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The Economic Impact of Oregon Agricultural Science and Technology Programs

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Educational programs have been evaluated in many ways in the past. Evaluation has been defined as the "systematic process of judging worth, desirability, effectiveness, or adequacy of something according to definite criteria and purposes (Ammons, 1973). Evaluation has been mandated by several Vocational Education Acts of the recent past (Wentling, 1980). The Perkins Act required that states produce annual reports on their progress toward stated objectives and use the report as a diagnostic tool for planning and improving programs (Hayes, 1985). Educators have studied evaluation from numerous perspectives but have rarely tried to determine an economic value or impact for high school level educational programs.

The Western Region of the American Association of Teacher Educators in Agriculture (AATEA, later to become the American Association for Agricultural Education) decided to use impact studies as their regional research thrust in 1985. Impact studies were considered to be a valuable part of the overall data which should be used in evaluating agricultural programs at the secondary level. However, very little program impact data existed for high school agricultural programs. Between 1985 and 1990, a series of impact studies were done in various states of the Western Region. A summary report of impact studies which were completed was presented by Shelhamer at the Western Region Research Conference of the American Association for Agricultural Education (AAAE) in Seattle in April 1991 (Shelhamer, 1991). The impact studies which were completed focused on leadership development and educational advancement of agricultural program graduates. No study was completed on agricultural program economic impact even though economic impact was one of the study areas identified in 1985 for research.

In a keynote presentation which started the impact study concept, Borg (1985) stated that an impact study should measure any area of potential "impact" that a program or person may have. Impact, therefore, was not defined by Borg as direct cause and effect but rather as influenced by. An agricultural economist who is an expert on agricultural impact studies stated that the only true "cause and effect" data in the economic impact study proposed by the Western Region study group was the teacher's salary, the subsequent distribution of that salary, and any new money brought into the school system because of the agricultural program's existence. He further stated that because of the nature of the Agricultural Science and Technology (AST) program requirement for Supervised Agricultural Experience (SAE) programs by students such a study would be interesting and could be labeled an "Impact Study" under the definition provided by Borg (Schmisseur, 1986).

There appear to be three reasons an economic impact study was not conducted when other types of impact studies were conducted in the Western Region of AAAE. They include the following:

The completion of the instrument by the AST teachers required extensive work.

During times when there were relatively few threats to the security of AST programs, considerable additional work was not viewed as something for which a teacher would volunteer.

The study was perceived as a new type of study. It was not a typical economic impact (cause and effect) study. It was an economic impact study based on a definition provided by Borg's broad work with numerous impact studies (Borg, 1985).

What precipitated the additional interest in this type of study was the passage of a tax limitation bill in Oregon which could have the effect of reducing the availability of elective programs at the secondary level. It was deemed important to show that Agricultural Science and Technology programs not only had educational value and could be evaluated using measurable educational accountability standards for Essential Learning Skills (Applegarth, 1990), but also were very unique programs in that they provided a monetary return to the community in which they were hosted. With statewide talk of elective program cuts, it was felt that Agricultural Science and Technology teachers would have renewed interest in a research effort which had the potential of providing a unique program justification.

Procedure

The theoretical framework for this study was a model of economic impact which sought data in three categories. The three categories with their prevailing definitions are listed below.

Direct Impact Data -- Teachers' salaries as well as state, federal, and donated grant monies coming to the local school and community that would not have come to the school had the agricultural program not existed.

Programmatic Impact Data -- Money earned and spent by students because the Agricultural Science and Technology program required students to work in agriculture or have agricultural production projects which generate money and other student activities, sales, etc. which generate money.

Indirect Impact Data -- College attendance, with the economic impact being the subsequent additional salaries earned by students who attended college as compared to those who do not attend college. Reduced social costs because AST program graduates are not on welfare, incarcerated, or have a higher than national average unemployment rates.

No attempt was made to show a monetary value for data in category three--Indirect Impact Data. Instead, it was reported as the percentage attending college, on welfare, incarcerated, or unemployed, etc. This data could then be compared with data from other sources to determine the agricultural program's impact on the students who participated in the program. This study claims no cause and effect relationship in this category, but rather that an influence (impact) was made on the student by the program which helped the student make decisions which benefited both the student and society.

For example, in studies of Oregon vocational program completers, a three-year follow-up survey showed that 37 percent of the graduates studied, attended college

(Rathbun, 11980). It was felt by Oregon AST teachers that a relatively high percentage of their graduates attended college. With the amount of national media attention given to the impending shortage of college trained agriculturalists (Coulter, Goecker, and Stanton, (1990) and the improved salary earnings potential of college graduates as compared to high school graduates, it was deemed important to include an accurate count of AST program graduates who attended college in this study.

