

TABLE 1 Core Competencies Considered "Essential" in the Collective Opinion of Faculty, Students, Industry Representatives, and Alumni.

Competencies	Rank Order
Describe the basic physiology of plants, e.g., source mode of absorption and role of essential nutrients in plant growth and development; role of photosynthesis and respiration in plant growth and development.	1
Describe soil fertility including the soil's role in supplying plant nutrients; sources of information regarding fertilizer requirements and the common organic and inorganic fertilizers.	2
Identify the major classes of nutrients supplied by plants and animals and indicate their value in human nutrition.	3
Indicate how supply and demand interact to determine prices and the role of prices in allocation of resources.	4
Describe how genetic principles can be applied to change the characteristics of plants and animals.	5
Identify factors influencing plant growth and crop distribution, e.g., production practices, climatic factors, genotype-environmental interactions.	6
Describe the water requirements for agriculture including plants, animals, and domestic uses as related to total water use.	7
Identify the major classes of dietary nutrients and their functions.	8
Summarize the modes of reproduction (sexual and asexual) associated with plant and animal production.	9

Combining the core competencies with specialized or professional competencies needed for the various majors could provide a competency-based instructional program for each agricultural major. The resulting instructional program would thus have direction and purpose not often associated with programs built upon courses the content of which is frequently shifted by changes in instructors.

As previously stated, the solution to providing a relevant, articulated instructional program which possesses direction and purpose does not rest solely upon one particular method or procedure. However, use of the competency concept does appear worthwhile. 19 of the competencies showed a statistically significant difference in the mean ratings between one or more of the four groups of respondents.

The effort to identify and validate core competencies proved that such a task could be accomplished. Analysis of the resulting data showed that there were competencies common for agricultural graduates majoring in such traditional areas as plant science, animal science, natural resources, etc. The one major in which a majority of the developed competencies did not seem appropriate was landscape architecture. Further, it was obvious that industry representatives did not understand the concept of core competencies and instead were concerned more

with "job competencies" which in most cases were more closely associated with "specialized competencies" normally developed within a program major. This undoubtedly accounted for the relatively low ratings made by industry personnel.

Future Efforts

Presently an attempt is being made to utilize the core competencies. It appears that use of the competencies by instructors in developing course outlines will tend to assure that the important knowledge and skills are taught. This will also provide the instructor with some assurance of the relevancy of his course content. When carried further by the curriculum committee or other appropriate person or group, the core competencies could help provide articulation between courses so as to avoid duplication and overlapping of instructional content.

3 Suggestions for effective teaching

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Abstract

To improve teaching, an instructor should organize his course materials so as to teach the basics of thinking in his discipline rather than what people in the discipline think about; he should prepare clearly stated instructional objectives that allow students to know what they should be able to do when the course is over; and he should condense, abstract, and index information so that he can "lose" details not relevant to students.

One of the more perplexing problems facing college and university administrators today is the quality of instruction. They know it is foolish to hire an economist to teach animal physiology. However, they may wonder why the economist might not be an effective economics instructor. Implicitly, college administrators err by assuming that a person who earns a doctorate has also acquired the ability to teach effectively. More correctly, a Ph.D. reflects achievement of a certain level of competency in a discipline and **not** teaching ability. This paper suggests three principles that might assist some instructors in becoming more effective teachers. In discussing these three guides, the author makes no claim for originality. Instead, some credit is claimed for synthesizing three concepts into a framework for effective university and college teaching.

The three suggested principles for effective teaching are (1) teach more with less, (2) prepare instructional objectives and (3) lose information in an orderly manner.

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The first two principles are best considered as guides to course organization; the last as a guide to lecture preparation. I will discuss these principles, using examples from an introductory agricultural economics course.

Teach More With Less

The concept of teaching more with less stems from an article by Noel McInnis which appeared in *Change* (January-February, 1971). McInnis noted that the amount of material associated with any discipline has grown astronomically, and instructors try to include too much material in any one course. McInnis argued that college and university-level instruction would be much more effective (especially introductory courses) if teachers would select the few basic principles of their discipline and continually show how they apply. In an introductory agricultural economics course, for example, instruction should not be a long discourse on what economists think about; rather, the course should be designed to teach how economists think.

