

Teacher Perceptions of Agriscience and Natural Resources Curriculum

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The past decade has resulted in many calls for educational reform in the United States. Parents, teachers, business leaders, and educational professionals have all called for new and innovative approaches to teaching English, mathematics, economics and science. Agricultural education in the United States is responding to this need by placing more emphasis on teaching scientific principles using agricultural and natural resources concepts. The National Research Council (1988) in its report, "Understanding Agriculture: New Directions for Education" stated, "Teaching science through agriculture would incorporate more agriculture into curricula, while more effectively teaching science." Michigan agricultural education programs addressed this issue by replacing the production agriculture curriculum with a new agriscience and natural resources curriculum.

Moss (1984) studied agricultural education programs in North Carolina and found, "twenty-four (24) of the 60 competencies in the Introduction to Agriculture/Natural Resources course were identified as being similar to competencies taught in high school courses such as Biology, Earth Science, and Physical Science." In Michigan, the Agriscience and Natural Resources (ANR) Curriculum was cross referenced with the State Science Objectives as determined by the Michigan Department of Education (State Administrative Board, 1990). All objectives of the curriculum matched objectives of the State Science Objectives.

Teacher attitudes about the new agriscience and natural resources curriculum are important to the success of the implementation process. Pepple (1982) studied factors associated with teacher use and effectiveness of the Illinois Rural Core Curriculum in Agriculture. The study found that the core curriculum influenced teachers to use a greater variety of classroom instructional methods (Pepple, 1982). Norris and Briers (1989) reported:

Teachers' perceptions toward the change process (need for the change, manner in which the change was managed, amount of teacher input into the change, etc.) was the single best indicator of teachers' free choices and actual decisions concerning adoption of the change.

Peasley and Henderson (1991) conducted a descriptive study of teacher use, attitudes, and knowledge of the agriscience curriculum in Ohio. Peasley and Henderson found 25 percent of the teachers were teaching more than 75 percent of the content objectives of the Ohio agriscience curriculum. This result led the researchers to state, "High school teachers of production agriculture in Ohio are teaching a moderate level of the agriscience content." The researchers concluded that "Ohio high school teachers of production agriculture could be described as having a positive attitude toward the notion of an agriscience core curriculum and the term agriscience (Peasley and Henderson, 1991)."

Purpose and Objectives

This survey was conducted to determine use and perceptions of the Michigan Agriscience and Natural Resources Curriculum by Michigan agriscience and natural resources (ANR) teachers. During 1991-92 Michigan agricultural education programs were restructuring to become agriscience and natural resources programs and adopting the new Michigan Agriscience and Natural Resources Curriculum. Specific objectives of the study were to determine:

The level of adoption of the Michigan ANR Curriculum by Michigan ANR teachers.

Michigan agriscience and natural resources teachers' attitudes towards the concept of agriscience.

Michigan agriscience and natural resources teachers' attitudes towards teaching the Michigan Agriscience and Natural Resources Curriculum.

Determine agriscience and natural resources educators' knowledge about the Michigan Agriscience and Natural Resources Curriculum.

Procedures

The research design for this study was a one-shot case study design. The survey was a census of all 140 Michigan agriscience and natural resources teachers during the 1991-92 school year. The survey instrument used in the research was developed by the researchers and included four parts. The survey instrument was mailed to all 140 Michigan agriscience and natural resources teachers.

Part I contained 70 items covering the Michigan Agriscience and Natural Resources Curriculum objectives. Teachers responded "yes" if they taught the objective, and "no" if they did not teach the objective in their agriscience and natural resources courses during the 1991-92 school year. The 70 items that were listed in the questionnaire were the objectives from Units 100, 200, and 300 of the Michigan ANR curriculum. These objectives were selected because they were cross-referenced with the State Science Objectives for Secondary Students as specified by the Michigan Department of Education.

Part II contained 13 questions pertaining to teachers' attitudes about the concept of "agriscience." The 13 questions used a seven-level semantic differential scale ranging from 1 (strong negative attitude) to 7 (strong positive attitude). Part III contained 11 Likert scale questions related to teachers' perceptions about the Michigan Agriscience and Natural Resources Curriculum. A five-point Likert scale with rankings from 1 (strongly disagree) to 5 (strongly agree) was used. Part IV contained 10 true/false questions to determine teachers' knowledge about the curriculum. Teachers were instructed to read a statement about the Michigan ANR Curriculum and mark the statement true or false. Teachers received one point for each correct response.

A panel of experts reviewed the survey for content and face validity. The members of the panel included faculty from the Department of Agricultural Extension Education and Michigan agriscience and natural resources teachers. Reliability was established by a pilot test with a select group of Michigan ANR teachers. Cronbach's alpha reliability coefficients ranged from .72 to .95.

Frame error was controlled by verifying the list with teacher educators in the Department of Agricultural and Extension Education at Michigan State University and the state supervisor for agricultural education at the Michigan Department of Education. The Total Design Method (TDM) (Dillman, 1978) was utilized for the study. A mail questionnaire was used to collect the data. The initial mailing was followed one week later by a postcard reminder. Second and third mailings, including replacement questionnaires, were made to all nonrespondents. A total of 122 teachers responded to the survey for a final response rate of 87 percent. Respondents were grouped as early or late respondents. The two groups were compared on their responses to the Likert scale questions using t-tests. No differences were found between the responses of early and late respondents so the results are generalizable to the target population (Miller & Smith, 1983).

Analysis of Data

Data were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+). Frequencies, means, standard deviations, semi-partial regression, and multiple regression analyses were used to summarize and analyze the data. Alpha was set *a priori* at .05.

