

# Competencies of Agronomy Graduates

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### Abstract

*A list of 39 competency statements was developed in order to survey what 210 graduates with bachelor degrees in agronomy at the University of Missouri-Columbia in the decade of 1971-81 perceived relevant to their performance in present employment situations. Of the 210 graduates, 159 responded. Current employers (152 in number) of those graduates were also surveyed to evaluate the graduates' competencies and the importance of having those competencies. The four competencies ranked among the top five by both graduates and their employers were identify major row crops, recognize causes of the variability in yield for a given crop, identify major weeds in field crops, and recognize the advantages and disadvantages of tillage practices.*

### Introduction

Within recent years, growing interest has arisen concerning problems university graduates might face in making the transition from the academic to the work environment. Persons in industry, education, and those conducting research have focused on measuring the degree of preparation of those entering the work force. Conventional wisdom held that there was some correlation between the nature of the curriculum students pursued in undergraduate education and their qualification for entering the job market as reasonably prepared workers.

Tanner and Tanner (1975) stated that changes in the nature of knowledge, conceptions of the learner, and the new demands of social life have called for significant revisions in curricula in education. Their observations have been built on the premise that one of the major problems of education lies in the isolation of the curriculum from actual experiences. This viewpoint holds that continuing revisions in curricula are necessary for effective education. But the continuing budgetary problems faced in the land-grant institution limit the faculty's ability to bring about changes, even when their need is evident. Further, it is common knowledge that built-in constituencies often support continuation of a curricular item when other factors

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point to the need to discontinue it. Accordingly, a continuous evaluation of the relevancy of the undergraduate curriculum is necessary to keep the curriculum effective and vital.

Few studies have assessed the need for revitalizing existing curricula for undergraduate students in agronomy. Nor has there been significant research directed toward ascertaining how graduates evaluate their education in terms of its relevancy to the quality of work their employees expect of them. Such investigation on the part of new employees and those who hire them would identify assets and liabilities of an academic program. Absence of this pertinent information concerning competence as perceived by both graduates and their employers became the focus of this investigation conducted at the University of Missouri-Columbia (Larke, 1982).

### Methodology

An ex post facto design was used in this study (Ferguson, 1976). The independent variables selected were agronomy graduates and their employers. If a graduate were self-employed, he or she also became the employer. The dependent variables were 39 selected competency statements (see Table 1 for listing) organized from course syllabi and various demographic data from the present undergraduate curriculum and other academic requirements of agronomy majors.

The population included the 210 graduates of the Department of Agronomy at the University of Missouri-Columbia from 1971-81. The response rate of the graduates was 75.6 percent. The response rate of the 152 employers was 61.2 percent.

### Instrument

The competency statements used on the questionnaire were organized from course content syllabi from professors in various areas of the present undergraduate program and from a previous, but different, study by Yayock (1981). The instrument for the graduates consisted of two parts, one of which contained 39 competency statements and the other personal data questions. The graduates were asked to indicate their perceived level of importance of each competency in regard to their current occupation. This section required forced responses on a five-point Likert-type scale (Likert, 1932). The employers' instrument, as developed, consisted of only one section and did not seek the employers' level of competence, but sought to determine the employers' perception of various competencies that agronomy graduates should be able to perform in their current occupations. This instrument also used forced responses on a five-point Likert scale.

### Results and Discussion

The rankings of the agronomy competencies studied within each group are compared in Table 1. The mean scores determined the rankings of the

**Table 1. Importance of Competencies Ranked by 159 Agronomy Graduates, University of Missouri — Columbia, and Their Employers, 1971-81.**

Competency	Rank	
	Graduate	Employer
Identify major row crops	1	2
Interpret soil test results	2	10
Recognize causes of variability in yield for a given crop	3	3
Identify major weeds in field crops	4	5
Recognize the advantages and disadvantages of tillage practices	5	1
Calculate the amount of fertilizer to apply	6	4
Take soil samples using the recommended procedures	7	8
Estimate the relative amount of fertilizer nutrients needed by crop plants	8	9
Identify and prescribe control factors that influence erosion	9	6
Implement proper control mechanism for plant pests	10	12
Identify nutrient deficiencies in field crops	11	14
Measure field size and calculate acreage	12	16
Identify major insects and diseases of crops in your particular area (geographic)	13	7
Recognize the important techniques of estimating production costs	14	11
Calibrate spraying or dusting equipment	15	15
Select the best adapted crop variety	16	13
Explain the importance of soil physical properties on infiltration, percolation, and runoff	17	18
Recommend the proper soil temperature for planting	18	24
Store grains and forages at correct moisture temperature	19	19
Determine the proper harvesting and tillage equipment	20	21
Recommend the optimum row planting widths	21	20
Describe requirements for seed germination	22	22
Adjusting harvesting and tillage equipment	23	28
Describe the importance of maintaining seed purity	24	26
Identify forage legume seeds and plants	25	17
Identify forage grass seeds and plants	26	25
Select the various marketing alternatives	27	23
Explain the importance of inorganic fertilizer	28	30