McInnis wrote:

Conventional methods of instruction require so much telling (verbally or in print) that our students get lost in the discourse. Their attention is so fragmented by the separate elements that they cannot grasp the whole. We often see the tragic results of this in our 'best' students, who can repeat what we have told them but who cannot apply it in a new context so that it means something. Their learning may have been comprehensive, but it has not been comprehending. They have taken it all in, but they have not actually taken it together.

Thus teaching more with less simply suggests quality will be higher if instructors will teach the basics of thinking (in the discipline) rather than what people in the discipline think about. Economists, for example, are often concerned about prices. Rather than teaching a beginning student the history of agricultural price determination, one should strive to teach him the concepts of supply and demand and how prices are determined by their interaction. With these concepts in mind, the instructor should apply them repeatedly so that students are inculcated with the way economists think about prices and price determination rather than the fact that economists are concerned with many aspects of prices.

The amount of detail retained by students after a course is over is probably quite small. If a large amount of detail is covered in a course, students typically are confused, remember details long enough to get past examinations, and have limited retention and use of the materials presented in class. Alternatively, if the instructor can give the student a thorough grounding in the way a few concepts apply to problems, the long term effectiveness of the course (retention of concepts and their application) will be higher. For illustrative purposes, two lists of introductory agricultural economics course topics are presented in Table 1 for comparison. One list contains (in the author's opinion) too much material, the other an amount more conducive to effective teaching.

TABLE1 Comparison of Alternative Lists of Topics for an Introductory Course in Agricultural Economics.

<p>Too Much Information Agricultural Economics Defined Agriculture in the National Economy National Wealth and Income National Economic Growth Regional Development Money and Agricultural Finance Changes in American Agriculture Economic Functions of Agriculture Production of Agricultural Products (Supply) Consumption of Agricultural Products (Demand) Market Price Determination Role of Market Price Determination Elasticity Market Structure Market Levels and Margins Agricultural Cooperatives Farm Management Principles Joint Products Derived Demand Short-run vs. Long-run Production Budgeting Land Use, Value, and Rent</p>	<p>An Effective Amount Demand Substitution Elasticity Shifts vs. Movement Supply Supply and Demand Analysis Price Takers vs. Price Searchers Agriculture in the National Economy Agriculture in the International Economy</p>
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Prepare Instructional Objectives

The concept of preparing instructional objectives is taken from a book of that title by Robert F. Mager (Fearon Publishers, Inc., Belmont, California, 1957). The point is that if a teacher prepares instructional objectives clearly, there is little more that he must do. Mager notes that a meaningfully stated objective communicates to students what they should be able to do when the course is over. To write meaningful instructional objectives, learner behavior must be described. Specifically, Mager suggests: (1) Identify the terminal behavior by name - i.e., specify the kind of behavior that will be accepted as evidence the learner has achieved the objective. It is clearer to say: "given the appropriate data, use supply and demand analysis to predict the price of soybeans in 1977" rather than "understand soybean pricing in the United States." (2) Define the desired behavior further by describing the important conditions under which the behavior will be expected to occur. For example, state: "in a thirty minute written examination, list and briefly explain the two major determinants of the price elasticity of demand for beef." (3) Specify the criteria of acceptable performance by describing how well the learner must perform to be considered acceptable. One might say: "in a one-hour written examination, the student must be

able to use the given information to compute the price elasticity of demand and discuss its implications on the firm's gross receipts."

Mager summarizes these steps by saying that perhaps the best way to prepare an objective is to write a statement describing one of your educational intents, then modify it until it answers the question, "What is the learner doing when he is demonstrating that he has achieved the objective?" An example of a fuzzy instructional objective would be: "To understand how supply and demand determine price in the market place." A more effective statement of this instructional objective would be: "Given the appropriate information, construct the supply and demand functions for fluid milk and identify the price that will clear the market."

If an instructor can write Mager-type instructional objectives for each of the objectives that he believes important to demonstrate successful completion of the course, then there is less doubt in the mind of the student as well as the instructor as to what the course is about or what is necessary for successful completion. This is especially critical in course design and development. If instructional objectives are prepared properly, the instructor has a much better chance of being effective. To further illustrate this principle, a partial list of specific objectives used by the author in an introductory agricultural economics course is presented in Table 2. While these instructional objectives contain considerable detail, they relate to a few economic concepts.

Lose Information in an Orderly Manner

This principle of effective teaching comes from a book by Kenneth Boulding (*Economics as a Science*, McGraw-Hill, 1970): "It is a very fundamental principle indeed that knowledge is always gained by the orderly loss of information; that is, by condensing and abstracting and indexing the great buzzing confusion of information that comes from the world around us into a form which we can appreciate and comprehend."

