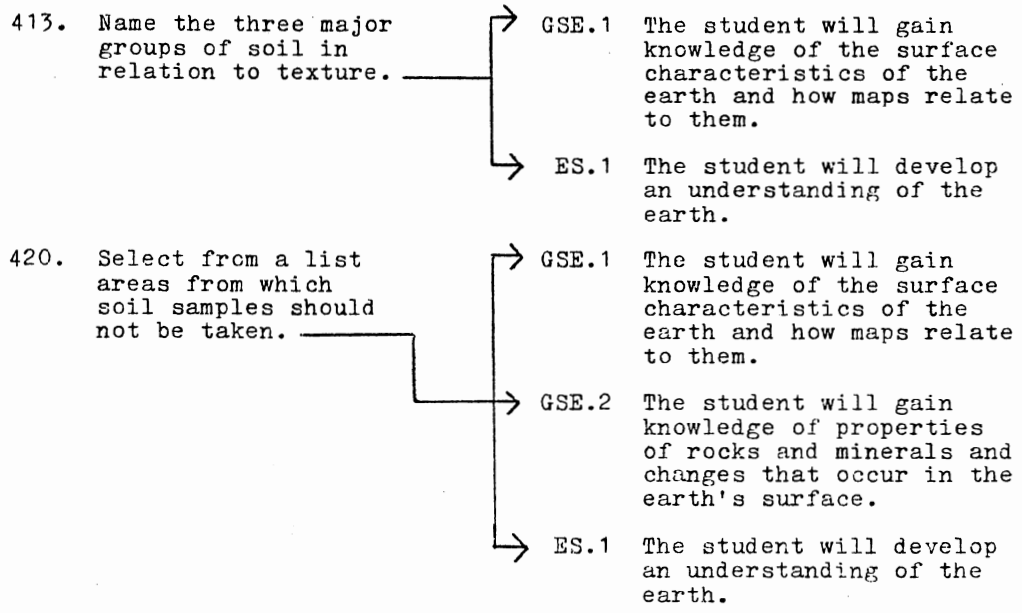


Figure 4. Relationship Between Vo Ag Core Curriculum Objectives and Science Objectives in Vo Ag IV

objectives both related to the General Science component area with each having two or more science objectives.

As illustrated in Table VI the total number of selected objectives with science objectives in Agriculture Mechanics I was 24 to be evlauated by the validation committee. The science component areas that one or more validators found strong in Ag Mechanics I were General Science and Physics, both with 100 percent validation. Chemistry I and II also rated high with 16 out of 24 validated. Four of the component areas had very little relationship to the Ag Mechanics I selected objectives. Physics showed a high degree of agreement with four and five validators per Ag Mechanics I selected objectives.

Figure 5 illustrates that General Science, Chemistry I and II, and Physics were represented as having high validation science objectives in Ag Mechanics I selected objectives as did Table VI. Each Ag Mechanics I random selected objective was represented by two or more science objectives as found in the SLO (1985).

Table VII provides a summary of the objectives validated by the validators in each science area. Two science areas were found to have a high percentage of objectives--80.09 in Biology and 78.03 in General Science validated by the committee. The General Science area was found to have high levels of validation in Vo Ag I, II, and III. It should be noted that 302 of the 341 total objectives validated in general science were in Vo Ag I, II and III.

The area of Biology I and II had the highest percentage (80.09). of the objectives validated by the committee. Vo Ag I, II and III had the largest total numbers with 335 objectives validated by the committee of validators.

TABLE VI

TWENTY FOUR AG MECHANICS I SCIENCE OBJECTIVES

Component Area	Number of Objectives Validated By:					Total Objectives Validated	
	1 Validator	2 Validators	3 Validators	4 Validators	5 Validators	N	%
General Science	8	1	11	2	2	24	100.00
Biology I & II		1				1	4.17
Chemistry I & II	14	1			1	16	66.67
Botany	1					1	4.17
Zoology	1					1	4.17
Physiology & Anatomy		1				1	4.17
Physics				2	22	24	100.00

AG MECHANICS I

General Science

085. Match the means of transporting electricity to correct descriptions.

088. State Ohm's law as related to electricity.

090. Solve problems to determine voltage.

100c. Wire lighting outlet controlled by two three-way switches.

→ GSP.5 The student will gain knowledge of energy and investigate its forms and changes.

→ PS.6 The student will acquire a knowledge of energy and investigate its forms and changes.

Chemistry I and II

085. Match the means of transporting electricity to correct descriptions.

088. State Ohm's law as related to electricity.

090. Solve problems to determine voltage.

→ CHI.7 The student will interpret chemical bonding in terms of electrostatic force.

→ CHI.15 The student will become aware of some of the practical applications of chemistry.

→ CHII.12 The student will gain additional knowledge of electrochemistry by investigating the characteristics of electrolytes.

Physics

085. Match the means of transporting electricity to correct descriptions

088. State Ohm's law as related to electricity

090. Solve problems to determine voltage.

100c. Wire lighting outlet controlled by two three-way switches.

→ PHI.13 The student will study electrical charges and the interactive forces between them.

→ PHI.14 The student will gain an understanding of electrical currents.

→ PHI.15 The student will be able to describe properties permanent magnets, electromagnets, and their magnetic fields.

→ PHI.16 The student will be able to diagram and contrast simple electrical circuits and apply Ohm's and Ki.

Figure 5. Relationship Between Vo Ag Core Curriculum Objectives and Science Objectives in Ag Mechanics I

TABLE VII

SUMMARY OF SCIENCE COMPONENTS BY INSTRUCTIONAL LEVEL
(VO AG I-IV AND AG MECHANICS I)

Component Area	Vo Ag I N = 82	Vo Ag II N = 159	Vo Ag III N = 157	Vo Ag IV N = 15	Ag Mechanics I N = 24	Total N = 437	%
General Science	55	139	108	15	24	341	78.03
Biology I & II	79	136	120	14	1	350	80.09
Chemistry I & II	17	62	45	14	16	154	35.24
Botany	18	94	83	15	1	211	48.28
Zoology	70	71	80	4	1	226	51.72
Physiology & Anatomy	68	60	61	4	1	194	44.39
Physics	5	17	22	5	24	73	16.70

The Chemistry area was one of the low validation areas with 35.24 percent of the Vo Ag objectives validated. It should be noted that Vo Ag II and III accounted for 107 of the 154 validations.

The Botany area illustrated that it was very close to the middle with 48.28 percent validation by the committee. It is of interest that 177 of the 211 validated objectives were found in Vo Ag II and III.

The area of Zoology was found to have 51.72 percent of the Vo Ag objectives validated with the largest concentration found in Vo Ag I, II and III. Neither Vo Ag IV or Ag Mechanics related to Zoology to any degree according to the validators.

The Physiology and Anatomy area was found to have 194 out of 437 objectives validated or 44.39 percent. Physiology and Anatomy area was found to be science concentrated in Vo Ag I, II and III.

The area of Physics was illustrated as the area with the least Vo Ag objectives validated with 16.70 percent validated. Ag Mechanics I was found to be 100 percent validated by the validators in Physics. It should be noted that Physics was the area with least expertise of the validators according to the self rating, but it was the area of most complete agreement with all five validators.