Instrument Design

The instrument was designed and approved by the Western Region AATEA Impact Study Committee (Wester Regional AATEA Conference, 1986). The instrument was field tested by a panel of five Oregon AST teachers not participating in the study to determine instrument reliability. Two teacher educators in agriculture and two agricultural economists were asked to review the instrument for content validity. The instrument was put in final form and provided to study participants.

Population and Sample

The population to be investigated was all Agricultural Science and Technology programs in Oregon. A random sample of 20 programs was drawn for participation in the study. The instrument and instructions were mailed to the participants. Special attention was given in the cover letter to the need for accuracy of the data as opposed to "best guesses." Five instruments were returned in the three-week time period provided. Calls were made to the remaining participants. Because of spring banquets, state level contests in FFA, and numerous other school activities, additional time was granted to allow participants to complete the instrument after the end of the 1991 school year. After a second follow-up call as a reminder of the new due date for returning the survey instrument, a total of 17 instruments were returned for a final response rate of 85 percent. The three remaining nonrespondents were called but refused to complete the instrument because of time commitments.

Findings

Analysis of data consisted of range, percentage, mean and median values. Medians were extensively used because the data were ordinal and because of the small number (N) in the sample.

Direct Impact Data

The median Agricultural Science and Technology teacher's salary was $31,500. Using an Oregon state model for Input-Output data an economic multiplier for household income of 2.63 was applied to the gross salary. The contribution of teacher salary to the community, applying this economic factor, was $82,845.

Money that was received by the school district because the Agricultural Science and Technology program existed had a median value of $6200.. The Oregon model for Input-Output data provides an economic multiplier of 2.97 for local governmental agencies. Applying this factor, the contribution of new district money to the community was $18,414.

Programmatic Impact Data

It was more difficult to be precise about data in this category. It must be understood that in some instances data may over-estimate a contribution while in others, data are very conservative. There are numerous ways to handle this data and the various models might use either gross or net incomes. This paper utilized an Oregon model which uses gross income data and appeared to be the most easily understood.

Activities which generate income for an Agricultural Science and Technology program or an FFA chapter were conducted by the majority of the programs responding. The types of activities conducted included: plant sales, dances, floriculture contests, conferences, animal sales, equipment sales, raffles, etc. Some teachers reported major responsibilities in county fairs but no program was a sponsor of such a large activity. It should be pointed out that while no data were available on county or state fair activities for FFA members, it is recognized that many individuals would not attend such functions if it were not for the participation of the FFA in those activities. A conservative estimate of this category's economic contribution follows.

The mean amount of money spent at activities for those programs where activities were sponsored was $40. The median number of people attending activities at Agricultural Science and Technology or FFA sponsored events was 400. The state model for Input-Output data has an agricultural economic multiplier of 2.87. With $40 spent per person and 400 persons involved per activity, times an economic multiplier of 2.87, the median value of program activities to a community where the Agricultural Science and Technology program sponsored such activities, was $45,920. In order to use the economic multiplier, the money under discussion must be new money to a community. Many of the activities would meet this criteria to some degree, others would not. The amount of money identified for this area's contribution must then be considered a liberal estimate.

A summary of student participation in the Supervised Agricultural Experience (SAE) portion of the AST program is presented in Table 1. The table includes the median class

Table 1. Summary of Agricultural Science and Technology Student SAE Impact on Local Communities

Class	1[a]	2	3	4	5	6
Freshman	17	70	325	2.87	11,000	
Sophomore	15	85	610	2.87	22,321	
Junior	11	95	928	2.87	27,832	
Senior	10	95	1342	2.87	36,590	
						97,843

[a]1=Number of students per class, 2=Percent of students with SAE, 3=Money earned per student from SAE, 4=Oregon agricultural multiplier, 5=Value of SAE by class to community, 6=Value of SAE program to community.

size, percent of students participating in the SAE portion of the agricultural program, median amount of money spent by class on SAE programs, the Oregon agricultural multiplier for Input-Output data, the value of each class's SAE program and a total SAE program value from the AST program to the community.

The values in Table 1 include gross income money as reported in the student SAE record books. Not all money came to the students from outside of the community. It would be difficult to estimate that percentage at this point. The value identified as value to the community would be considered a high value in that all money reported did not come from outside sources. This added value to economic impact for the community was not estimated.

Indirect Impact Data

The indirect economic impact of Agricultural Science and Technology programs was measured by follow-up studies of students who graduated one year previous to the study instrument's distribution. Two kinds of data were sought--current activity of graduates and salary of graduates.

Table 2 identifies the current activities for 1990 graduates of Agricultural Science and Technology programs in this study. The mean number of graduates for AST programs in the study was nine.