If this concept of "losing information in an orderly manner" is carefully followed in preparing lectures, the instructor has a better chance of being effective. In many ways, Boulding's statement is much like model building in the sciences and social sciences. A model is a simple depiction of a "real world" system. Inherent in a model is simplicity in the sense that all the irrelevant information concerning operation of the system is excluded. Only the important aspects and their relationship are considered. Thus, in lecture preparation, instructors should strive to isolate the relevant information and emphasize its relationships. By doing so, the instructor conveys knowledge and, hopefully, a way of thinking consistent with the discipline.

Consider the economic concept of demand. To teach this concept effectively, an instructor must sift through the bulk of information pertaining to demand. He must decide what information is relevant and present it. When completed, all he should have remaining is a set of points that captures the essence of the topic in question.

TABLE 2 An Illustration of Instructional Objectives

Successful completion of the course requires that the student, in written examinations, be able to do the following:

1. For each of the following economic concepts, write an essay which
 - a. describes a current problem to which the concept is applicable;
 - b. describes the concept including assumptions, operations, and consequences;
 - c. applies the concept to the problem by showing how the concept clarifies, systematizes, corrects and/or solves the problem.

Economic Concepts

- (1) Demand
 - (2) Supply
 - (3) Supply and demand
 - (4) Opportunity cost
2. Given the appropriate data,
 - a. graphically depict a demand curve and explain its meaning,
 - b. explain the difference between demand and quantity demanded,
 - c. explain the difference between a shift in the demand function and movement along the demand function, and
 - d. list three shifters of demand.
 3. Define the concept of price elasticity of demand and
 - a. explain why this concept is used by economists,
 - b. explain what it means,
 - c. explain how it is used by economists, and
 - d. list two major determinants of price elasticity of demand.
 4. Given the appropriate data on inputs, outputs, and prices, compute the level of output that a price taking producer will offer for sale.
 5. Given the appropriate data,
 - a. graphically depict a producer's supply curve and explain its meaning,
 - b. explain the difference between supply and quantity supplied,
 - c. explain the difference between a shift in the supply function and movement along the supply function.
 6. Given the supply and demand functions for a particular commodity,
 - a. explain how equilibrium price and quantity are determined;
 - b. explain and/or predict changes in price and quantity when specific events are hypothesized.

For example, when a beginning student is introduced to the economic concept of demand he is told about:

- growth of population and consumption over the past century
- growth of income
- the concept of utility—cardinal and ordinal
- diminishing marginal rate of substitution
- indifference curves
- substitutes and complements
- budget constraints
- market demand vs. individual demand
- shifts vs. movements

While an instructor may have to discuss many or most of these and other concepts, he should ultimately reduce them to a few general points that the student can comprehend and put in perspective. A partial list exemplifying how this might be done is presented in Table 3. Unless essential information is pulled together in this manner, students may have difficulty comprehending the material.¹

¹Critics of this approach might argue that this is "spoon-feeding" college students. While this may be the case, I would argue that an instructor cannot effectively lecture unless the main points he wishes to make are clear in his mind. And if they are clear, why not share them with the students?

TABLE 3 Results of an Orderly Loss of Information on the Economic Concept of Demand.

1. Law of Demand: People will find substitutes for anything when the cost to them increases.
2. Five major characteristics of demand:
 - a. Demand refers to a relationship between price and quantity.
 - b. Quantity demanded refers to a specific point on the demand function—a particular quantity taken when price is given.
 - c. Demand reflects wants rather than needs.
 - d. Demand is meaningful only when quantity demanded is defined per unit of time.
 - e. Demand is meaningful only if it reflects what people would do rather than what they would like to do.
3. Movements along the demand function:
 - a. Any change that would cause a change in quantity produced would be reflected in a change in price.
 - b. Such a price change causes a change in quantity demanded.
 - c. Since we operate on the same demand function this is known as a movement along the demand function.
4. Shifts in the demand function:
 - a. Demand defined as a relationship between price and quantity is a simplification.
 - b. There are many other factors which affect quantity-demanded other than price.
 - c. These other determinants may be called "non-price determinants."
 - d. In the simple demand function diagram, these non-price determinants are assumed to be constant.
 - e. If these non-price determinants change, this causes a shift in the demand function.
 - f. A shift in the demand function means that there is a change in quantity demand because of a change in a non-price determinant.