It should be noted that the data indicated Vo Ag IV and Ag Mechanics I were limited in the amounts of science being provided throughout the curriculum. Even though limitations were apparent in the number of objectives having science concepts the validators, validated all of those objectives selected from both curriculums.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study is to identify the science objectives found in the basic core curriculum for vocational agriculture in Oklahoma, and to compare the vocational agriculture objectives to those science objectives identified in the Suggested Learner Outcomes: Science (1985), as prescribed for instruction in high schools in Oklahoma.

In order to accomplish the purpose of this study, the following objectives were formed:

1. To identify the science concepts included in the basic core curriculum of the vocational agriculture in Oklahoma.

2. To compare the science concepts found in the vocational agriculture program to the science concepts used in high school science courses.

Summary

Based on the information received from the validators' response to the survey instrument, the following findings can be drawn from this study:

1. It was found that all validators in their self assessments felt they had high levels of expertise in Biology (9.0), Zoology (8.0), Botany (7.6), Physiology and Anatomy (7.6), and General Science (7.4)

on the average.

2. Of the 82 selected Vocational Agriculture I core curriculum objectives, the validators validated 79 in Biology I and II, 70 in Zoology, 68 in Physiology and Anatomy, and 55 in General Science.

3. The findings also revealed that out of 159 selected Vocational Agriculture II core curriculum objectives, 139 for General Science and 136 for Biology I and II were validated.

4. Out of the 157 selected Vocational Agriculture III core curriculum objectives, 120 in Biology I and II, 108 in General Science, 83 in Botany, and 80 in Zoology were validated.

5. Vocational Agriculture IV core curriculum with 15 selected objectives, 15 in General Science and Botany and 14 in Biology I and II and Chemistry I and II were validated as science objectives by the validators.

6. Out of the 24 selected Agriculture Mechanics I core curriculum objectives, 24 in General Science and Physics and 16 in Chemistry I and II were validated as relating to science objectives in the Suggested Learner Outcomes: Science (1985).

7. The findings revealed that 80.09 percent of Vocational Agriculture I through IV and Agriculture Mechanics I core curriculum selected objectives were validated as science related in Biology I and II and 78.03 percent in the General Science component area.

Conclusions

From the summary of the responses to the questionnaire by the validators, several conclusions were drawn:

1. It was concluded that the validators were highly qualified

both by being selected for the original Suggested Learner Outcomes: Science (1985) validation committee and according to the self assessments of high levels of expertise in the science areas.

2. Vocational Agriculture I core curriculum was concluded to be highest in science objectives in the Biology I and II, Zoology, Physiology and Anatomy, and General Science component areas.

3. Vocational Agriculture II core curriculum was concluded to be the highest in science objectives in the General Science and Biology I and II component areas.

4. Vocational Agriculture III core curriculum was concluded to be highest in the science objectives in the Biology I and II, General Science, Botany, and Zoology component areas.

5. Vocational Agriculture IV core curriculum, although limited in the number of selected objectives in the study, was highest in the science objectives in General Science, Botany, Biology I and II, and Chemistry I and II component areas.

6. It was also concluded that Agricultural Mechanics I core curriculum was highest in science objectives in General Science and Physics component areas.

7. From the findings it was concluded that Vocational Agriculture I, Vocational Agriculture II and Vocational Agriculture III core curriculum were highest in science objectives within certain selected component areas.

Recommendations

As a result of the findings and conclusions, the following

recommendations have been made by the author:

1. It is recommended that the State Department of Education reevaluate the Vocational Agriculture program and subsequent substituting of units of credit in Science for units of credit in Vocational Agriculture I, Vocational Agriculture II and Vocational Agriculture III based on the findings of this study.

2. It is recommended that colleges and universities study the possibilities of using Vocational Agriculture credits as meeting acceptable science entrance requirements at university and college levels.

Recommendations to Methodology

1. It is recommended that in future studies that the questionnaire to be used should be taken through a pilot study.

2. It is recommended that all members of the validation committee for the Suggested Learner Outcomes: Science (1985) be members of the validation committee on future studies.

3. It is recommended that a committee should be appointed to select the objectives for the study from the Vocational Agriculture Core Curriculum of Oklahoma for further studies.

Recommendations to Further Research

1. It is recommended that further research be carried out to identify the mathematic objectives that are included in the Vocational Agriculture Core Curriculum for Oklahoma.

2. It is recommended that additional research be conducted on what science and math objectives are being taught currently in Vocational Agriculture courses in the State of Oklahoma.

BIBLIOGRAPHY

Anderson, Harold B. and Robert Boddy. "The Identification of Science Competencies Included in the Curriculum of Secondary Vocational Education Programs." Fort Collins, CO: Department of Vocational Education, Colorado State University (June, 1985).

Briers, Gary E., D. Thomas Dayberry, and Melanie Reap. "Identification of Math and Science Concepts, Skills, and Experiences Provided in Vocational Agriculture in Texas." College Station, TX: Department of Agriculture Education, Texas A&M University, 1986.

Carr, Harold L. "We Integrated the Academics." Vocational Education: The Journal of the American Vocational Association, 59, 2 (March, 1984), pp. 34-36.

DeVaughn, Zed F. Jr. "Scientific Concepts Taught Vocational Agriculture Students." (Unpub. M.S. thesis, Oklahoma State University, 1962.)

Dyrenfurth, Michael J. "State Trends in Graduation Requirements." Vocational Education: The Journal of the American Vocational Association, 60, 1 (January, 1985), pp. 43-46.

Gliem, Joe A. and J. Robert Warmbrod. "Mathematical Problem-Solving Skills of High School Vocational Agriculture Students and Undergraduate Students in Agricultural Education." Columbus, OH: Department of Agricultural Education, Ohio State University, 1986.

Moss, Jeffrey W. "Identification of Science-Related Competencies Taught in Vocational Agriculture Programs in Louisiana." Baton Rouge, LA: Department of Vocational Education, Louisiana State University, 1987.

Moss, Jeffrey W. "Teaching Science in Vocational Agriculture: An Identification of Science Competencies Taught in Ornamental Horticulture and Introduction to Agriculture/Natural Resources." Raleigh, NC: Department of Occupational Education, North Carolina University, 1984.

Mrachek, Len. "VocEd Students Need Math and Science." Vocational Education: The Journal of the American Vocational Association, 59, 2 (March, 1984), pp. 24-26.

Oklahoma State Department of Education. Suggested Learner Outcomes: Science. Oklahoma City, OK: University of Oklahoma Printing Services, 1985.

Operating Policies of the State Department of Vocational Technical Education (Procedural Policies of the Vocational Agriculture Education Division of the State Department of Vo Tech) 4.8.A. Curriculum, Organization and Contents. Revised January 21, 1985. Stillwater, OK: 1985.

Parks, Darrell L. and Gail H. Henderson. "Strengthening the Academic Foundations of Vocational Education." Vocational Education: The Journal of the American Vocational Association, 60, 4 (May, 1985), pp. 34-36.

Patton, Bob and Joyce Sawatzky. "Vocational Community's Review of Suggested Learner Outcomes." Stillwater, OK: Curriculum and Instructional Materials Center, Oklahoma State Department of Vocational and Technical Education (May 20, 1987.)

