

Relationships Between Student Performance and
Organizational and Program Variables
In Agricultural Education

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The gap between identifying competencies required for jobs, and getting vocational agricultural teachers to teach those competencies is large. Without adequate evidence teachers rarely accept a request for curricular revision. For this reason, student performances and the relationship between performances and teacher content emphasis were assessed in this study. The organizational variables examined were: single versus multiteacher staffing, and student participation in either specialized classes of agricultural science or mechanics, or in a class that combined these subjects. Student participation in occupational experiences, Future Farmers of America activities, and whether a student had already decided on a career, were tested for a possible relationship to student performance. Finally, evaluations of class content emphasis were compared to industry importance ratings to assess the level of agreement.

Performance was measured by a written test. Test questions were selected from two validated tests on the basis of employer surveys regarding essential skills and knowledge in Utah. The Utah studies by Bahen (1980), Bigo (1979), and Summers (1980) were used to derive six major content areas. Ten representative multiple-choice questions were selected for each content area from validated tests developed in Ohio for agribusiness (Warmbrod, 1974) and in Arizona for production agriculture (McCormick, 1976). Selections from the two tests were combined to make 120 questions. Measuring student performance only by a written test represents a weakness in this study.

Senior vocational agricultural students were tested. Their performances on the test questions were correlated with the variables previously described.

Sampling

Twenty-five of the 46 departments of vocational agriculture in Utah were randomly selected for the study. The teachers in these departments were asked by telephone to participate. Twenty-three of the 25 agreed and 21 (91%) provided useable data. The 239 useable student returns constituted a return rate of 85%.

Hypothesis Statements and Findings

The following hypotheses were tested:

Hypothesis 1. The competencies emphasized by vocational agricultural teachers and by leaders in Utah's agricultural industry are positively related.

Findings:

Kendall's Tau indicated a small degree of correlation (.20) between the agribusiness industrialists' perceptions of essential skills and teacher emphasis placed on those skill areas. No correlation (.00) was found between teachers' emphasis and farmers' perceptions of skills and knowledge essential for farm employment.

Therefore, at the .05 level of significance, the hypothesis is not retained.

Hypothesis 2. Vocational agricultural students' performances on the criterion-referenced test are not related to teacher emphasis.

Findings:

Kendall's Tau identified a strong positive correlation (.87) significant at $p < .05$ between students' agribusiness test scores and degree of teacher emphasis. Relative to farm production content emphasis, student performance was negatively correlated (-.80) with teacher emphasis. Hypothesis two was therefore rejected for the agribusiness and production portions of the test.

Student performance followed teacher emphasis in the case of agribusiness instructional emphasis. In contrast, student scores decreased with higher teacher emphasis in the production portion of the test. For example, students scored highest in the crop production cluster, which received the least teacher emphasis. Students scored lowest in livestock selection and carcass evaluation, while their teachers said that they emphasized this area of instruction more than any other area in production agriculture. Perhaps this lack of positive correlation can be partially explained by the observation that Utah students participate more in supervised farming programs than in agribusiness experiences.

Students scored highest in human relations and lowest in marketing agricultural products on the agribusiness portion of the test. The hypothesis of no relationship was not retained. There was a relationship that was positive for agribusiness and negative for production agriculture.

Hypothesis 3. There is no difference in scores on a measure of agricultural content knowledge between students with or without career goals.

Findings:

No significant t-values in performances were found between students with or without career goals on either agribusiness or production agriculture tests at the $p < .05$ level of significance. The null hypothesis was retained.

Hypothesis 4. There is no difference between the scores of students who have or have not had supervised occupational experience.

Findings:

Scores were computed at a t-value of 2.29 for student performance on the agribusiness portion of the test. A t-value of 10.13 was computed for the production agriculture segment of the test. At the $p < .05$ level of significance these t-values represent a significant difference between the groups in favor of students with supervised occupational experience programs. The null hypothesis was not retained.

Students with supervised farming experience had an average score of 59.4% while students without such experience averaged 54.7% on the agribusiness test. Students with supervised farming experience averaged 56.2% on the production agriculture portion of the test while those without such experience averaged only 48.4%. In every competency cluster, on both portions of the test, students with supervised occupational experiences scored higher than students without such experience. The greatest differences within the agribusiness portion of the test were in human relations (9.5%) and procedures and records (6.1%). The greatest differences between students with and without supervised occupational experience for the production portion of the test were in livestock health and nutrition (12.2%) and livestock reproduction (10.6%). Supervised farming experience was not associated with differences in scores in the other content areas of production agriculture.

Hypothesis 5. There is no difference between the scores of students having had a combination of agricultural science and agricultural mechanics and those having had only agricultural mechanics or agribusiness classes.

