Identifying and Prioritizing Agricultural and Natural Resources Curriculum Needs of Nebraska Secondary Schools

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Abstract

The purpose of this study was to identify and prioritize current curriculum training needs of Nebraska's secondary agricultural education teachers. A web based survey was used to collect the necessary information concerning Nebraska's secondary agricultural curriculum. Data were collected from Nebraska secondary agricultural education teachers regarding the importance, knowledge, performance, and the students' ability to perform (consequence) on 409 achievement indicators representing ten subject matter areas. The study was conducted at the conclusion of the 2000-01 school year with 83 teachers completing five of the ten randomly assigned subject matter sets. Secondary teachers and students were found to be knowledgeable and satisfactorily skilled in the areas of agribusiness, agricultural sales and marketing, agricultural mechanics, animal science, leadership, and plant and soil science. Secondary programs were not preparing students for course work in the areas of food science, natural resources and horticulture. Recommendations were made to conduct a Delphi study of secondary teachers, post-secondary faculty, and business and industry representatives to further identify the exit level competencies of secondary students leading to a seamless, articulated curriculum, and to provide pre-service and in-service training in the areas of companion animals, food science, horticulture, and natural resources.

Introduction

Standards, assessment, relevancy, articulation, and accessibility to higher education are affecting the agricultural and natural resources curriculum being taught in Nebraska and likely the nation. Teachers are feeling the pressure to modify existing curriculum to meet the needs of a non-rural, non-production agriculture clientele base. This non-rural, non-production clientele base is not generally attracted by offerings that solely rely on production agriculture and this curriculum also does not reflect the agriculture of today. Consequently, agricultural education curriculum in Nebraska is gradually shifting from a traditional production agricultural base of animal science, plant science and agricultural mechanics to a more diverse curriculum including food science, natural resources, and agribusiness (Foster, Bell, & Erskine, 1995). Teachers are frustrated by this broadening definition of agricultural and natural resources, and subsequent increased curriculum subject matter areas that require them to teach outside their technical preparation.

Past research regarding secondary agricultural education curriculum and student performance in Nebraska was primarily directed at agricultural mechanics (Umbaugh, 1979; Schlautman, 1989). Admittedly, agricultural mechanics is a curriculum component of many programs but focusing on a one subject dimension abandons a much broader, useful look at the entire curriculum and a broader, diverse student base. Little research in Nebraska has been conducted on competency attainment of secondary agricultural education teachers or students.

Theoretical Framework

Needs assessment has been described as deceptively simple to understand (Soriano, 1995). A need was described as a discrepancy or gap between 'what is', or the present state of affairs in regard to the group and situation of interest, and 'what should be', or desired state of affairs (Witkin & Altschuld, 1995; 2000). McKillip (1987) described a need as a value judgment that some group has a problem that can be solved. "Any difference between 'desired status of learners' and 'current status of learners' equals an educational need" (Popham, 1993, p. 67). An assessment is a measurement from a variety of data collection methods used to evaluate educational outcomes (Chase, 1999).

For the purposes of this study a needs assessment was defined as "a systematic set of procedures undertaken for the purpose of setting priorities and making decisions about program or organizational improvement and allocation of resources" (Witkin & Altschuld, 1995, p. 4). The three models of needs assessment define "best" in different ways by maximizing different values (McKillip, 1987). The discrepancy model maximizes normative or expert values. The marketing model maximizes consumers' values. The third model, decision-making, maximizes the values of those who would use the results.

The discrepancy model is the most straightforward and widely used, especially in education. It emphasizes normative expectations and involves three phases: goal setting, identifying what ought to be; performance measurement, determining what is; and discrepancy identification, ordering differences between what ought to be and what is (McKillip, 1987). This was also known as the "gap" model.

A discrepancy model widely used in agricultural education is the Borich needs assessment. Borich's original intention was to develop a needs assessment method that would provide for more than direct information when conducting follow-up studies of pre-service and in-service training programs (Borich, 1980). The Borich model "adds validity to the process of assessing respondents' perceptions about the importance of educational programming needs particularly in the area of in-service education for homogeneous groups of people" (Waters & Haskell, 1989, p. 26). The advantage of this model is the ability to "lock in the type and quality of the data that will be received" (Borich, 1980). It "attempts to gather additional information from the respondents regarding their current knowledge of the topic and their ability to apply this information" (Waters & Haskell, 1989, p. 27). Borich (1980) identified needs assessment as the ability to identify two polar positions of 'what is' and 'what should be'.