Results

Percentages were calculated separately for Michigan agriscience and natural resources educators (70 objectives) who taught Units 100, 200, and 300, and horticulture teachers (27 objectives) who taught Units 100 and 200 only. Table 1 lists the mean percentage of objectives taught, the standard deviation, minimum, maximum and number of respondents.

Table 1. Percentage of Michigan Agriscience and Natural Resources Curriculum Objectives Taught by Agriculture Teachers

Group	Mean	SD	Min.	Max.
All respondents	82%	17%	0	100%
ANR teachers (n=80) (not including horticulture)	83%	18%	0	100%
ANR teachers (n=28) (horticulture only)	79%	16%	44%	100%

The percentage of objectives taught was also placed into quartiles for reporting purposes. The largest percentage of all three groups taught between 75 and 100 percent of the curriculum objectives. Table 2 presents the number and percentage of respondents in each quartile.

Table 2. Michigan Agriscience and Natural Resources Curriculum Objectives Taught in Quartiles

Percent	ANR (except hort.)		ANR (hort. only)		All teachers	
	N	%	N	%	N	%
1-25	1	1.3	0	0.0	1	0.9
26-50	3	3.8	3	10.7	6	5.6
51-75	13	16.3	8	28.6	21	19.4
76-100	63	78.8	17	60.7	80	74.1
Totals	80	100.0	28	100.0	108	100.0

Semi-partial regression analysis of the percentage of science objectives taught on the independent variables indicated that both the demographic variables of the teachers and ANR program variables were significant. Table 3 presents the results of the semi-partial regression.

Table 3. Semi-Partial Regression Coefficients for Independent Variable Sets with Percentage of Science Objectives Taught by Teachers.

Variable set	sR ²	F
Demographic variables	.56	5.27*
Independent variables	.12	4.37*
Total	.68	4.37*

*p<.05

Multiple regression analysis revealed that the independent variables schools located in towns or rural areas, and the hours of in-service workshops attended contributed significantly to predicting the percentage of objectives taught. Table 4 displays the results of the multiple regression.

Part II of the questionnaire consisted of thirteen pairs of adjectives using a semantic differentiation scale. Michigan agriscience and natural resources teachers had a slightly positive attitude towards the concept of "agriscience." The mean score for all teachers on the semantic differential scale was 5.70 with a standard deviation of .97.

Part III of the questionnaire measured teachers' perceptions about the curriculum using 11 Likert scale questions. The mean for all respondents was 4.18, with a standard deviation of .48. Respondents strongly agreed that ANR courses should receive high school science credit. Respondents disagreed that traditional production agriculture programs were better than agriscience and natural resources programs. Results of the Likert scale questions are located in Table 5.

Table 4. Multiple Regression of the Percentage of Science Objectives Taught by Teachers on their Independent Variables

Independent variables	Beta	t-value
Demographic variables		
Age	-.01	.14
Gender	-.08	.39
Urban schools	-.09	.60
Town schools	.41	.00*
Rural schools	.26	.02*
Years taught	.01	.12
Program variables		
Program restructured	-.00	.91
Hours of in-service	.00	.04*
Restructuring committee	.16	.41
Science certification	.10	.57

R²=.68

*p<.05

Part IV determined teachers' knowledge of the curriculum using 10 true/false questions. Results indicated that the teachers had a mean score of 6.43. The scores ranged from four to 10. The largest group of respondents had a score of six on the 10 point test. Only 6.5 percent of the teachers had a score of nine or higher.

A t-test indicated no significant differences in the percent of ANR objectives taught between programs that had and those that had not completed the restructuring process to become agriscience and

Table 5. Statistics for Likert Scale Questions on Teachers' Perceptions of Agriscience and Natural Resources

Question	Mean	Descriptor
High school science credit should be awarded for ANR courses	4.73	Strongly agree
An ANR program in high school will give students a solid base for a career in agriculture and natural resources	4.38	Agree
I am a supporter of the change to agriscience and natural resources programs	4.29	Agree
An ANR program is appropriate for my community	4.22	Agree
My community supports the concept of agriscience and natural resources	4.12	Agree
There is evidence to support the change to an ANR base curriculum	4.11	Agree
Teaching an ANR curriculum enables me to more effectively meet the needs of my students	4.05	Agree
ANR programs should be placed in the science department of high schools	3.99	Agree
An ANR curriculum attracts a diverse group of students	3.95	Agree
An ANR course should be recommended to all high school students	3.92	Agree
I believe that traditional production agriculture programs are better than agriscience and natural resources programs	2.06	Disagree

(1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree)

natural resources programs.

Conclusions

This study found that Michigan ANR teachers are teaching a large percentage of the objectives of the Michigan Agriscience and Natural Resources Curriculum. Over 78 percent of the Michigan agriscience and natural resources teachers and 60 percent of Michigan horticulture teachers cover at least 75 percent of the science objectives of the Michigan Agriscience and Natural Resources Curriculum. Michigan agriscience and natural resources and horticulture teachers had a slightly positive attitude towards the concept of "agriscience." They agreed that the curriculum is useful and should be recommended to all high school students.

Michigan agriscience and natural resources teachers only had an average knowledge of the Michigan ANR curriculum development project activities.

Recommendations

In-service and technical update sessions should be planned to assist teachers with developing instructional lesson plans that incorporate more objectives of the Michigan ANR Curriculum. Teachers should be encouraged to attend

professional development training and incorporate more hands-on activities into the curriculum. Greater emphasis needs to be placed on disseminating curriculum development information to all Michigan agriscience and natural resources teachers.

The results of this study should be reviewed by other states considering curriculum changes. Additional research is recommended that would determine the factors that affect a program's decision to restructure to become an agriscience and natural resources program.

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