
A Case Description: A Process for Animal Science Curriculum Development

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Abstract

Departmental courses and curriculum are a complicated network. As in any other complex system the linkages create a situation where each part is very dependent on the other and a change in one component influences all others. In 1987, the Animal Science Department University of Nebraska completed an intensive self-study and external review and several key issues faced the department. To address the curriculum issues the faculty embarked on a curriculum development process.

When the curriculum development process was completed in 1989, 11 new courses were offered and all but 7 of the 38 previously offered courses were deleted or had major revisions. In addition, methods were developed to include communication competency, problem solving, and awareness of societal issues in the curriculum. Furthermore, a method to allow students flexibility in designing areas of specialization was developed. The purpose of this article is to describe the process used by the department and provide the learning concepts and goals that were developed and served as the foundation for building the curriculum.

Background

In 1987, the Animal Science department consisted of 31 faculty and as mentioned previously, offered 38 undergraduate courses. The majority of the faculty had joint appointments in research, teaching or extension; however, several extension specialists and had a 100% extension appointment. There were 158 Animal Science majors which accounted for 13.5% of the College of Agriculture enrollment.

Following the 1987 departmental self-study and review team report, the Department had the following recommendations relative to undergraduate teaching to consider:

Self-Study Recommendations:

- Develop a system for a periodic, peer review of courses and course content and elimination of unnecessary courses.

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- Adjust freshman and sophomore courses and curriculum to enhance:
 - Theoretical and scientific as well as the practical basis of animal agriculture and animal practices.
 - Balanced introduction and appreciation for all disciplines of Animal Science.
 - Careers and career planning experiences.
 - Knowledge of socio-economic impact of animal agriculture.
- Structure production course(s) to provide:
 - Integration of the disciplines.
 - Involvement of instructors with management-systems training.
 - Graduates with competency across species or products and specialization within selected species or products in the animal industries.

Review Team Recommendations:

1. Incorporate more flexibility in the Animal Science curriculum.
2. Careful reassessment to determine whether some classes might be consolidated or dropped.
3. Define role and emphasis of live animal and meat evaluation in curriculum.
4. Greater emphasis be placed on the student internship or work experience program.
5. Consider developing an academic program in which a student would graduate in five years with a B.S. in Animal Science and an MBA.

Key Elements

Developing a new curriculum is a complicated process. Wulf and Schave (1984) pointed out some characteristics of projects that fail:

- Changing leadership
- Only a small group of faculty involved
- Do not have strong support base for the project
- Expectations of time and resources unrealistic.

Several key elements of our curriculum development process were included from the beginning to address characteristics of projects that fail. Figure 1 illustrates the relation-

Figure 1. Curriculum Development Project Overview

Process Proposal	Leadership TEAM	Curriculum Goals	Concept Areas & Learning Goals	Basic Structure Core Courses	Core Course Descriptions	Specialization Courses and Curriculum Approval	
March 1987	May 1987	July 1987	Sept. 1987	March 1988	May 1988	Aug. 1988	May 1989

ship of the key elements or the process and the time-frame. The following text describes the key elements in detail.

Initial Proposal

A specific grant-like proposal including justification, specific objectives, and detailed procedures with a reasonable time-frame was developed. The purpose of the proposal was specific; to assure the faculty and to capture their support on the basis that the curriculum would be significantly improved when the process was completed.

The justification was developed around the self-study and review team recommendations. The objective: "To modify where necessary, our course offering and curriculum to build on strengths, optimize available resources, and to enhance learning." The procedure contained three important elements:

1. the project would be conducted with the assumption that the department had no courses or curriculum;
2. a leadership team would be given the authority to develop procedures and direct the process, but not to proceed without input and approval from all faculty;
3. the project would be completed by fall 1989.

The proposal was presented at a faculty meeting with the commitment that the department would not proceed unless there was consensus to proceed.

Leadership Team

The leadership team was a vital ingredient in the curriculum development project. The leadership team for our project was selected carefully. The department head first selected the team leader. As described by Wulf and Schave (1984), the team leader is a very important individual, because the team leader sets tone for the project, and is a catalyst, energizer and "whip cracker." Furthermore, the team leader must be committed to improving undergraduate education. The team leader and department head then selected the leadership team striving for balanced representation of all segments of the faculty. The department was organized by discipline groups (nutrition, physiology, animal products, and genetics), therefore each of these groups were represented. In addition, faculty with a traditional production/management (animal husbandry background and philosophy) were represented, as well as, the faculty with large research appointments who taught graduate level courses. In each selection, trust and confidence of peers was considered. The leadership team also included a member

from the Agronomy department as an "outside" member. The "outside" member provided a different perspective, an unbiased what do you think resource, and constructive criticism. Finally, the leadership team included a representative of the college administration, actually the Dean of the college served as the representative. He provided a broad based viewpoint and helped validate the process with faculty in both the department and College of Agriculture.