Purpose of the Study

In providing for a seamless, articulated educational system and graduates who are ready for the job market, it was important to conduct a needs assessment of the current secondary and post-secondary agricultural sciences and natural resources programs, and the entry-level job requirements of business and industry. The first phase of the research was to conduct a needs assessment that compared the perceived importance, knowledge, performance, and consequence of teachers to the curriculum taught in Nebraska's secondary agricultural education program during the 2000-2001 academic year. The independent variables of importance, knowledge, performance, and consequence were defined as:

Importance - importance of the topic to teacher's job function (Barrick, Ladewig, & Hedges, 1983).

Knowledge - teacher's ability to accurately recall, paraphrase, or summarize the procedural mechanics of the behavior on a paper and pencil test (Barrick, Ladewig, & Hedges, 1983).

Performance - teacher's ability to accurately execute the behavior in a real or simulated environment in the presence of an observer (Barrick, Ladewig, & Hedges, 1983).

Consequence - ability to elicit learning from pupils (as recorded on tests or practicums) (Borich, 1980).

The dependent variable, curriculum, was defined as the identified content standards taught within the secondary agricultural education program as approved by the local board of education. The mediating variables of age, gender, years of teaching, educational background, technical preparation, endorsement area(s), and courses taught that receive dual credits were statistically controlled in the study.

The specific objectives were to:

1. Identify the relative importance of specific technical agriculture topics within ten subject matter areas as perceived by teachers.
2. Identify the relative knowledge of specific technical agricultural topics within ten subject matter areas as perceived by teachers.
3. Identify the relative ability of teachers to perform specific technical agricultural topic-related skills within ten subject matter areas as perceived by teachers.
4. Identify the relative ability of teachers to produce pupil-learning competency (consequence) in specific technical agriculture topics within ten subject matter areas as perceived by teachers.

5. Determine the relationships among the four variables of importance, knowledge, performance, and consequence.

Methodology

Population. The population for the secondary agricultural education curriculum needs assessment was all 132 Nebraska secondary agricultural education programs for academic year 2000-2001 (Nebraska Department of Education, 2000). Teachers in all programs were surveyed. For programs that had multiple teachers, the survey request was sent to the 'head' agricultural education teacher. The minimum response rate needed to make generalizations was 61% of the population or 80 secondary agricultural education teachers (Keppel, 1991).

Instrumentation. A web-based survey was designed to collect data on the importance, knowledge, performance and consequence of curriculum competencies (achievement indicators) as perceived by Nebraska's secondary agricultural education teachers. There were 409 achievement indicators identified in the Nebraska Agricultural Education Curriculum Framework and Content Standards (Bell, 1999) in ten subject matter areas. Face validity was established by a panel of university experts. They reviewed the instrument and their suggestions were incorportated.

The Borich needs assessment model (1980) served as the framework for the survey. For each curriculum achievement indicator listed, teachers were asked to respond to its perceived importance, knowledge, performance and consequence by using a Likert scale. Teachers first responded to the importance of the achievement indicator. If the teacher selected "yes", they were asked to rate their knowledge, their skill proficiency and the skill proficiency of their students. If the teacher perceived the competency as not important, s/he responded "no" and proceeded to the next achievement indicator.

Teachers were asked where they would rate their knowledge or 'ability to accurately recall, paraphrase, or summarize the procedural mechanics of the behavior (competency) on a paper and pencil test. They responded to what letter grade they would expect to receive on an objective test (A, B, C, D, or F)'. Teachers then responded to a question regarding their performance of the competency. 'Your ability to accurately execute the competency in a real or simulated environment. Respond with the following scale: Advanced; Proficient; Unsatisfactory; or N/A'. The final question was to determine their students' proficiency (consequence) levels. 'Your students' ability to accurately execute the competency in a real or simulated environment. Respond with the following scale: Advanced; Proficient; Unsatisfactory; or N/A'. The scales were the same for performance and consequence. The scales were described as: advanced - superior performance, demonstrates outstanding skill; proficient – competent performance, demonstrates satisfactory skills; unsatisfactory – inadequate performance, skill needs much improvement; and N/A – skill not observed.

Demographic information such as age, gender, years of teaching, educational background, technical preparation, endorsement area(s), and courses taught that received dual credits were collected.

