

RELATIONSHIPS BETWEEN PROGRAM EVALUATION STATEMENTS  
AND DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS  
IN A SOUTHERN REGION STUDY OF VOCATIONAL  
AGRICULTURE/AGRIBUSINESS EDUCATION GRADUATES

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With the national trend to reduce governmental spending, accountability has taken on new importance for vocational educators. As commonly used in education, accountability implies the acceptance of responsibility for the effectiveness of programs in delivering appropriate and relevant educational services to students--and thus to the public--within budgetary restrictions. Evaluation of educational programs by the "products", the graduates themselves, has general acceptance in the profession and by the public. The present austerity program in governmental funding accents the need for current information, including program assessment responses, from program completors. This was the focus of the study completed in late 1979 by the Research Committee of the Southern Region (Iverson, *et al.*) and reported in the July issue of this publication. (Iverson, 1980).

*The Study*

Cooperating researchers in the 10 Southern states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, Texas and Virginia administered a two page questionnaire by mail to the 1974 graduates from a 10 percent systematic sample of high school vocational agriculture departments, stratified by district. The instrument was modified from one developed at Mississippi State University (Allen, 1978). The reliability coefficient of the final instrument was .87, using Cronbach's Alpha (N=976).

After a second mailing, a 10 percent random follow-up of nonrespondents was conducted by telephone. Univariate analysis of the telephone and mailed responses indicated no significant differences, so the responses were combined. The 1252 respondents were primarily male, ages 22-23, Caucasian, from rural homes, and earning over \$10,000 annually. More than half (50.9%) were found to be in an agricultural occupation. The non-duplicated listing by employment area is shown in Table 1.

Table 1

NON-DUPLICATED LISTING OF OCCUPATIONS<sup>a</sup>  
 REPORTED BY RESPONDENTS IN THE SOUTHERN REGIONAL STUDY  
 AND USED IN THE REGRESSION MODEL

OCCUPATION	N	%
Full-Time Farming/Ranching	136	11.8
Part-Time Farming/Ranching, Only	82	7.1
Part-Time Farming/Ranching plus Off-Farm Agricultural Occupations	73	6.3
Part-Time Farming/Ranching plus Non-Agricultural Occupations	102	8.9
Off-Farm Agricultural Occupations	167	14.5
Non-Agricultural Occupations, Only	446	38.7
College, Only	73	6.3
Self-Employed, Only (Agricultural and Non-Agricultural)	51	4.4
Unemployed, Only	21	1.8

<sup>a</sup>Respondents in agricultural occupations (including 26 self-employed) was 586 or 50.9%.

The graduates were generally positive and supportive of the quality of vocational agriculture in the South as exemplified by the finding that 92% would enroll again, if they had it to do over! However, it is nearly as important to know *why* respondents rated the programs highly as it is to know *how* they rated them.

### *Purpose*

It was the intent of the researchers to further analyze data from the Southern Region Study (Iverson, *et al*, 1979) to determine if categories of responses could be identified, and if a significant relationship existed between these categories and the demographic variables. If such relationships could be identified, educators would be better able to plan and evaluate vocational agriculture programs in the region.

### *Procedure*

The 26 program evaluation statements were examined by factor analysis, using pairwise deletion for missing data (only variables within cases having missing data were deleted). Categories of evaluation statements (constructs) were identified through factor analysis, using the principal components method, followed by the Kaiser Normalized Varimax Rotation.

To aid in interpretation, Vincent (1971) suggested that factor loadings of .5 or higher should be used as high loadings. If there are no factor loadings of .5 or more, the items with the highest factor loadings should be considered. Adelman and Morris (1967) stated that to reduce the likelihood of random associations, a variable should be omitted when its highest loading in a given rotated factor matrix is below .45. For the purpose of this study, variables loading .50 or higher on a factor were considered in interpreting the meaning of that factor.

The six factors thus identified are listed in Table 2, along with the questionnaire items which factored together. The factor loading is indicated for each item.