Curriculum Goals

Initially, the leadership team really struggled with — "how do we start?" In fact, the condition of the team was best described by one member of the team, when he said, "all great thinkers need to be at a point of utter chaos before concrete things can happen." However, in the next meeting concrete things began to happen when the team began to develop curriculum goals. The goals served as a solid foundation and constant means of focusing on the task. The goals were stated in terms of what the faculty wanted to develop in Animal Science graduates:

- Knowledge within the various disciplines of Animal Science.
- Competence in integrated problem solving.
- Competence in communication and leadership.
- Awareness of issues and concerns of society as they relate to animal agriculture.

Although very general in nature, the adoption of these goals was a major step, because they indicated a commitment to developing graduates in areas that required a new united effort beyond the traditional classroom experience. Based on the need to accomplish these goals, the faculty was positioned to explore innovation in the Animal Science curriculum.

Concept Areas and Learning Goals

Critical to the "no course" concept of the curriculum development project was faculty development of concept areas and learning goals. Two principal elements of the process were the model for stating the goals and the technique used to involve the entire faculty in the process.

The model used was outlined by Wulf and Schave (1984). First, concept areas were developed: for example, "Students understand how meat animals grow and develop". The following guidelines of stating appropriate goals for student learning were used:

1. Describe the desired product i.e. identify in general terms what the student will be like as result of education.
2. Stated desirable characteristics attributable to learning.
3. Define what each individual is expected to derive.
4. Consider the scope of the goals.
 - Too broad — give purpose and justification to everything
 - Too narrow — behavioral objectives

Examples of learning goals within the example concept area stated above were:

1. Students learn the definition and recognize the types of growth.
2. Students understand the differentiation, development, and growth of muscle, fat, and bone.
3. Students learn the composition changes that occur in animals during growth.
4. Students understand growth curves and their function.
5. Students develop a knowledge of the hormonal, nutritional, and genetic factors that affect growth and development of meat animals.
6. Students learn the techniques to measure growth, development, and composition.

The technique used to involve faculty in the construction of concept areas and learning goals was designed to obtain the opinions of all faculty members. In phase I of developing the concept areas and learning goals, all faculty (regardless of type of appointment or location) were asked to participate in the group which represented their formal training: nutrition, animal products, genetics and selection, and physiology. Each group was asked to develop concept areas and learning goals that described the knowledge required for all animal science majors. Individuals were asked to serve as group leaders by the department head after he received recommendations from the leadership team. Prior to the first group meeting, group leaders attended a 2-hour workshop on developing concept areas and learning goals. At the workshop, a detailed time-frame was outlined.

Following Phase I, an interdisciplinary discussion day (Phase II) was scheduled. During the morning, 1-hour interdisciplinary discussion groups were formed for each of the disciplines by distributing faculty from other disciplines among the groups. Group meetings were scheduled so all faculty could attend the discussions of each discipline concept areas and learning goals. Preliminary drafts of each discipline group's concept areas and learning goals were distributed to the entire faculty before the discussions. Based on these interdisciplinary discussions, discipline groups revised their concept areas and learning goals.

Phase III involved identification of concept areas and goals related to knowledge not stated by the disciplines. Four new interdisciplinary groups, again involving the entire faculty, were formed. Members of the leadership team called the new groups together and led the discussion. Reports of the four groups were consolidated by the leadership team. Examples of learning goals identified in this phase included:

1. Students understand the parts of a farm record system and how to calculate total income and expenses for a given farm unit.
2. Students learn basic concepts of animal behavior.
3. Students learn to properly move and handle livestock.
4. Students understand sanitizing and hygienic procedures, their common usage and effectiveness.
5. Students understand interactions among plants and animals on range and pasture.
6. Students learn the principles of evaluating records and visual and instrumental evaluation of muscle fat and skeletal systems.

When Phase III was completed the faculty had identified 263 learning goals. These learning goals served as an excellent reference for evaluating the knowledge needed of animal science graduates. A complete set of the learning goals is provided in Table 1.

The next step in the process was to prioritize the learning goals. All faculty were asked to rank each goal on a basis of 1, 2, 3, or 4 with a score of 1 indicating the goal was very important and 4 indicating the goal was not very important for all animal science graduates. The highest ranking goals are reported in Table 2.