Data Collection Procedures. Nebraska secondary agricultural education teachers were asked to complete the web-based curriculum survey while they attended the 2001 Nebraska FFA Chapter Officer Leadership Training Conferences held in Aurora, Nebraska, from May 21-June 1, 2001. Teachers were provided a consent form letter, user name and password, and information sheet. Fifty minutes was allocated to complete the web-based survey. A follow-up memo was hand-delivered to non-respondents during the Nebraska Agricultural Education

Association summer conference held June 4-6, 2001, reminding teachers to complete the web-based survey. A memo was sent to those individuals not in attendance. The memo and letter served as the consent form. It also contained their username and password, and general information regarding the survey.

A third and final e-mail message was sent ten days later to non-respondents, once again reminding them of the importance of their response and encouraging them to respond to the web-based questionnaire.

Data Analysis. Data collected through the web-based survey were analyzed using the following procedures:

1. Questionnaires were reviewed for missing data and coded as they were received. If data was missing on an individual item, it was coded as missing and not used in statistical computations.
2. Data were electronically submitted into a Sequel database. Data were then transferred into 11 flat files or text files. The flat files consisted of the ten subject matter content areas and demographic information. The flat files were saved into text files and transferred to Excel spreadsheets to edit the data. Once data were determined to be accurate and in an acceptable format, it was imported as data files into SPSS, release 10, a statistical package for Windows.
3. Independent paired T-tests were conducted on all variables, including demographic variables, to compare early and late respondents to determine if non-respondent error was present. Due to the large amount of data collected (16,750 pieces of information), the .01 significance level was used to control for Type I error. No variables were found to be significantly different between early and late respondents. Therefore, all variables were used in the analysis.
4. The Cronbach's Alpha reliability test determined if the survey instrument obtained valid data. The overall Cronbach Alpha score was .98. Consequently, the survey instrument was determined to be reliable.
5. Descriptive statistics (frequencies, means, and standard deviations) were calculated and reported on the variables importance, knowledge, performance, and consequence for each achievement indicator listed, as well as all demographic data. Interpretations of the variables were made with the following guidelines:
   a. Importance [yes = 1 and no = 0]

Very:	.80 – 1.00
Quite:	.60 – .79
Somewhat:	.40 – .59
Of little importance:	< .40

   b. Knowledge [A = 1; B = 2; C = 3; D = 4; F = 5]

A	=	1.00 – 1.50
A-	=	1.51 – 1.99
B	=	2.00 – 2.50
B-	=	2.51 – 2.99
C	=	3.00 – 3.50
C-	=	3.51 – 3.99
D	=	4.00 – 4.50
D-	=	4.51 – 4.99

F = 5.00

c. Performance [Advanced = 1; Proficient = 2; Unsatisfactory = 3; Skill not observed = 4]

Superior performance	= 1.00 – 1.49
Advanced performance	= 1.50 – 1.99
Highly proficient performance	= 2.00 – 2.49
Somewhat proficient performance	= 2.50 – 2.99
Unsatisfactory performance	= 3.00 – 3.49
No skills	= 3.50 – 4.00

d. Consequence [Advanced = 1; Proficient = 2; Unsatisfactory = 3; Skill not observed = 4]

Superior performance	= 1.00 – 1.49
Advanced performance	= 1.50 – 1.99
Highly proficient performance	= 2.00 – 2.49
Somewhat proficient performance	= 2.50 – 2.99
Unsatisfactory performance	= 3.00 – 3.49
No skills	= 3.50 – 4.00

6. Mean Weighted Discrepancy Scores (MWDS) were calculated for each curriculum subject matter area (Barrick, Ladewig, & Hedges, 1983; Borich, 1980; Layfield & Dobbins, 2000; Newman & Johnson, 1994).
   a. Discrepancy scores were figured as follows:
      1). Knowledge Discrepancy Score (KDS) = Knowledge Mean (KM) – Importance Mean (IM)
      2). Performance Discrepancy Score (PDS) = Performance mean (PM) – Importance Mean (IM)
      3). Consequence Discrepancy Score (CDS) = Consequence mean (CM) – Importance Mean (IM)

   b. Weighted discrepancy scores were figured as follows:
      1). Knowledge Weighted Discrepancy Score (KWDS) = KDS x IM
      2). Performance Weighted Discrepancy Score (PWDS) = PDS x IM
      3). Consequence Weighted Discrepancy Score (CWDS) = CDS x IM

   c. Mean weighted discrepancy scores were figured as follows:

$$\text{Mean Weighted Discrepancy score (MWDS)} = \frac{(\text{KWDS} + \text{PWDS} + \text{CWDS})}{3}$$

   d. Training needs were interpreted by using the following scale:

Degree of Training	MWDS
Very high	1.68 – 2.16
High	1.16 – 1.67
Low	0.67 – 1.15

Very Low	0.66 – 0.26

7. A Friedman two-way analysis of variance was conducted to determine significant difference between importance, knowledge, performance, and consequence variable means for each achievement indicator in each subject matter content area (Barrick, Ladewig, & Hedges, 1983). Kendall Tau coefficient tests were conducted to determine relationships between importance, knowledge, performance, and consequence variable means for achievement indicator in each subject matter content area (Barrick, Ladewig, & Hedges, 1983; Waters & Haskell, 1989).

Findings

Eighty-three of the 132 (63%) Nebraska secondary agricultural education teachers completed the curriculum, web-based survey. Forty-three (52%) of the teachers completed the survey during the Nebraska Chapter Officer Leadership Training Conference in May, 2001, and 40 (48%) teachers completed the web-based survey from their home or office in June, 2001. Each teacher completed five of the ten subject matter content areas that were randomly assigned. All teachers completed the demographic data items.

Demographic data. Teaching experience of respondents ranged from 0 to 38 years with a mean of 14 years: 32% (26), 0-5 years; 11% (9), 6-10 years; 11% (9), 11-15 years; 14% (12), 16-20 years; 17% (14), 21-25 years; 11% (9), 26-30 years; and 5% (3), 31-38 years.

Nebraska's 132 agricultural education programs were geographically distributed in 12 districts. Participants were asked to identify which NAEA district they represented. A range of 7.2% (6) to 11% (9) of the teachers per district participated in the web-based survey. District 2, the smallest district (6 programs), had 4% of the total participation but had half of their teachers completing the survey. Participants were evenly distributed geographically within the state according to NAEA districts and had, at a minimum, half of their teachers participating in the survey.

Two-thirds (66%) of the female agricultural education teachers participated in the survey accounting for 12% (10) of the participants; male participants accounted for 88% with a gender ratio of 1:7. Eighty-eight percent (72) of the responding teachers held an agricultural education teaching certificate; 10% (8) had an agricultural education/biology teaching certificate; 2% (2) had an agricultural education/industrial arts certificate; and 1% (1) had a biology/natural sciences certificate. Completion of graduate course work was varied with 24% (21) reporting no formal graduate level coursework, 42% (35) had completed some formal course work; slightly under a third (24) had their Masters degree, and 5% (3) had a specialization certificate. No teachers had a doctorate.

Teachers were asked to identify the number of formal credit hours they had completed in technical agriculture and natural resources training (See Table 1). These hours included undergraduate and graduate courses. Teachers reported that they had more formal training credit hours in the areas of animal science (M=17), leadership and communication (M=13), agronomy (M=11), agribusiness (M=9), and agricultural mechanics (M=9). Three subject matter areas had 50% or more of the teachers showing no formal training. They were food science (61), horticulture (54), and natural resources (42). There was confusion with the teachers on what constituted leadership coursework. Teachers reported they had completed between 0-53 hours. It is unknown how many, but a majority of the teachers may have counted their teacher preparation course work as leadership. Teachers (4) did report that they had completed other technical coursework related to agriculture and natural resources. This included educational psychology (27 hours) and entomology, home economics and welding (ranging from 3-5 hours).

Teachers reported that 15% (12) of the agricultural education programs provided dual credit coursework to their students. College credit courses in agricultural and natural resources included eight agribusiness classes categorized as agribusiness management (4), farm business management (2), agricultural management and marketing (1), agricultural business and records (1); eight agricultural mechanics classes categorized as welding and metals (5), agricultural power (1), agricultural mechanics (1), and automotive technology (1); seven classes in animal science categorized as animal science (5), livestock production (1), and animal and plant sciences (1); horticulture (4); five classes in agronomy categorized as agronomy (3), plant science (1), and animal and plant sciences (1); natural resources (1); and interpersonal skills (1).