State of Oklahoma Department of Education. Administrator's Handbook for Elementary, Middle, Junior High, and High Schools. Oklahoma City, OK: State Board of Affairs, Central Printing, Bulletin 113-Y, 1986.

Strickland, Deborah C. and Donald E. Elson. "Graduation Requirements and Vocational Enrollments." Vocational Education: The Journal of the American Vocational Association, 62, 4 (May, 1987), pp. 41-47.

Thomas, Larry G. and Ramsey Groves. "Vocational Agriculture Teacher's Opinions Relative to Selected Animal Science Competencies." Journal of the American Association of Teacher Educators in Agriculture, 27, 3 (Fall, 1986), pp. 20-28.

Truxal, John G. "Seeing the Applications Make Learning Science Exciting." Vocational Education: The Journal of the American Vocational Association, 59, 2 (March, 1984), pp. 24-26.

U.S. Department of Education. What Works, Research About Teaching and Learning. Washington, D.C.: 1986.

U.S. Bureau of Census. Statistical Abstract of the United States. Washington, D.C.: U.S. Department of Commerce, 107th edition, 1986.

Vocational Agriculture Curriculum Guide I, II, III, IV, and Agriculture Mechanics I. Stillwater, OK: State Department of Vocational and Technical Education, 1975-1985.

APPENDIX

Instructions: Please check each science area the Vo-Ag objective relates to referring to the State Department of Education booklet Suggested Learner Outcomes in Science Grades 9 - 12. General Science includes Physical Science, Earth Science, and Life Science.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	4	5	5	3	3	3	5	001. Define terms associated with agricultural safety.
3	3	2	3	1	1	1	2	002. List major agricultural safety areas.
4	3	3	3	1	1	1	4	003. State safety precautions to observe when operating general farm machinery and equipment.
4	3	-	4	-	-	-	2	004. State safety precautions to observe when refueling equipment
4	2	-	4	-	3	1	-	005. State safety precautions to observe when handling farm animals.
3	3	3	-	-	3	1	-	006. Match to their correct definitions terms associated with beef breeds and selection.
4	3	4	-	-	4	1	-	007. Identify major breeds of beef cattle.
4	2	3	-	-	4	3	-	008. Label the parts of a beef animal.
2	1	1	-	-	2	1	-	009. List factors to consider in selecting show animals.
2	1	2	-	-	2	2	-	010. List indicators of muscling.
2	-	1	-	-	2	1	-	011. List indicators of finish.
2	-	1	-	-	2	2	-	012. Label types of defective front and hind legs.
2	1	1	-	-	2	1	-	013. Select from a list characteristics of the ideal market steer.
3	3	3	-	-	3	2	-	014. List desirable characteristics of a cow.
3	2	2	-	-	3	1	-	015. List desirable characteristics of a bull.
2	1	2	-	-	2	1	-	016. Label wholesale cuts of beef with their proper names & desired percentages of total carcass yield.
2	1	1	-	-	2	1	-	017. Define livestock judging.
2	-	1	-	-	2	1	-	018. Match to their correct definitions terms associated with livestock judging.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
2	-	1	-	-	2	1	-	019. Distinguish between selected beef-judging terms for desirable and undesirable traits.
2	-	1	-	-	2	1	-	020. Match to their correct definitions terms associated with swine breeds and selection.
4	2	4	-	-	4	1	-	021. Identify major breeds of swine.
4	3	4	-	-	4	2	-	022. Label the parts of a hog.
2	-	1	-	-	2	1	-	023. Label wholesale cuts of pork with their proper names & desired percentages of total carcass yield.
2	-	1	-	-	2	1	-	024. List the two major traits of a market hog.
2	1	1	-	-	2	1	-	025. List characteristics of the ideal market hog.
1	-	-	-	-	1	-	-	026. Distinguish between selected swine-judging terms for desirable and undesirable traits.
2	-	1	-	-	2	1	-	027. Match to their correct definitions terms associated with sheep breeds and selection.
4	3	4	-	-	4	1	-	028. Identify major breeds of sheep.
4	2	4	-	-	4	2	-	029. Label the parts of a sheep.
2	1	1	-	-	2	1	-	030. Select from a list the characteristics of the ideal market lamb.
2	-	1	-	-	2	1	-	031. List desirable characteristics of breeding sheep.
2	-	1	-	-	2	1	-	032. Label wholesale cuts of lamb with their proper names and desired percentages of total carcass yield.
2	-	1	-	-	2	1	-	033. Select from a list major factors to consider in judging breeding sheep.
2	-	1	-	-	2	1	-	034. Select from a list major factors to consider in judging market lambs.
2	-	1	-	-	2	1	-	035. Arrange in order the procedures to follow in handling sheep for judging.
2	-	1	-	-	2	1	-	036. List the areas of a lamb that have fat covering.
2	1	2	-	-	1	2	-	037. State procedures for catching sheep.
2	1	2	-	-	1	2	-	038. State procedures for holding sheep.
2	-	1	-	-	2	1	-	039. Distinguish between selected sheep-judging terms for desirable and undesirable traits.
3	1	2	-	-	3	1	-	040. Match to their correct definitions terms associated with dairy cattle breeds and selection.
4	1	4	-	-	4	-	-	041. Identify major breeds of dairy cattle.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
4	2	4	-	-	3	1	-	042. Label the parts of a dairy cow.
3	-	2	-	-	3	2	-	043. Match breeds of dairy cattle to their yearly production averages.
2	-	1	-	-	2	1	-	044. Define **dairy judging.**
2	-	1	-	-	2	1	-	045. Match terms associated with dairy cattle judging to their correct definitions.
2	1	1	-	-	2	1	-	046. Distinguish between dairy cattle judging terms for desirable and undesirable traits.
2	1	1	-	-	2	1	-	047. List traits classified by the dairy-type evaluation system.
2	1	2	-	-	2	1	-	048. Select from a list factors to consider in selecting dairy cattle.
2	1	2	-	-	2	1	-	049. Match to their correct definitions terms associated with light horse breeds and selection.
4	1	4	-	-	4	1	-	050. Identify breeds of light horses.
4	1	4	-	-	4	2	-	051. Label the parts of a horse.
3	1	3	-	-	2	1	-	052. Match types of horses to their correct uses.
2	-	1	-	-	2	1	-	053. Label common head markings.
2	-	1	-	-	2	1	-	054. Label common leg markings.
2	-	1	-	-	2	1	-	055. Match body colors to their correct descriptions.
2	-	1	-	-	2	1	-	056. Match to their correct definitions terms associated with judging.
2	-	1	-	-	2	1	-	057. Describe general traits to consider in judging a halter class of light horses.
2	-	1	-	-	2	1	-	058. Select from a list specific traits or points to look for when judging light horses.
2	-	1	-	-	2	1	-	059. Label common conformational faults of feet and legs.
2	-	2	1	-	2	1	-	060. Match to their correct definitions terms associated with livestock feeding.
4	1	4	1	1	3	3	-	061. Match nutrients to their correct basic functions.
2	2	2	1	1	1	1	-	062. Select from a list factor to consider when purchasing feed.
2	1	2	1	1	1	1	-	063. List commercial feed tag requirements.
2	2	1	2	1	1	1	2	064. State rules for calculating price per pound of protein in feed.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
2	2	2	2	-	1	2	-	065. Match types of performance rations to their correct definitions.
2	1	2	1	-	2	1	-	066. Match swine-feeding situations to their correct thumb rules.
2	1	2	1	-	2	1	-	067. Match sheep-feeding situations to their correct thumb rules.
2	1	2	1	-	2	1	-	068. Match beef-feeding situations to their correct thumb rules.
2	1	2	1	-	2	1	-	069. Match dairy-cattle-feeding situations to their correct thumb rules.
2	1	2	1	-	2	1	-	070. Match light-horse-feeding situations to their correct thumb rules.
2	2	2	1	-	1	1	-	071. Survey livestock-feeding information in the community.
5	4	5	-	5	-	-	-	072. Match to their correct definitions terms associated with plant science.
5	3	4	-	5	-	-	-	073. Match to their correct definitions terms associated with plant growth classifications.
4	3	4	-	4	-	-	-	074. List general factors that affect crop production.
4	3	3	-	4	-	-	-	075. Identify major grain crops grown in Oklahoma.
3	3	3	-	3	-	-	-	076. List major hay crops grown in Oklahoma.
4	2	3	-	4	-	-	-	077. Match plant classes to their specific crops.
5	2	4	-	5	-	-	-	078. Label the parts of a grass plant.
5	1	3	-	5	-	-	-	079. Identify common pasture and range plants.
5	2	2	-	5	-	-	-	080. Identify common weeds.
5	4	4	-	5	-	-	-	081. Label parts of a tree.
5	3	4	-	5	-	-	-	082. Identify common types of trees.
5	5	-	-	-	-	-	5	083. Match terms associated with fundamentals of electricity to the correct definitions.
5	5	2	5	1	1	2	5	084. Discuss the electron theory.
5	3	-	2	-	-	-	5	085. Match the means of transporting electricity to correct descriptions.
5	3	-	1	-	-	-	5	086. Distinguish between 115-volt service and 230-volt service.
5	4	-	1	-	-	-	5	087. Match letter designations used in Ohm's law to the correct terms.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	3	-	1	-	-	-	5	088. State Ohm's law as related to electricity.
5	3	-	1	-	-	-	5	089. Calculate problems using Ohm's law as related to power.
5	3	-	1	-	-	-	5	090. Solve problems to determine voltage.
5	3	-	1	-	-	-	5	091. Solve problems to determine amperage.
5	3	-	-	-	-	-	5	092. Solve problems to determine resistances and wattages.
								093. Demonstrate the ability to:
5	3	-	1	-	-	-	5	a. Use a voltmeter.
5	3	-	1	-	-	-	5	b. Use an ohmmeter.
5	3	-	1	-	-	-	5	c. Use an ammeter.
5	3	-	1	-	-	-	5	d. Use a watt meter.
5	3	-	1	-	-	-	5	094. Match terms associated with electrical wiring to the correct definitions.
5	2	-	1	-	-	-	5	095. Complete a chart on conductors, types, and uses.
5	4	-	1	-	-	-	5	096. Name factors affecting voltage drop.
4	1	-	-	-	-	-	4	097. Arrange in order the procedure to follow in wiring.
5	1	-	-	-	-	-	5	098. Match electrical schematic symbols to their names.
5	1	-	-	-	-	-	5	099. Distinguish between schematic diagrams and wiring diagrams.
								100. Demonstrate the ability to:
5	1	-	-	-	-	-	5	a. Wire a lighting outlet controlled by a single pole switch with a duplex receptacle.
4	1	-	-	-	-	-	4	b. Wire three duplex receptacles using nonmetallic cable.
5	1	-	-	-	-	-	5	c. Wire lighting outlet controlled by two three-way switches.
5	1	-	-	-	-	-	5	d. Wire a range plug.
5	4	2	1	2	-	-	-	101. Match to their correct definitions terms associated with selecting soil-conservation practices.
5	5	2	1	1	-	-	-	102. Define soil