Final Remarks

I have suggested three principles as guides to effective teaching. By effective, I mean producing a desired result: the principles described can guide instructors to produce definite and desired results.

In most disciplines, especially in the sciences and social sciences, there are basic principles to guide the thinking of practitioners. Accordingly, there must be principles that guide teaching. However, most doctoral candidates are so immersed in their own discipline that they seldom have time to learn the principles taught by education professors. For those college and university instructors who choose not to or lack the opportunity to follow the advice of their counterparts in education colleges, the principles suggested here are offered for consideration.

MINUTES OF NACTA EXECUTIVE COMMITTEE MEETING October 1, 1976 TWA MEETING ROOM, KANSAS CITY AIRPORT

The meeting was called to order by President Frederick at 9:00 a.m., October 1, 1976. Executive committee members present were Frederick, Thomas, Carpenter, Brown, Everett, Sahlstrom, Burger, Everly, and Rydl. Robert Swope, Chairman of the Publicity committee, was present, representing Penn State University, host of the 1977 NACTA Conference. Keith Wharton, Chairman of the Improvement of Teaching Committee was present.

Minutes of Executive committee and business meetings at the 1976 Annual Conference were accepted as presented.

An agenda for the meeting was presented by President Frederick and was adopted.

A current treasurer's report was given. The Association has \$1,160.82 cash balance at present. All bills are paid and all other finances are in good shape.

Vice President Carpenter presented a report of membership activities. A copy of his report is attached. Included, also, are copies of Bob Shrode's plan of recruitment action in Tennessee and "NACTA Membership at a Glance" and are suggested for use by state coordinators.

Everett reported that Wallace Olson, Deputy Director, National Agricultural Library, Beltsville, MD, was interested in having NACTA Journals and historical records in that library. Schowengerdt reported on his Historian's report. The Secretary-Treasurer reported that the Historian had returned his "expense" check of \$150.00 and asked to be allowed to make the "History of NACTA" represent his contribution to the association. A motion was passed to accept Carl Schowengerdt's contribution and continuing efforts with deep gratitude.

Reports of Regional Directors were presented. Copies of their reports are attached. A motion was passed to authorize each regional director to request up to \$50.00 from NACTA funds to use in holding regional conferences of NACTA State coordinators, the funds to be dispersed after approval of the Executive committee. Sahlstrom requested \$50.00 for the Central Region. A motion was passed to honor his request.

The secretary was requested to work with Regional Directors updating annually the list of "Post-Secondary U.S. Institutions with Programs of Agriculture." A suggestion was made to seek a grant from H.E.W. Office of Education, to further this work.

Instructional materials exchanges at annual NACTA conferences were discussed. A consensus was to have publisher's exhibits and sharing of teaching aids at the next annual conference.

Duties of the Public Relation's committee were discussed.

Plans for the 1977 Annual NACTA Conference were discussed.

A report was presented by Wharton, Chairman of the Improvement of Teaching committee. A discussion of possible functions for this committee followed. Functions proposed by the chairman were endorsed strongly by the Executive committee.

A report of the E.B. Knight Journal Award committee was circulated. A motion was passed to raise the honorarium to \$100 per year, with the monies being obtained from interest generated by the E.B. Knight C.D. funds.

A report of the International Affairs committee was made by President Frederick for Chairman Rawlins.

Reports of the Publications committee and the NACTA Journal Editor were presented by Everly. A motion was passed to continue the \$300 annual honorarium for the editor. A companion motion was passed to provide a \$150 annual honorarium for the Assistant NACTA Journal Editor.

The report of the Teacher Recognition and Evaluation committee is attached. Suggestions to the committee were made by Executive committee members.

A report of the Delta Tau Alpha liaison committee was presented by Rydl.

A motion was passed to entertain invitations from the Central NACTA Region for the 1979 Annual NACTA conference.

A motion was passed for President Frederick to contact the leaders of the "NACTA" Judging Contests to clarify the position of NACTA in regards to the contests.

Thomas was designated to update the NACTA Constitution and By-Laws for presentation and adoption at the 1977 Annual NACTA conference.

The written application from Minnesota for status as a State Affiliate with NACTA was formally received from Ed Frederick. Minnesota, therefore, became the first NACTA State affiliate.

A motion was passed to elevate Canada to separate status, no longer listing them as being in the Eastern Region.

The opportunity for obtaining sustaining NACTA members was noted by the President.