Table 1
Formal Course Work Means, Ranges, and Credit Hour Frequencies (N=80)

Subject Matter Areas	M	Range		Credit Hours							
		Min	Max	0	1- 6	7 – 12	13 – 18	19 – 24	25 – 30	31 – 36	37 +
Agribusiness	9	0	50	16	12	39	5	3	4	0	1
Ag Mechanics	9	0	30	18	15	34	5	6	2	0	0
Agronomy	11	0	40	15	11	30	12	8	3	0	1
Animal Science	17	0	130	11	5	22	17	9	6	2	5
Food Science	1	0	25	61	17	1	0	0	1	0	0
Horticulture	2	0	15	54	17	8	1	0	0	0	0
Leadership & Communication	13	0	53	24	12	12	8	7	11	1	5
Natural Resources	4	0	30	42	21	12	2	1	2	0	0

Note. M = mean credit hours. The range of credit hours was reported with the Min (minimum) and the Max (maximum) hours completed by secondary teachers. The teacher number completing training was reported to the corresponding credit hour range.

Curriculum Importance. Of the ten subject matter areas studied, teachers rated only leadership and personal development as 'very important'. Natural resources, plant and soil sciences, animal science, agricultural mechanics, agricultural business management, and agricultural sales and marketing were rated as 'quite important'. Three subject matter areas were rated as 'somewhat important': food science, horticulture and companion animals.

Teacher Knowledge. Teachers reported that if they were to complete a knowledge exam in the ten subject matter areas they would receive an 'A minus' in animal science, leadership and personal development, agricultural mechanics, agricultural sales and marketing, companion animals, and natural resources. Teachers perceived they would earn a 'B' in the areas of plant and soil sciences, agricultural business management, food science, and horticulture.

Teacher Performance. Teachers reported that their performance (ability to perform competencies) was 'advanced' in agricultural mechanics, agricultural sales and service, animal science, leadership and personal development, and natural resources. Teachers reported that they were ‘highly proficient’ in the subject matter areas of plant and soil sciences, agricultural business management, companion animals, food science, and horticulture.

Student Performance (Consequence). Teachers reported that their students were ‘highly proficient’ in all ten subject matter areas.

Mean Weighted Discrepancy Scores (MWDS). Mean weighted discrepancy scores were calculated on each of the ten subject matter areas to determine training needs. All ten subject matter areas required ‘low training needs’.

Table 2
Subject Matter Area Importance, Knowledge, Performance and Consequence Means and Mean Weighted Discrepancy Scores

Subject Matter Areas	**N**	**IM**	**KM**	**PM**	**CM**	**MWDS**
Ag Business Management	45	.65	2.06	2.02	2.28	.950
Ag Mechanics	33	.70	1.82	1.83	2.15	.858
Ag Sales & Marketing	37	.61	1.83	1.85	2.21	.826
Animal Science	67	.72	1.77	1.86	2.22	.887
Companion Animals	22	.53	1.93	2.06	2.40	.837
Food Science	14	.58	2.12	2.17	2.39	.959
Horticulture	34	.56	2.23	2.16	2.44	.972
Leadership/Personal Development	26	.83	1.80	1.86	2.20	.928
Natural Resources	50	.76	1.94	1.99	2.28	.994
Plant & Soil Sciences	81	.73	2.04	2.00	2.32	1.016

Note: N = the number of cases, i.e. questions per subject matter set; IM = importance mean; KM = knowledge mean; PM = performance mean; CM = consequence mean; and MWDS = mean weighted discrepancy score calculated by adding the mean discrepancy scores of knowledge, performance and consequence and dividing by 3.

Differences and Relationships Between Variables in Each Subject Matter Area. The Friedman two-way test of analysis of variance was applied to test if there were differences between importance, knowledge, performance, and consequence for each of the ten subject matter areas (See Table 3). There was a significant difference in the rankings of importance, knowledge, performance and consequence of each subject matter content area. Therefore, each variable measured represented a distinct value and was considered when determining training needs.

Table 3
Friedman Test Statistics

Subject Matter Areas	Mean Rank				N	Chi Square	df	Sig.
	I	K	P	C				
Agribusiness	1.00	2.70	2.41	3.89	45	116.99	3	.00
Ag Mechanics	1.00	2.45	2.55	4.00	33	89.73	3	.00
Ag Sales & Marketing	1.00	2.32	2.68	4.00	37	102.94	3	.00
Animal Science	1.00	2.10	2.92	3.98	67	194.73	3	.00
Companion Animals	1.00	2.20	2.80	4.00	22	61.99	3	.00
Food Science	1.00	2.32	2.68	4.00	14	38.61	3	.00
Horticulture	1.00	2.90	2.29	3.81	34	86.19	3	.00

Leadership Development	1.00	2.31	2.69	4.00	26	72.47	3	.00
Natural Resources	1.00	2.27	2.78	3.95	50	136.70	3	.00
Plant & Soil Science	1.00	2.68	2.38	3.94	81	218.03	3	.00

Note. I = Importance; K = Knowledge; P = Performance; C = Consequence. $p < .01$.