The next step in the analysis was to set up a multiple regression model which allowed the researchers to examine the main effects and their interactions. This analysis aided in the explanation of the variance in the dependent variable by indicating the relative contributions of the independent variables to the prediction of the dependent variable (Kerlinger and Pedhazur, 1973). At NCSU, the complete model was entered into the Triangle University Computation Center (TUCC) SAS system which used two

Table 2

## RESULTS OF FACTOR ANALYSIS OF THE EVALUATIVE RESPONSES IN THE SOUTHERN REGIONAL STUDY

ITEM NO. (from questionnaire)	FACTOR/ITEM NAME	FACTOR LOADING
	<b>Factor 1: Vocational Agriculture Program Components and Functions</b>	
IIC3	Vo-Ag is useful to farmers in the community	.55
4	Vo-Ag is useful to agribusiness persons in the community	.62
5A	Vo-Ag should include FFA activities	.70
5B	Vo-Ag should include SOEP (work experience in agriculture)	.79
5C	Vo-Ag should include laboratory instruction (shop, greenhouse, etc.)	.76
5D	Vo-Ag should include instruction for adults	.73
6	Vo-Ag should have teachers year around	.59
	<b>Factor 2: Agricultural Career Guidance</b>	
IIA4	Vo-Ag helped me choose an occupation	.59

5	Vo-Ag helped me to enter and advance in an agricultural occupation	.70
11	Vo-Ag encouraged me to go to college	.57
B1	My Vo-Ag teacher(s) encouraged me to enter an agricultural occupation	.69
2	My Vo-Ag teacher(s) encouraged me to major in agriculture at college	.76
Factor 3: Non-Agricultural Career Guidance		
IIA3	Vo-Ag taught me skills used in a non-agricultural career	.64
6	Vo-Ag helped me to enter and advance in a non-agricultural career	.70
10	Vo-Ag helped me to stay in school	.50
B3	My Vo-Ag teacher provided me with information on non-agricultural careers	.57
Factor 4: Human Relations/Leadership Skills		
IIA7	Vo-Ag helped me learn to get along with other people	.68
8	Vo-Ag helped me develop leadership skills	.72
9	Vo-Ag helped me learn to participate in meetings	.70

(Continued on page 22)

Table 2, Continued

ITEM NO. (from questionnaire)	FACTOR/ITEM NAME	FACTOR LOADING
Factor 5: Values of the Program		
IIA12	Vo-Ag experiences were good for me	.62
13	Vo-Ag experiences were of no benefit	-.76
14	Vo-Ag experiences were such that I would enroll again	.55
Factor 6: Vo-Ag Emphasis on Farming		
IIC1	Vo-Ag should emphasize only farming	.78
3	Vo-Ag is useful to farmers	.30 -- next highest load

hours of computer time and 6318 K of computer core to develop a general linear model for factor one only. At a potential cost of nearly \$400 per factor, it was not practical to continue the procedure in the TUCS system. Since the Auburn University computer had but 4048 K of memory it was necessary to run the analysis in three parts, in order to develop reduced models. This is consistent with Bancroft's (1968) "incompletely specified models" statement. The first two runs consisted of preliminary investigations of main effects and their interactions. The reduced models were composed of all interactions and their main effects which had a probability of .20 either before or after adjustment for other effects (Weiner, 1971). The researchers made the decisions as to the order in which variables would enter into the regression analysis on the basis of precedence in time or cause-effect. This *a priori* ordering approach is appropriate in non-experimental designs (Kerlinger and Pedhazur, 1973).

The demographic variables of educational level, years of enrollment in vocational agriculture, years of membership in FFA, degree held in the FFA, state from which one originated, years of enrollment in adult/young farmer classes, race, sex, income, age, place of residence, and occupation were employed as predictors (independent variables) and the six constructs (factors), identified by factor analysis were used as criterion (dependent) variables. A probability level of .05 was used to determine significance. The following null hypothesis was tested:

- Ho 1. There will be no statistically significant linear regression model for each factor (construct) in the Southern Regional Study.