With the concept areas and learning goals and the information obtained from faculty priority survey, the leadership team began the process of conceptualizing the basic structure for the curriculum and core courses.

Faculty Input and Reaction Cycle

Following the process of developing concept areas and learning goals, the faculty truly had an attitude that the curriculum was being developed considering there were no courses. Furthermore, confidence in the leadership team and charge to develop proposals had evolved. Therefore in the next phases of the curriculum development project, the leadership team's challenge was two-fold. First, to take the information developed and design curriculum and courses to achieve the curriculum and learning goals. Second, to keep the trust of the faculty. To achieve item two, a key cycle was developed. The cycle contained the following chief components:

- Obtain input from faculty
- Develop proposal
- Obtain critique from all faculty
- Revise proposal
- Faculty meeting to obtain approval to continue in proposed direction
- Move to next step until final proposal completed

The cycle was repeated for each of the following elements:

Group 1

- Basic structure of curriculum and core courses

Group 2

- Recommendations regarding:

- Communication
- Problem solving
- Society issues
- Course descriptions for core courses

Group 3

- Core requirements of courses not offered by animal science
- Specialization concept and requirements
- Course descriptions for animal science courses required for specialization

Group 4

- Complete proposal — curriculum and courses

The elements were distributed in four groups and a special faculty meeting held for each group. Each meeting was scheduled for 1/2 day with a very specific agenda. An important aspect of each meeting was an informal lunch provided by the department to display support and appreciation for the efforts and to start with a unpretentious atmosphere of cooperation.

In addition, as the curriculum and courses reached the final stages of completion, key faculty in other departments were invited to respond to the proposal at a meeting hosted by the Animal Science department.

During the final faculty meeting a motion to accept the entire proposal: 45 course outlines, core curriculum, and specialization requirements, was presented and amendments

were presented. Individuals presented 16 amendments of which 4 were editorial in nature. Eight of the amendments passed. The amended proposal was then submitted to the faculty with a mail ballot. The final vote was 27 in favor, 3 opposed, and 1 abstained.

Summary

The procedures outlined in this article helped the Animal Science department address a complex set of curriculum issues. Furthermore, and probably most important, through the process an ownership in the curriculum and all courses evolved. Therefore, it seems that a list of ingredients of successful curriculum development projects should include:

- Unchangeable leadership
- Strong support base for the project
- All faculty actively involved
- Realistic expectations of time and resources

Reference

Wulf, K. M. and B. Schave. 1984. *Curriculum Design: A Handbook for Educators*. Scott and Foresman, Glenview, IL.

Note: A complete description of "Concept Areas and Goals" can be obtained by writing the author. Paper No. 94-1 Journal Series, Nebraska College of Agricultural Sciences and Natural Resources.

BOOK REVIEWS

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Economics of Resources, Agriculture, and Food

Wesley D. Seitz, Gerald C. Nelson, and
Harold G. Halcrow

McGraw-Hill, Inc., New York, NY, 1994
477 pp. Illustrated. Hardbound \$47.44

This book was written as an introductory text designed to present basic economic principles to students enrolled in colleges of agriculture and liberal arts. Fundamental microeconomic and macroeconomic theory are illustrated using examples from agriculture, resource, and food concerns with a strong focus on the global scope of agriculture and agribusiness today. The authors have done an excellent job of preparing a book that pro-

vides the groundwork necessary to stimulate student interest in more advanced national and international issues in economics.

The book contains twenty chapters divided into five sections plus a glossary of economic terms at the end. Each chapter includes eight basic divisions that begin with a detailed outline followed by an overview that establishes the context of the subject covered in the chapter. The third division clearly states the learning objectives that establish expectations of the benefits to be gained from the main body of text, which is well supplemented with tables and figures. Section five embodies a concise summary followed by a preview of the forthcoming subject matter and how it is related to the material just presented. The last two sections of each chapter consist of a list of terms and ideas that are important for the student to know as well as a set of practical questions and exercises that allow the student to apply what they have learned.

Part One, "Economic Scope, Organization, and Problems of Agriculture" consist of one chapter that explores the economic theory behind resource scarcity, changes in the farm, agribusiness, and the public sectors. The section concludes with several agricultural economic issues that are likely to impact agriculture in the years to come.

Part Two, "Microeconomic Concepts" has three chapters that introduce the basic microeconomic theory of demand, production, and supply. Chapter 2 addresses the subject of demand in a way that allows the student to relate to the material in terms of their own experience as consumers. Then in Chapters 3 and 4