Select proper grain storage facilities	29	29
Evaluate potential crop productivity by soil profile observation	30	31
Use soil survey map to identify soil types	31	32
Identify plant water stress in determining the need for irrigation	32	34
Recognize acceptable drying temperatures for grain to be used for various purposes	33	27
Inoculate legume seed with correct bacteria	34	33
Relate the comparative nutritional values of several forage crops	35	37
Estimate and judge the quality of forages	36	36
Describe the ways pollination can occur	37	35
Indicate crop plants that are cross or self pollinated	38	39
Plan for the layout of terraces	39	38

competency. Several similarities existed within the rankings of the importance of competencies as perceived by the graduates and the employers. Among the five top ranked competencies, four were listed by both groups as important. Within the five lowest ranked competencies, four of the five listed by both groups were ranked as least important. From an overall view, graduates and employers ranked importance of competencies very similarly. Six of the competency statements were ranked identically by both the employers and employees.

Dunkenberger and Molnar (1980) concluded that college administrators and teachers have reacted to these trends by giving attention to the reorganization of curricula and the introduction of new methods to meet adequately the needs of non-farm and urban students in agriculture.

In comparing the rankings of the competencies, the author found that competencies related to efficient crop production ranked higher than those which dealt with marketing alternatives, storage, and terraces.

**Table 2. Agronomy Graduates' Present Occupational Categories (N = 159)**

Position Title	Percentage
Production Agriculture	20.7
Governmental Agencies	13.8
Education/Extension	13.2
Graduate School	13.2
Agri-Business/Sales Service	13.2
Self-Employed	9.4
Non-Agricultural Profession	5.6
Agricultural Loan Officers	4.4
Positions Unknown	3.1
Military Service	2.5
Unemployed	1.8

Table 2 lists the various categories of the present occupations of the graduates. The ranges reflect that 20.7% of the graduates were employed in a production agriculture occupation which included farmers, ranchers, and nursery operators, and that 1.8% were unemployed at the time of the survey. With respect to rankings of competencies, the table shows a close relationship between the graduates who were employed either in governmental agencies, education/extension, agri-business/sales and service, or were graduate students.

### Conclusion

The results of the survey were quite useful. The objective of the agronomy curriculum should be to provide the best possible graduate for the employer. The results have given the Department of Agronomy a closer look at what competencies are needed by their graduates. The Department has undertaken a few changes in order to provide a more useful curriculum to its graduates. The results also indicate that employers are very much aware of what competencies should be possessed by their employees. It is recommended that other departments undertake such a study to ascertain the effectiveness of their current curriculum. A copy of the survey instrument used is available from the author upon request.

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31st Annual NACTA Conference  
June 16-19, 1985  
North Carolina State University  
Raleigh, North Carolina

## Peer Response: An Effective Way to Incorporate Writing Into the Classroom

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### Introduction

Writing is a skill that we begin learning at an early age. Students formally build upon their writing skills throughout their educational careers, but the completion of freshman English in college usually marks the end of writing training. Learning to communicate through writing, however, should not stop here. Writing is a skill that improves with practice, and we as teachers must seize opportunities to enable students to practice their writing.

When we as teachers write an article for a journal or popular magazine, rarely do we serve as the sole reviewer before sending it to an editor for publication. The article not only may undergo extensive revision by the author, but it is often critiqued by several colleagues before submission. In contrast, we often require students to write papers in our classes, but do little to foster the review process. Why not teach our students methods that have proved widely effective?

Peer response has long been used by professional writers, but only recently has the technique been systematically adapted to the classroom. Research on this technique and its use in education is fairly new (Klaus, 1975). Peer response capitalizes on the surprising ability of students to critique their peers' writing, and at the same time, allows students to learn more about their own writing and exposes them to a wide range of viewpoints. Not only can students learn to write better reports using the technique; they can also learn the subject matter more thoroughly. (Bruffee, 1978; Schiff, 1982; Sommers and McQuade, 1984).

This paper focuses on the peer response technique as a method to incorporate writing into the sciences, its benefits and shortcomings, a sample writing plan and response questions, and results of a survey conducted to evaluate the effectiveness of peer response in agronomy courses at Va Tech.

### The Peer Response Technique

Peer response provides a structured mechanism for interchanging ideas and comments among students in a classroom setting. Students are informed of the peer response process and the procedures on the first day of class. Giving some brief explanations and assurances that their grades are not in danger, but will actually benefit, usually sets students at ease. Students are asked to select a topic for instructor review within the first two weeks of the term; most are able to select a

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