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	5	1	1	2	-	-	-	103. Label an illustration showing the composition of an average soil.
5	5	4	1	3	-	-	-	104. State the benefits of organic matter in soil.
5	5	3	1	3	-	-	-	105. Select from a list reasons soil is important.
5	5	2	1	2	-	-	-	106. Name factors affecting soil formation in a particular location.
5	5	1	1	1	-	-	-	107. List physical features of a soil that contribute to its texture.
5	5	-	1	1	-	-	-	108. Classify major soil-particle groups according to size.
4	4	-	1	1	-	-	-	109. Match major soil-texture classifications to their correct soil characteristics.
4	4	-	1	1	-	-	-	110. Match subdivisions of the soil-texture classifications to their correct soil characteristics.
4	4	-	1	1	-	-	-	111. Match kinds of soil structures to their correct definitions.
4	4	-	-	1	-	-	-	112. Match soil colors to the correct soil characteristics indicated by color.
4	4	-	-	-	-	-	-	113. Match the horizons in a soil profile to their correct definitions.
5	5	-	-	-	-	-	-	114. Match degrees of soil depth to their correct definitions.
5	5	-	-	-	-	-	-	115. Match degrees of slope to their correct definitions.
5	5	1	-	1	-	-	-	116. List types of erosion.
5	5	1	-	1	-	-	-	117. Match degrees of erosion to their correct definitions.
5	5	1	-	1	-	-	-	118. Match categories of water erosion to their correct definitions.
5	5	2	-	-	-	-	-	119. List management practices that aid in erosion control.
5	5	2	-	-	-	-	-	120. Select from a list wind-erosion conservation practices.
5	5	1	-	-	-	-	-	121. Match degrees of permeability to their correct soil characteristics.
3	3	1	-	-	-	-	-	122. Match rates of surface runoff to the correct definitions.
4	4	2	-	1	-	-	-	123. Match land-capability classes to their correct definitions.
4	4	1	-	-	-	-	-	124. Match land-capability class(es) to their correct suitable uses.
4	4	1	-	-	-	-	-	125. Select from a list the best land-capability class possible for certain soil factors.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
3	3	-	-	-	-	-	-	126. List types of recommended land treatments applied to land-capability classes.
4	4	2	-	3	-	-	-	127. Match types of vegetative practices to the correct land-capability class(es) each is applied to.
4	3	-	1	1	-	-	-	128. State types of fertilizer applications applied to certain soil types.
5	5	2	-	-	-	-	-	129. Match factors that may influence land-capability class to the correct land treatments applied to each.
5	5	-	-	-	-	-	-	130. Determine degree of erosion.
4	4	1	-	-	-	-	-	131. Complete a soil-classification worksheet.
4	4	1	-	-	-	-	-	132. Complete a recommended-land-treatment worksheet.
3	3	1	-	-	-	-	-	133. Determine land-capability classes and select land treatments.
								134. Demonstrate the ability to:
4	4	1	-	1	-	-	-	a. Determine soil texture by feel.
4	4	-	-	-	-	-	-	b. Use a slope finder to determine slope.
5	3	5	-	5	-	-	-	135. Match to their correct definitions terms associated with plant growth and reproduction.
5	2	5	-	5	-	-	-	136. Arrange in order the stages in the life cycle of plants.
5	2	5	-	5	-	-	-	137. Match to their correct descriptions plant classifications based on life-cycle patterns.
5	2	3	-	5	-	-	-	138. Discuss plant classifications based on agricultural use.
5	1	3	-	5	-	-	-	139. Label the parts of a legume.
5	4	5	-	5	-	-	-	140. Match the four basic plant parts to their correct functions.
5	3	5	-	5	-	-	-	141. Name and describe root types.
5	3	5	-	5	-	-	-	142. Identify parts of a stem.
5	3	5	-	5	-	-	-	143. Describe monocot and dicot leaf types.
5	1	5	-	5	-	-	-	144. Name and describe dicot leaf-to-stem attachment patterns.
5	3	5	-	5	-	-	-	145. Distinguish between the vascular functions of phloem and xylem.
5	2	5	-	5	-	-	-	146. Match to their correct definitions terms associated with flowers.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	2	5	-	5	-	-	-	147. Label the parts of a flower.
5	2	5	-	5	-	-	-	148. Arrange in order the steps in plant sexual reproduction (seed production).
5	2	5	-	5	-	-	-	149. Match to their correct descriptions plant asexual (vegetative) reproduction methods.
5	1	4	-	5	-	-	-	150. Arrange in order the stages in the seed germination process.
5	2	3	-	5	-	-	-	151. Select from a list requirements for good germination
5	2	3	-	5	-	-	-	152. List factors that cause poor or no germination.
5	3	5	-	5	-	-	-	153. State and explain the formula for photosynthesis.
4	1	3	-	4	-	-	-	154. Evaluate common agricultural plants.
5	3	5	-	5	-	-	-	155. Demonstrate the ability to germinate seeds.
4	2	4	-	4	-	-	-	156. Match to their correct definitions terms associated with seeds and seed selection.
3	2	2	-	3	-	-	-	157. Match to their correct descriptions commonly recognized classes of pedigreed seed.
3	1	1	-	3	-	-	-	158. Select from a list guidelines for selecting high-quality seed.
2	1	-	-	2	-	-	-	159. Discuss weed seed allowances in quality commercial seed samples.
2	1	-	-	2	-	-	-	160. Identify commercial seed tag requirements.
3	1	1	-	3	-	-	-	161. List critical considerations for storing seed.
4	1	3	-	4	-	-	-	162. Identify common crop seeds.
3	1	-	-	3	-	-	-	163. Identify seeds of selected noxious weeds.
3	1	1	-	3	-	-	-	164. Match to their correct definitions terms associated with seedbed preparation.
4	3	2	-	4	-	-	-	165. List the purposes of tillage.
2	1	-	-	1	-	-	-	166. Name and describe common systems of tillage and seedbed preparation.
3	2	1	-	2	-	-	-	167. Select from a list factors to consider in determining when to till.
2	1	-	-	1	-	-	-	168. Match common tillage equipment to their correct descriptions and illustrations.
2	1	-	-	2	-	-	-	169. Interpret seed tag analysis information.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
4	2	3	-	4	-	-	-	170. Evaluate seed germination percentage.
2	1	-	-	1	-	-	-	171. Determine tillage operations and practices.
4	1	4	-	1	2	-	-	172. State the goals of integrated pest management.
4	3	3	1	3	1	-	-	173. List major factors affecting crop production.
4	3	4	1	2	1	-	-	174. Match major pest-control practices to their correct descriptions.
5	4	4	-	4	2	-	-	175. Match to their correct definitions terms associated with crop pests and diseases.
5	2	3	-	5	-	-	-	176. State ways weeds hinder crop production.
5	3	4	-	5	-	-	-	177. List ways weeds are spread.
5	3	4	-	5	-	-	-	178. Select from a list methods of controlling weeds.
4	1	3	1	4	-	-	-	179. Match classifications of herbicides to their correct descriptions.
5	4	4	-	1	4	-	-	180. Label life-cycle stages of most insects.
5	4	5	-	1	4	1	-	181. State methods of controlling insects.
3	2	3	1	1	2	-	-	182. Match classifications of insecticides to their correct descriptions.
4	1	3	1	4	1	-	-	183. Select from a list indications of plant diseases.
5	1	3	-	4	-	-	-	184. Match causes of infectious plant diseases to their correct descriptions.
5	1	3	-	5	-	-	-	185. Discuss methods of controlling plant diseases.