### *Findings*

1. The data gathering instrument was found to have high reliability (Cronbach's Alpha = .87).
2. Six categories of response statements were identified by factor analysis. These six factors were:

Factor 1 - Vocational Agriculture Program Components and Functions

Factor 2 - Agricultural Career Guidance

Factor 3 - Non-Agricultural Career Guidance

Factor 4 - Human Relations/Leadership Skills

Factor 5 - Values of the Vocational Agriculture Program

Factor 6 - Vocational Agriculture Emphasis on Farming

3. Examination of the overall regression models (Table 3) for the six identified factors and the demographic variables indicated a significant relationship for each derived regression model. Thus, the null hypothesis was rejected at the .05 level of significance. In addition, the summary of the regression equations (Table 3) revealed that the final regression models accounted for from 24 to 49 percent of variance ( $R^2$ ), due partially to reduced models necessary because of limited computer capacity/funding and possibly because of undetermined additional sources of variance.

4. Student evaluation of vocational agriculture program components and functions (Factor 1) was significantly related to state, race, residence (main effects) and the interactions of: state and sex, race, years of vocational agriculture, and years of adult classes; race and residence, educational level, and highest degree; and years of adult classes and highest degree. Neither occupation nor income were significantly related to responses on Factor 1. Data concerning these findings may be seen in Table 4.

5. Responses to questions on Factor 2, Agricultural Career Guidance, were significantly related to just two interactions: state and years of SOEP; and occupation and income. This finding is detailed in Table 5.

6. As shown in Table 6, one main effect and nine interactions were significantly related to responses on Factor 3, Non-Agricultural Career Guidance. Residence was the sole main effect. State and years of vocational agriculture; race and residence, educational level, and years of vocational agriculture; residence and years of SOEP, highest degree and years of adult class; years of vocational agriculture/years of SOEP; and years of FFA/years of SOEP were the significant interactions.

7. Two main effects, residence and educational level, were significantly related to responses on Factor 4, Human Relations/Leadership Skills. The Only significant interaction was years of vocational agriculture/residence. These findings are presented in Table 7.

8. Table 8 reveals that, on Factor 5, Values of the Vocational Agriculture Program, just four main effects were significant--educational level, years of FFA, highest degree, and years of adult classes. Five interactions were significantly related: state and years of FFA and years of adult class; race and years of vocational agriculture; educational level and years of adult class; and years of FFA/years of SOEP.

Table 3

## SUMMARY OF THE OVERALL REGRESSION ANALYSIS FOR FACTORS 1-6

Category	Source	df	SS	MS	F-Value	p	R <sup>2</sup>
Factor 1 Program Components	Model	222	292.856	1.319	1.49	.0001*	.315
	Error (Residual)	719	636.073	.885			
	Total	941	928.929				
Factor 2 Ag'l Career Guidance	Model	299	462.354	1.546	2.05	.0001*	.489
	Error (Residual)	642	483.234	.753			
	Total	941	990.610				
Factor 3 Non-Ag Career Guidance	Model	205	324.554	1.583	1.75	.0001*	.328
	Error (Residual)	736	666.057	.905			
	Total	941	990.610				
Factor 4 Human Relations/ Leadership	Model	347	420.026	1.210	1.38	.0003*	.435
	Error (Residual)	619	544.683	.880			
	Total	966	964.709				
Factor 5 Values of Vo-Ag	Model	136	218.755	1.608	1.87	.0001*	.240
	Error (Residual)	805	691.630	.859			
	Total	941	910.386				
Factor 6 Vo-Ag Emphasis on Farming	Model	234	390.890	1.670	2.04	.0001*	.403
	Error (Residual)	707	580.248	.821			
	Total	941	971.138				

\*Significance  $p \leq .05$

Table 4  
REDUCED LINEAR MODEL FOR FACTOR 1

Source	DF	Type IV SS	F Value	Probability
State	9	23.7606	3.61	.0002
Race	2	6.6892	3.78	.0233
Residence	3	7.8456	2.96	.0313
State/Sex	8	19.4756	2.75	.0054
State/Race	8	24.3915	3.45	.0007
Years VoAg/State	9	20.4247	2.57	.0067
Years Adult Class/ State	9	16.0491	2.02	.0350
Race/Residence	4	10.9280	3.09	.0155
Education Level/Race	2	5.5883	3.16	.0411
Race/Highest Degree	7	14.0555	2.27	.0272
Years FFA/ Years Adult Class	1	3.6897	4.17	.0415
Years SOEP/ Highest Degree	4	11.2587	3.18	.0132
Years Adult Class/ Highest Degree	4	12.0238	3.40	.0091