The Kendall tau_b correlations test was used to determine what the relationships were between importance, knowledge, performance, and consequence (See Table 4). Significant relationships ($p< .01$) existed among all variables. A significant negative relationship existed between importance and knowledge, performance and consequence with a range of -.25 to -.75. A positive relationship existed between knowledge, performance, and consequence with a range of .60 to .86. Due to the moderate relationship of the variables, all variables were used (MWDS) in ranking and prioritizing subject matter areas for training.

Table 4
Kendall Tau_b Correlations

Agribusiness (N = 45)		KM		PM		CM	
	IM	-.48**	.00	-.53**	.00	-.53**	.00
	KM	-		.77**	.00	.67**	.00
	PM	-		-		.69**	.00
Agricultural Mechanics (N = 33)		KM		PM		CM	
	IM	-.69**	.00	-.74**	.00	-.65**	.00
	KM	-		.83**	.00	.78**	.00
	PM	-		-		.73**	.00
Ag Sales and Marketing (N = 37)		KM		PM		CM	
	IM	-.60**	.00	-.49**	.00	-.66**	.00
	KM	-		.80**	.00	.68**	.00
	PM	-		-		.60**	.00
Animal Science (N = 67)		KM		PM		CM	
	IM	-.36**	.00	-.46**	.00	-.54**	.00
	KM	-		.76**	.00	.56**	.00
	PM	-		-		.64**	.00
Companion Animals (N = 22)		KM		PM		CM	
	IM	-.66**	.00	-.58**	.00	-.75**	.00
	KM	-		.65**	.00	.65**	.00
	PM	-		-		.64**	.00
Food Science (N = 14)		KM		PM		CM	
	IM	-.61**	.00	-.57**	.01	-.59**	.00
	KM	-		.73**	.00	.79**	.00
	PM	-		-		.82**	.00
Horticulture (N = 34)		KM		PM		CM	
	IM	-.40**	.00	-.25*	.04	-.15	.22
	KM	-		.71**	.00	.35**	.00
	PM	-		-		.57**	.00
Leadership Development (N = 26)		KM		PM		CM	
	IM	-.65**	.00	-.65**	.00	-.61**	.00
	KM	-		.80**	.00	.71**	.00

PM	-		-		.79**	.00
Natural Resources (N = 50)	KM		PM		CM	
IM	-.49**	.00	-.52**	.00	-.54**	.00
KM	-		.86**	.00	.70**	.00
PM	-		-		.73**	.00
Plant and Soil Science (N = 81)	KM		PM		CM	
IM	-.37**	.00	-.42**	.000	-.35**	.00
KM	-		.75**	.00	.60**	.00
PM	-		-		.66**	.00

Note. IM = importance mean, KM = knowledge mean, PM = performance mean, CM = consequence mean. ** Correlation is significant at the .01 level (2-tailed). * Correlation is significant at the .05 level (2-tailed).

Conclusions and Recommendations

Conclusions

The majority or higher percentage of subject matter areas taught were in the traditional areas of agribusiness, agricultural mechanics, animal science, leadership, and plant and soil science. These findings were similar to the results of Siekman (1974). He reported that secondary agricultural education curriculum consisted of animal science, agricultural management and economics, agronomic science, agricultural mechanics, and leadership and careers. Over two-thirds of the curriculum taught in 1972-73 consisted of animal science, agronomic resources, and agricultural mechanics.

Teachers reported teaching less content in companion animals, food science, and horticulture when compared to the traditional areas listed above. Natural resources and agricultural sales and marketing were taught by a majority of the teachers, but these subject matter areas were not reported by Siekman (1974).

Agricultural education teachers' training and knowledge bases were in the traditional areas of agribusiness, agricultural mechanics, animal science, and plant and soil sciences. Teachers were less knowledgeable in the non-traditional areas of companion animals, food science, and horticulture.