3	2	2	3	-	-	1	-	186. Discuss factors to consider before using agricultural chemicals on crops.
3	3	2	3	1	-	-	-	187. Discuss factors to consider when selecting and obtaining chemicals.
3	3	2	3	2	1	1	1	188. List personal protective devices used when handling pesticides.
3	3	2	3	1	-	1	-	189. State treatments for types of pesticides exposure.
5	4	2	5	2	1	1	1	190. Select from a list factors to consider in storing and disposing of chemicals.
3	1	-	3	-	-	-	-	191. Match types of pesticide formulations to their correct definitions.
3	1	-	3	-	-	-	-	192. Match types of pesticide applicators to their correct descriptions.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
3	2	1	2	-	2	-	-	193. Interpret pesticide label information.
3	-	-	3	-	1	-	-	194. Calculate pesticide mixture and cost.
5	3	5	2	-	3	4	-	195. Match to their correct definitions terms associated with animal digestion and interpreting nutritional information.
5	3	4	1	-	3	4	-	196. Discuss reasons for studying the digestive processes of animals.
4	1	3	1	-	2	2	-	197. Match categories of feed to their correct definitions.
5	1	5	1	-	3	3	-	198. Match major classes of animal digestive systems to their correct definitions.
5	1	5	-	-	3	3	-	199. Identify the major parts of the digestive system of ruminants.
5	-	5	1	-	3	3	-	200. Arrange in order the major steps in the digestive process of ruminants.
4	-	4	-	-	2	1	-	201. Match subdivisions of the nonruminant class to their correct definitions.
5	1	5	-	-	3	4	-	202. Identify the major parts of the digestive systems of nonruminants.
5	-	4	-	-	3	4	-	203. Arrange in order the major steps in the digestive processes of nonruminants.
2	-	2	1	-	2	1	-	204. Discuss factors measured in determining ration formulations.
5	3	5	1	-	2	4	-	205. Match nutrients to their basic functions.
3	-	2	1	1	1	-	-	206. State sources for the types of protein found in ration formulations.
2	-	2	1	1	2	-	-	207. Match to their correct definitions systems used in evaluating ration formulations.
2	-	1	1	1	2	-	-	208. Discuss factors to consider when deciding which system to use to evaluate ration formulations.
5	4	5	1	1	3	3	1	209. State the basic theories that govern the net-energy system.
2	1	2	-	-	2	1	-	210. State resources needed when applying the net-energy system to livestock feeding.
4	2	4	-	-	2	2	-	211. Match abbreviations used in the net-energy system to their correct definitions.
3	1	3	-	1	2	1	-	212. State the extent to which primary energy-level considerations have been determined by species.
5	1	5	1	1	3	3	-	213. Interpret nutritional information from tables.
4	3	4	-	-	3	2	-	214. Match to their correct definitions terms associated with maintaining animal health.
3	3	3	-	-	3	2	-	215. List signs of a healthy animal.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
3	3	3	-	-	3	2	-	216. List signs of an unhealthy animal.
4	4	4	-	-	3	2	-	217. Match common farm animals to their normal average temperature, pulse rate, and breathing rate.
4	3	4	-	-	2	2	-	218. Discuss factors to consider when developing a program for preventing ill health in animals.
3	2	3	-	-	2	2	-	219. Select from a list good management practices for maintaining animal health.
3	2	2	-	-	2	1	-	220. List major shelter requirements of livestock.
3	2	3	1	1	2	1	-	221. Match disinfectants and antiseptics to their correct uses/descriptions.
2	-	1	-	1	2	-	-	222. Select from a list factors to consider in disinfecting livestock facilities.
4	2	4	2	-	1	3	-	223. Match methods of administering medicine to their correct descriptions.
4	3	4	2	1	2	3	1	224. Label and discuss uses of equipment used to administer medications and to monitor health care of livestock.
2	2	2	1	-	2	1	-	225. Label illustrations of injection sites with the correct injection method and description.
3	1	1	1	-	2	2	-	226. Select from a list guidelines for proper vaccination of livestock.
3	-	1	1	-	2	2	-	227. Select methods, equipment, and locations for administering medication.
								228. Demonstrate the ability to:
2	-	1	1	-	1	2	-	a. Fill a syringe.
2	-	1	-	-	1	2	-	b. Take an animal's temperature.
2	-	1	-	-	1	2	-	c. Give an intramuscular injection.
2	-	1	-	-	1	2	-	d. Give a subcutaneous injection.
2	-	1	-	1	2	2	-	e. Administer growth stimulant implants.
5	3	5	-	1	5	4	-	229. Match to their correct definitions terms associated with animal parasites.
5	2	4	-	-	5	4	-	230. Label the life cycle stages of an internal parasite.
5	2	5	-	-	5	4	-	231. Match common internal parasites to their correct descriptions.
5	2	5	-	1	5	4	-	232. Label the life cycle stages of an external parasite.
5	2	5	-	1	5	4	-	233. Match common external parasites to their correct descriptions.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	2	4	-	-	3	4	-	234. Match to their correct definitions terms associated with animal diseases.
5	2	4	-	-	2	4	-	235. Match common infectious diseases to their correct descriptions.
5	2	4	-	-	1	4	-	236. Match common noninfectious deseases to their correct descriptions.
4	2	2	-	-	2	3	-	237. List types of animal health products.
2	2	2	2	1	2	2	1	238. List label requirements for animal health products.
2	2	2	1	-	2	2	-	239. Discuss guidelines for using animal health products.
3	1	1	3	1	2	2	1	240. List factors to consider when calculating mixes or determining dosage levels for animal health products.
4	3	4	1	1	3	3	-	241. Determine prevention and controls for common parasites.
4	3	4	1	1	2	3	-	242. Determine treatment and controls for common deseases.
3	1	1	2	1	2	3	1	243. Interpret information on labels of animal health products.
3	1	2	3	1	2	2	1	244. Calculate mixes and dosage levels for animal health products.
								245. Demonstrate the ability to:
2	-	2	2	-	2	2	1	a. Use a drench gun.
2	-	2	1	-	2	2	1	b. Administer worm paster.
2	-	1	1	-	2	2	1	c. Administer a bolus.
2	-	1	1	-	2	2	-	d. Install insecticide ear tag.
3	2	1	3	1	1	1	3	246. State safety precautions for handling oxyacetylene welding and brazing equipment.
3	2	1	3	-	-	-	3	247. Match types of oxyacetylene welding and brazing flames to their correct characteristics.
3	2	1	3	-	-	-	3	248. Distinguish between definitions of oxyacetylene welding and oxyacetylene brazing.
2	1	1	2	-	-	-	2	249. List properties of a good weld.
2	1	1	1	-	-	-	2	250. List factors that determine a good weld.
3	1	1	2	-	-	-	3	251. Match incorrect flame temperatures to their effects on the flow of brazing filler metal.
4	1	3	3	3	-	-	-	252. Match terms associated with fertilizers to the correct definitions.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	3	5	2	4	1	-	-	253. Select from a list factors that influence the use of fertilizers.
5	2	4	-	4	-	-	-	254. Match the major (primary) plant nutrients to the correct characteristics.
5	1	4	-	5	-	-	-	255. Match the minor (secondary) plant nutrients to the correct characteristics.
5	2	4	1	5	1	1	-	256. Match nutrients to their deficiency symptoms.