Table 5  
REDUCED LINEAR MODEL FOR FACTOR 2

Source	DF	Type IV SS	F Value	Probability
Years SOEP/State	9	13.8499	2.04	.0324
Income/Occupation	12	17.0808	1.89	.0325

Table 6

## REDUCED LINEAR MODEL FOR FACTOR 3

Source	DF	Type IV SS	F Value	Probability
Residence	3	9.9561	3.67	.0122
Years VoAg/State	9	17.2217	2.11	.0262
Race/Residence	4	14.9832	4.14	.0025
Education Level/Race	2	6.9927	3.86	.0214
Years VoAg/Race	2	8.4913	4.69	.0094
Years SOEP/Residence	3	8.0333	2.96	.0312
Highest Degree/ Residence	11	22.1369	2.22	.0120
Years Adult Class/ Residence	3	10.5137	3.87	.0093
Years VoAg/Years SOEP	1	9.5959	10.60	.0012
Years FFA/Years SOEP	1	5.1094	5.65	.0178

Table 7

## REDUCED LINEAR MODEL FOR FACTOR 4

Source	DF	Type IV SS	F Value	Probability
Residence	3	7.7798	2.95	.0318
Education Level	1	6.6011	7.50	.0063
Years VoAg/Residence	3	8.9244	3.38	.0179

Table 8

## REDUCED LINEAR MODEL FOR FACTOR 5

Source	DF	Type IV SS	F Value	Probability
Education Level	1	3.6128	4.21	.0406
Years FFA	1	4.1124	4.79	.0290
Highest Degree	4	8.3948	2.44	.0453
Years Adult Class	1	3.4956	4.07	.0440
Years FFA/State	9	17.1202	2.21	.0194
Years Adult Class/ State	9	15.6285	2.02	.0343
Years VoAg/Race	2	7.6183	4.43	.0122
Education Level/ Years Adult Class	1	3.9179	4.56	.0330
Years FFA/Years SOEP	1	4.7839	5.57	.0185

Table 9

## REDUCED LINEAR MODEL FOR FACTOR 6

Source	DF	Type IV SS	F Value	Probability
State	9	14.4722	1.96	.0412
Race	3	7.0203	2.85	.0360
Income	1	5.6534	6.89	.0089
State/Race	9	14.0553	1.90	.0484
Years FFA/Income	1	4.5436	5.54	.0189

9. State, race and income were significantly related to responses on Factor 6, Vocational Agriculture Emphasis on Farming. State/race and years of FFA/income were the two significant interactions. Data Relating to this finding are portrayed in Table 9.

### *Conclusions and Implications*

This expanded analysis has provided additional evidence of the impact of the vocational agriculture program on students in the Southern Region. The high reliability (.87) of the instrument makes it valuable for use in other locales. Widespread use of the instrument at the local, state and regional levels would aid in the development of a national data bank for agricultural education.

Educational planners at the local, state, regional and national levels can, by using regression models, predict evaluative responses on the six factors. Thus, if program managers have prior knowledge of certain demographic characteristics of potential students, they could develop and/or modify programs so as to maximize satisfaction with and student benefits from the vocational agriculture program.

Using data from graduates is a valuable procedure in educational program evaluations. Evaluators can expect to get consistent results by using the Southern Region instrument with program completors.

Variation among states affects respondents' evaluations more than any other variable; race, educational level, years of vocational agriculture, FFA and SOEP also strongly affect responses; residence, degrees held and years of adult classes are moderate in effects, while income, occupation and sex of the respondents have little influence on responses.

The researchers recommend further investigation into the above relationships using data from other states in order to test the results found in this study.

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