Findings:

Students who had taken agricultural mechanics classes only, scored significantly lower ($\bar{x}=4.75$) on the agribusiness portion of the test than did students who had taken a combination of agricultural mechanics and agricultural science classes ($\bar{x}=5.8$, t-value of 4.39). Students who had taken only agricultural science classes scored higher on the agribusiness test ($\bar{x}=6.08$) than did students attending a combination of the classes, but the difference was not significant at $p < .05$ (t-value of 1.49). Therefore, the null hypothesis was rejected in the case of agricultural mechanics classes alone, but it was not rejected for only agricultural science classes versus a combination.

Agribusiness skills identified as essential by agribusiness employers, are apparently not being adequately taught in Utah's vocational agricultural mechanics classes. The agricultural science program appears to be more effective in this record.

Production agriculture skills are generally not taught in Utah's agricultural mechanics classes. Therefore, no production agriculture test scores were computed for students who took only mechanics classes.

Hypothesis 6. There is no difference between the scores of students from single teacher vocational agriculture departments and students from multiple teacher departments.
Findings:

In comparing agribusiness test scores, a significant t-value of 2.29 was obtained at the $p < .05$ level, consequently, the null hypothesis was rejected. A t-value of 15.65 significant at the $p < .05$ level was obtained for the production agriculture section of the test, and the null hypothesis was rejected. Significant differences in scores favored students in single teacher departments for agribusiness and production agriculture. The greatest differences in student scores for production agriculture were in crop production (13%) and chemicals and fertilizers (12.9%). Students from single teacher departments exceeded the performance of students from multiple teacher departments in all six agribusiness competency clusters.

Hypothesis 7. There is no difference between the scores of members and non-members of the Future Farmers of America.
Findings:

Active members of the Future Farmers of America scored significantly higher (\bar{x} of 6.20) than non-members (\bar{x} of 5.09) with a t of 2.43 for the agribusiness portion of the test. Results were similar for the production agriculture portion of the test in which FFA members scored significantly higher (\bar{x} =6.03) than non-members (\bar{x} =4.71) with a t of 14.83. Because there were significant differences between the scores of FFA members and non-members in both the agribusiness and production agriculture portions of the test, the null hypothesis was not retained. There were significant differences in student performance, favoring those with FFA membership.

Summary and Conclusions

The relationship (.20) between what agribusinessmen and vocational agricultural teachers believe should be taught to vocational agricultural students was positive but not significant. Farmers' perceptions of the importance of certain production content items had .00 correlation with the teachers' perceptions. This lack of correlation between the opinions of teachers and agricultural employers is deserving of attention. Farm background and formal instruction does not appear to insure that teachers know what farmers perceive to be important skills and knowledge.

The strong relationship between teacher emphasis and student achievement (.87) for agribusiness content, and a negative correlation (-.80) for production agriculture is also important. An analysis of the data indicates that Utah teachers are not teaching on up-to-date curriculum focused on the skills and knowledge that the industry believes to be most important, and that their teaching is not effective as measured by the test used in this study. The fact that supervised occupational experience was significantly related to student scores indicates it is possible that this experience prepared students to score well even in areas not emphasized by their teachers.

Students in single teacher departments scored significantly better than those in multiple teacher departments. Because the majority of single teacher departments are found in rural settings, it would seem that urban versus rural backgrounds could logically explain much of this difference because students in rural settings may have more opportunity for supervised farming programs than urban students.

The movement in Utah away from a program organization to semester offerings has not been without cost. Students who take only agricultural mechanics learn significantly less agribusiness content. Students whose semester schedule allows them to take only agricultural science are also at a disadvantage. Preparing for agricultural jobs requires agricultural science and agricultural mechanics skills and knowledges. Teachers can specialize without apparent harm to students, but students should not be allowed to do so.

The strong positive relationship between supervised occupational experience and participation in the Future Farmers of America with student performance emphasizes the importance of these programs to the success of vocational agriculture students.

Implications

An analysis of the findings of this study has implications for those responsible for program quality: the teacher, administrator, state supervisor, and teacher educator. There is a need to get back to the basics of vocational agriculture. The following suggestions are designed to emphasize the importance of certain program components:

1. Provide state-wide curriculum based upon industry competency studies. Teachers are not at present emphasizing the content that employers believe to be most important.
2. Organize curriculum on a programmatic basis. The Ag. I, II, III, and IV curricular pattern provided (for both agribusiness and agricultural mechanics) should provide instruction typical of the jobs available. The 3 or 4 year curricular program provided a continuous membership in the Future Farmers of America organization that is missing where semester offerings have become common.
3. Insist on supervised occupational experience programs for all vocational agriculture students as a program standard.
4. Focus pre-service and in-service educational efforts on improving the quality and number of industry contacts by vocational agricultural teachers. Teachers need to know what their local employers have to say about employee needs for skills and knowledge. A personal contact is as important as printed curricular material. Both are necessary ingredients of productive program changes and improvement.

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