3	3	2	2	2	-	-	-	257. Select from a list the information that must be stamped on fertilizer bags according to state law.
3	2	2	3	2	-	-	-	258. Match types of fertilizer analyses to the correct descriptions.
3	2	1	3	2	-	-	-	259. Match dry, liquid, and gas fertilizers to the correct descriptions.
4	3	3	3	3	-	-	-	260. List the percent nutrient value of specified fertilizers.
5	4	4	5	3	1	1	2	261. Read a pH scale to determine if the soil is acid, neutral, or alkaline.
5	2	4	3	5	-	-	-	262. Name ways liming benefits plant growth.
3	2	2	2	3	-	-	-	263. Classify plants according to the most desirable pH scale range.
3	1	1	3	2	-	-	1	264. Calculate problems comparing the cost per pound of nitrogen.
3	-	1	3	2	-	-	1	265. Calculate problems determining application rates of fertilizers.
3	-	2	-	3	-	-	-	266. Collect plants with fertilizer deficiencies.
3	-	2	3	2	-	-	1	267. Calculate number of pounds of actual nitrogen, phosphorus, and potassium available from different fertilizer analyses.
3	-	2	1	2	-	-	-	268. Make fertilizer recommendations.
4	3	2	1	3	-	-	-	269. Complete a soil analysis form.
3	2	3	-	2	-	-	-	270. Match terms associated with rangeland to the correct definitions.
3	2	3	1	2	-	-	-	271. Select from a list factors that affect forage growth.
2	2	2	-	1	-	-	-	272. Select from a list practices to follow in order to better utilize grazing of rangeland.
3	2	3	-	3	-	-	-	273. Select from a list principles of range management.
2	2	2	-	-	1	1	-	274. Discuss in a short paragraph the meaning of animal unit.
2	2	2	-	2	1	1	-	275. Distinguish between grasses according to their palatability.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
4	1	1	-	4	-	-	-	276. Complete a chart listing characteristics of native grasses.
2	-	2	-	2	-	-	-	277. Select from a list ways to prevent overgrazing.
2	-	1	-	2	1	-	-	278. Match the grazing systems to the correct descriptions.
2	1	1	-	2	-	-	-	279. Match kinds of range sites to the correct descriptions.
2	-	1	-	2	1	-	-	280. Match degrees of pasture utilization to the correct descriptions.
2	-	1	-	2	1	-	-	281. Match range conditions to the correct descriptions.
4	1	2	-	4	-	-	-	282. Identify collected rangeland plants.
2	1	2	-	2	-	-	-	283. Survey a native rangeland to determine kind of site, degree of utilization, and range condition and to recommend control practices for improving the productivity of the range.
2	2	2	-	2	-	-	-	284. Match terms associated with tame pastures to the correct definitions.
2	1	1	-	2	-	-	-	285. Select from a list advantages of tame pastures.
2	1	2	-	2	-	-	-	286. Select from a list steps to follow in preparing the ideal seedbed for pasture improvement.
2	1	2	-	2	-	-	-	287. Match alternative tame pasture plants with varieties of each.
2	1	2	2	2	-	-	-	288. Match the starter fertilizers to the types of pasture plants on which they should be applied.
2	1	2	2	2	-	-	-	289. Select from a list the proper fertilizer to use in top dressing tame pasture plants.
3	1	2	2	3	-	-	-	290. Match methods of weed and brush control with the correct descriptions.
3	1	2	2	2	1	-	-	291. Select from a list advantages of renovating pastureland.
3	1	1	2	3	1	-	-	292. Select methods to follow in order to increase production of forage growth.
4	1	1	3	4	1	-	-	293. Match herbicides to the type of weeds and brush controlled by each.
2	2	1	1	2	1	-	-	294. List functions of the county Agricultural Stabilization and Conservation Service (ASCS) in relation to the farming operation.
3	2	3	-	3	1	-	-	295. Survey a tame pasture to recommend improvement practices.
4	2	3	-	4	-	-	-	296. Survey a native rangeland.
2	2	1	1	2	1	-	1	297. Calculate the cost of establishing a tame pasture program.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
3	3	3	2	3	-	-	-	298. Match terms associated with lawn care to the correct definitions.
4	3	2	1	4	-	-	-	299. Select from a list careers associated with lawn care.
3	2	2	-	3	-	-	-	300. Match types of grasses to growing characteristics.
3	2	2	1	3	-	-	-	301. Match types of grasses to the proper time to fertilize a lawn.
3	2	1	2	2	-	-	1	302. Identify methods of applying lawn fertilizers.
3	1	1	1	3	-	-	-	303. Match types of grasses to the correct mowing heights.
3	1	3	1	3	-	-	-	304. Select from a list conditions that determine amount and frequency of watering a lawn.
3	1	2	2	3	-	-	-	305. Match lawn problems to the correct control methods.
3	1	2	2	3	-	-	-	306. Survey a lawn to determine type of grass, fertilizer needs, weed control, and mowing height.
3	2	3	1	3	-	-	-	307. Match terms associated with gardening to the correct definitions.
3	2	3	1	3	-	-	-	308. Select from a list factors to consider in selecting a garden site.
3	3	3	1	3	-	-	-	309. Name reasons for planning and laying out a garden on paper.
3	3	3	1	3	-	-	-	310. Select from a list characteristics of good seed.
4	3	4	-	4	-	-	-	311. Select from a list reasons for transplanting vegetables.
3	1	2	-	3	-	-	-	312. Select from a list vegetables which are normally transplanted.
3	1	1	-	3	-	-	-	313. Distinguish between advantages of commercial versus home-grown transplants.
3	1	1	-	3	-	-	-	314. Select from a list common structures used to grow plants.
3	-	3	-	3	-	-	-	315. Match vegetables to common planting dates.
3	-	2	1	3	-	-	-	316. Match types of pests to the correct methods of control.
5	3	4	-	5	-	-	-	317. Select from a list benefits of mulches.
5	3	4	-	5	-	-	-	318. Name materials that can be used as mulches.
4	2	1	1	3	-	-	-	319. Select from a list the steps needed in preparing the soil for planting.
3	1	2	1	3	-	-	-	320. Name methods of irrigation to use in the garden.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
3	1	2	-	3	-	-	-	321. Select from a list items which can be used as containers in a minigarden.
3	1	1	-	3	-	-	-	322. Name vegetables which may be grown in a minigarden.
4	3	4	-	4	-	-	-	323. Demonstrate the ability to germinate vegetable seed.
3	3	3	-	-	2	-	-	324. Match terms associated with selecting and breeding livestock to the correct definitions.
5	4	5	-	4	4	4	-	325. Select from a list hereditary characteristics that are determined by genes.
4	2	4	-	2	3	2	-	326. Match the types of livestock to the correct number of chromosome pairs.
5	1	5	-	2	4	3	-	327. Discuss in a short paragraph how the genetic make-up of an animal is determined.
5	2	5	-	4	4	3	-	328. Distinguish between dominant and recessive genes.
5	1	5	-	4	4	3	-	329. Distinguish between simple gene inheritance and multiple gene inheritance.
5	-	5	-	3	3	3	-	330. Name the color inheritance of the offspring when given the mating combinations.
5	2	5	-	3	3	4	-	331. Discuss in a short paragraph how the sex of the offspring is determined.
3	1	3	-	1	2	1	-	332. Define **dwarfism** as it relates to livestock breeding.
3	-	3	-	-	2	1	-	333. Distinguish between performance testing and progeny testing.