Table 2. Activities of 1990 Graduates of Agricultural Science and Technology Programs

Activity	Number	Percent
Attend four-year college, agriculture	18	12
Attend four-year college, nonagriculture	20	13
Attend two-year college, agriculture	17	11
Attend two-year college, nonagriculture	23	15
Employed full-time, agriculture	20	13
Employed full-time, nonagriculture	6	4
Self-employed, agriculture	0	0
Self-employed, nonagriculture	0	0
Employed part-time, agriculture	8	5
Employed part-time, nonagriculture	5	3
Not employed and seeking	3	2
Not employed and not seeking	0	0
Military	11	7
Incarcerated	0	0
Welfare-unable to work	0	0
Welfare-able to work	0	0
Deceased	0	0
Unaccounted graduates	22	15
Total	153	100

Graduates of Agricultural Science and Technology programs were attending college in either two-year of four-year programs at a rate of 51 percent (both Ag and Nonag majors). Twenty five percent were employed (full-time or part-time, Ag and Nonag). Seven percent were in the military, none were incarcerated or on welfare, and only two percent were unemployed. According to the Oregon Unemployment Board, the August 1991 national unemployment rate for individuals ranging from 20 to 24 years of age was 8.4 percent (Oregon Unemployment Board, December 1991).

Salary data for 1990 Agricultural Science and Technology program graduates are summarized in Table 3.

Table 3. Summary of Salary Data for 1990 Agricultural Science and Technology Program Graduates

Employment Category	Salary range	Salary median
Attending four-year college, part-time employment	3-12000	5630
Attending two-year college, part-time employment	3-20000	4547
Employed full-time, agriculture	9-17500	15500
Employed full-time, nonagriculture	9-20000	16000
Employed part-time, agriculture	3.5-9000	7900
Employed part-time, nonagriculture	2-8000	5000

Salaries in agricultural and nonagricultural employment compared favorably for AST graduates. Interestingly, those employed part-time in agriculture were making considerable more than those working part-time in nonagricultural occupations. Those attending four-year colleges and working part-time were making more than those attending two-year colleges and working part-time.

The critical data not available from this study is whether there would be a salary difference five years from now for college graduates and noncollege participants of this study.

Summary, Conclusions and Recommendations

Considering the teacher's income, federal and state money brought into the community by the Agricultural Science and Technology program and the Oregon model economic impact multipliers which apply, a direct economic impact of $101,253 was realized by the communities hosting the Agricultural Science and Technology programs of this study.

Programmatic economic impact combined sponsored or co-sponsored community activities with student SAE program spending. The programmatic economic impact for the schools sponsoring activities in this study was $45,920. The SAE program economic impact was $97,843. The total programmatic economic impact for schools studied was $143,763.

Adding direct and programmatic economic impact data provides and indication of the economic value of the Agricultural Science and Technology program to its host community. The total figure for these two study areas was $245,022.

Indirect measures of economic impact included having 51 percent of the graduates of Agricultural Science and Technology programs attend college as compared to 37 percent for other vocational program completers. No graduates of Agricultural Science and Technology programs were on welfare or incarcerated, and only two percent were unemployed as compared to a national unemployment rate of 8.4 percent for the same age group.

It can be concluded that an Agricultural Science and Technology program had a substantial direct and programmatic economic impact on the community in which it is located. It can further be concluded that students who participate in these programs at the

schools studied had a much higher tendency to attend college as compared to the state average for vocational program completers thus having a positive indirect economic impact. With no AST program graduates on welfare or incarcerated and only two percent unemployed, additional positive indirect economic impact benefit can be observed for AST programs. A final conclusion would be that Agricultural Science and Technology programs return far more to a community than the educational time which is purchased. It becomes incumbent upon a community and its corresponding school district to consider more than just the cost of the Agricultural Science and Technology program when determining which are the most appropriate cost reduction measures to take when resources become limited for a school. This research has shown an actual monetary return to the community in which an Agricultural Science and Technology program is located. This monetary return is a return over and above the educational return received by the student, school and community.

It is recommended that every Agricultural Science and Technology program gather the type of data in this study. In many instances the data are at the fingertips of the Agricultural Science and Technology teacher. It merely needs to be transformed into a form that school administrators and interested community leaders can read and understand.

The follow-up portion of the study is critical information to be supplied to counselors, administrators, students, parents and community leaders. Follow-up data should be compiled on a one- and five-year basis.

A final recommendation would be to transform the data identified in the "Direct" and "Programmatic" categories of this study into a Cost/Benefit Analysis by determining the costs associated with the AST program. The major costs to be considered would be teacher salary before the multiplier, transportation specific to the program and dedicated facilities maintenance costs.

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