3	-	3	-	-	2	-	-	334. Match the different systems of breeding livestock to the correct definitions.
5	1	5	-	2	3	3	-	335. Draw a diagram showing the inheritance of horns in cattle for the F_1 and F_2 generations.
5	1	5	-	3	3	3	-	336. Estimate all possible gene combinations when given the matings and using the checkerboard procedure.
5	2	5	-	-	4	4	-	337. Match terms associated with the reproductive organs of farm animals to the correct definitions.
5	2	5	-	-	4	5	-	338. Select from a list the components of the male reproductive tract.
5	-	5	-	-	3	5	-	339. Select from a list the main functions of the epididymis.
5	2	5	-	-	4	5	-	340. Match male reproductive organs to the correct functions.
5	2	5	-	-	4	4	-	341. Identify the parts of the reproductive tract of a cow.
5	2	5	-	-	4	5	-	342. Match the parts of the female reproductive tract to the correct functions.
5	1	5	-	-	4	5	-	343. Select from a list two hormones produced by the ovaries.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	2	5	-	1	4	5	-	344. Name the primary organs of reproduction in the male and female.
3	-	3	-	-	2	3	-	345. Match terms associated with artificial insemination to the correct definitions.
3	-	3	-	-	2	3	-	346. Select from a list the advantages of using artificial insemination.
3	-	3	-	-	2	3	-	347. Select from a list the disadvantages of using artificial insemination.
3	-	3	-	-	2	3	-	348. Name sources of semen for use in artificial insemination.
4	-	2	1	-	1	4	-	349. List the characteristics of semen such as color, volume, pH, and sperm cell concentration.
4	-	2	-	-	1	3	-	350. Select from a list factors that influence volume of semen produced.
5	1	5	-	-	3	5	-	351. Identify the parts of a sperm cell when given a drawing.
3	-	2	-	-	1	3	-	352. Name types of abnormal sperm.
4	-	3	-	-	2	3	-	353. Discuss the signs of estrus in cows.
2	-	1	-	-	1	2	-	354. State which sign of estrus is the most important in regard to time of insemination.
2	1	2	-	-	1	2	-	355. Match farm animals to their normal estrus cycles.
2	1	2	-	-	1	2	-	356. Name the time when a cow ovulates.
3	-	2	-	-	1	3	-	357. Select from a list factors that contribute to poor conception rates.
3	-	1	-	-	1	3	-	358. Select from a list the reasons why timing is important when using artificial insemination.
4	2	4	-	-	2	2	-	359. Match given animals to the correct gestation period in days.
2	-	-	-	-	1	2	-	360. Match the percentage of pregnancies expected to the number of services when using artificial insemination in cattle.
5	2	5	-	1	4	5	-	361. Select from a list functions of the ovary.
3	1	2	-	-	2	3	-	362. Name functions of the mucous fluid.
2	-	-	-	-	1	2	-	363. Name reasons why cattle do not settle.
2	-	-	-	-	1	2	-	364. Match methods of thawing semen to the correct procedures.
2	-	-	-	-	1	2	-	365. Identify equipment necessary for artificial insemination.
2	-	-	-	-	1	2	-	366. Identify errors in inseminating a cow with relationship to the misplacement of the inseminating tube.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
2	-	1	-	-	1	2	-	367. Examine semen for mobility and abnormalities.
2	-	1	-	-	1	2	-	368. Identify points in time on an estrus cycle chart.
								369. Demonstrate the ability to:
2	-	-	-	-	1	2	-	a. Place inseminating tube and dye into reproductive tract acquired from slaughterhouse.
2	-	-	-	-	1	2	-	b. Inseminate a cow.
2	-	-	-	-	1	2	-	370. Match terms associated with fertility and pregnancy testing to the correct definitions.
2	-	-	-	-	1	2	-	371. Select from a list advantages of pregnancy testing.
2	-	-	-	-	1	2	-	372. Select from a list advantages of fertility testing bulls.
5	2	5	-	-	4	4	-	373. Identify the parts of a cow's reproductive tract.
2	-	-	-	-	1	2	-	374. Name the distinct indications of pregnancy while using a rectal examination.
4	-	3	-	-	1	3	-	375. Identify the stages of pregnancy when given a reproduction tract or an artist's drawing showing the stages.
2	-	-	-	-	1	2	-	376. State in writing the most difficult stage of pregnancy to detect when using the rectal examination.
1	-	-	-	-	1	-	-	377. Discuss in a short paragraph why the left hand and arm should be used in rectal examinations of cows for pregnancy.
2	-	-	-	-	1	2	-	378. Select from a list causes of sterility and delayed breeding in bulls.
2	-	-	-	-	1	2	-	379. Match grades of semen to visual characteristics.
1	-	-	-	-	-	1	-	380. Select from a list periods during the year that represent the most practical time for checking bulls for fertility.
1	-	-	-	-	-	1	-	381. Demonstrate the ability to pregnancy test a cow by using the rectal examination.
2	-	1	-	-	2	1	-	382. Match terms associated with market grades and classes of livestock to the correct definitions.
2	-	1	-	-	2	-	-	383. List factors that determine market classes of cattle.
2	1	1	-	-	1	-	-	384. Select from a list factors that should be considered in selecting feeder cattle.
2	1	1	-	-	1	-	-	385. Match approximate age ranges for cattle to the correct definitions.
2	1	1	-	-	2	-	-	386. Identify slaughter grades of cattle.
2	1	1	-	-	1	-	-	387. Identify the feeder grades of cattle.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
2	1	1	-	-	2	-	-	388. Select from a list factors that determine market classes of sheep.
2	1	1	-	-	2	-	-	389. Match age groups of sheep to the correct definitions.
2	-	-	-	-	2	-	-	390. Identify the market grades of slaughter lambs.
2	-	1	-	-	2	-	-	391. Select from a list factors that determine market classes of swine.
4	4	-	2	-	-	-	4	392. Match terms associated with fundamentals of electricity to the correct definitions.
5	3	-	1	-	-	-	5	393. Distinguish between single-phase and three-phase power.
5	3	-	-	-	-	-	5	394. Match the means of transporting electricity to the correct descriptions.
4	2	-	1	-	-	-	4	395. Name the types of power suppliers.
5	2	-	1	-	-	-	5	396. Match letter designations used in Ohm's law to the correct terms.
5	3	-	-	-	-	-	5	397. State Ohm's law as related to electricity.
5	3	-	-	-	-	-	5	398. Calculate problems using Ohm's law as related to power.
5	2	-	-	-	-	-	5	399. Calculate the cost of operating electrical equipment.
5	3	-	-	-	-	-	5	400. Solve problems to determine voltage.
5	3	-	-	-	-	-	5	401. Solve problems to determine amperage.
5	3	-	-	-	-	-	5	402. Solve problems to determine resistance and wattage.
5	3	-	-	-	-	-	5	403. Demonstrate the ability to use a voltmeter.
5	2	-	-	-	-	-	5	404. Match terms associated with electrical wiring to the correct definitions.
5	1	-	-	-	-	-	5	405. Complete a chart on conductors, types, and uses.
5	2	-	1	-	-	-	5	406. Name factors affecting voltage drop.
5	1	-	-	-	-	-	5	407. Arrange in order the procedure to follow in wiring.
5	5	5	5	4	4	5	5	408. Match terms and definitions associated with careers.
5	5	5	5	4	4	5	4	409. Select from a list the advantages of selecting a career.
5	5	5	5	5	5	5	5	410. List the important points in choosing a career.

Number Respondents	General Science	Biology I & II	Chemistry	Botany	Zoology	Physiology & Anatomy	Physics	Vo Ag Core Curriculum Objectives
5	5	5	5	4	4	4	5	411. Select a career and obtain information pertaining to the selected career.
3	2	-	1	2	-	-	1	412. Match the different variations of permeability, depth, slope, erosion, and surface runoff with the identifying characteristics of each.
5	5	2	1	1	-	-	-	413. Name the three major groups of soil in relation to texture.
4	4	1	-	1	-	-	-	414. Discuss in a short paragraph the means of determining soil texture by touch.
3	2	1	1	2	-	-	-	415. Name the proper fertilizer and soil amendments when given the deficiency.
3	3	1	1	1	-	-	-	416. Match terms associated with soil testing with the proper definitions.
3	3	1	2	2	-	-	-	417. Explain in writing reasons for testing soil.
3	3	1	1	1	-	-	-	418. Select from a list major items for which soils are tested.
3	3	1	1	1	-	-	-	419. Select the procedure for collecting representative soil samples from a given field.
3	3	1	1	1	-	-	-	420. Select from a list areas from which soil samples should not be taken.
3	3	1	1	1	-	-	-	421. Name items of information that should be submitted with soil samples, in order for proper fertilizer recommendations to be made.
3	3	1	2	1	-	-	-	422. Demonstrate the ability to secure a soil sample and prepare it for mailing or processing.

VITA 2

Larry David Gallatin

Candidate for the Degree of

Master of Science

Thesis: SCIENCE OBJECTIVES INCLUDED IN THE OKLAHOMA VOCATIONAL AGRICULTURE CURRICULUM AS COMPARED TO THE SUGGESTED LEARNER OUTCOMES FOR HIGH SCHOOL SCIENCE COURSES IN OKLAHOMA

Major Field: Agricultural Education

Biographical:

Personal Data: Born in St. Louis, Missouri, November 4, 1945.

Education: Graduated from Riverton High School, Riverton, Wyoming, in May 1963; received Associate Degree from Casper Junior College, Casper, Wyoming, in May 1965; received Bachelor of Science Degree from University of Wyoming, Laramie, Wyoming, in August 1967; completed requirements for the Master of Science Degree at Oklahoma State University in July, 1987.

Professional Experience: Vocational Agriculture Instructor, Pinedale, Wyoming, 1967-1973; Agriculture Retail Sales, 1973-Present.

Professional Organizations: Wyoming Vocational Agriculture Teachers Association; National Vocational Agriculture Teachers Association; Wyoming Education Association; National Education Association; Phi Theta Kappa; National Association of Realtors; Oklahoma Association of Realtors; Enid Association of Realtors.