Agricultural education teacher performance was related to their knowledge. Teachers' knowledge was a product of their pre-service education and professional development activities, including in-service. Teachers reported having more formal course work in the areas of agribusiness, agricultural mechanics, animal science, and plant and soil sciences. In the technical areas of companion animals, food science, horticulture, and natural resources, over 50% of the teachers had no formal (credit generating) training.

Agricultural education teachers rated student performance lower than their own. Students were most proficient in the traditional areas of agricultural mechanics, animal science, and plant and soil science. Students were less proficient in the areas of agricultural sales and marketing, companion animals, food science, horticulture, leadership, and natural resources.

Student performance was indicative of teacher performance and knowledge. Teachers teach what they know, what they have experienced, and what they have been taught. This is exemplified by the following examples: agricultural sales as a course was taught at only one post-secondary institution; companion animals was taught only as a unit of instruction in an animal science class at one post-secondary institution; food science and horticulture classes were not required as pre-service requirements until new agricultural education teacher certification endorsement standards were released in 2000 (Moody, 2001).

The teacher perception of the importance of a topic had a negative or inverse relationship with teacher knowledge and performance and student consequences. The rankings of teacher knowledge and performance and student consequences had a positive relationship and were moderately to highly related. Because these variables were significantly different and moderately related, they were combined to prioritize training needs of secondary agricultural education curriculum.

Mean weighted discrepancy scores were calculated for each of the ten subject matter areas combining importance, knowledge, performance, and consequence means. The higher the MWDS, the more training was needed. The MWDS for each of the ten subject matter areas was in the 'low training needed' category. One possible reason for this is that teachers who did not rate the area important were not required to rate their knowledge, performance or consequence. Therefore, training programs should use caution in interpreting MWDS, realizing the number of importance responses might have skewed the results.

Recommendations

The demographic variables of years of teaching experience, school location, college graduation, and technical training should be studied to determine the relationship and influence on achievement indicators. As well, a change instrument should be given to those secondary teachers completing the web-based survey. This may prove to be insightful to understand and describe the change attributes in relation to the resistance to move to a non-traditional curriculum.

Pre-service and in-serve education and training needs should be validated with the findings of this study. More training efforts need to be placed in the areas of food science, horticulture, natural resources, and companion animals. Current training formats should be reviewed for relevancy, contextual learning, and psychomotor skill development. Alternative formats such as on-line instruction and two-way audio and video instruction should be studied as well as the frequency and timing of workshops. A potential format for graduate credit may include involving teachers (pre-service included) in either synchronous or asynchronous sessions to present the cognitive material; psychomotor skill development time; reflection; and revisiting the cognitive and psychomotor stages at a later date providing closure and assessment.

A Delphi study can further describe and identify exit level student competencies of secondary agricultural education students. Experts from secondary agricultural education, post-secondary faculty, and business and industry representatives can clarify expected student proficiencies in agricultural and natural resources. Information gained can be used to create seamless articulated programs, graduation benchmarks, and update current Nebraska agricultural and natural resources achievement indicators.

Secondary agricultural education programs should conduct community needs assessments regarding curriculum needs. Reinstating or involving existing advisory committees will expedite and validate the needs assessment. It is common practice that education does not involve business and industry in making curricular decisions. Specifically, secondary agricultural education in Nebraska is known for its grass roots control. Pre-service coursework and the Nebraska Agricultural Education Curriculum Framework and Content Standards (Bell, 1999) provide suggestions for local curriculum. The agricultural education teacher is hired as the content expert. Ultimately, it is this person who implements the curriculum. Without the support and input of the community, the profession, and business and industry, the teacher will implement what they know and that may not be what is needed to prepare a trained workforce or college-bound students.

References

Barrick, R.K., Ladewig, H.W., & Hedges, L.E. (1983). Development of a systematic approach to identifying technical inservice needs of teachers. *The Journal of the American Association of Teacher Educators in Agriculture, 24*(1), 13-19.

Bell, L.C. (Ed.). (1999). *Nebraska State Agricultural Education Curriculum Frameworks and Content Standards*. Lincoln, NE: Nebraska Department of Education.

Borich, G. (1980). A needs assessment model for conducting follow-up studies. *Journal of Teacher Education, 31*(1), 39-42.

Foster, R., Bell, L., & Erskine, N. (1995). The importance of selected instructional areas in the present and future secondary agricultural education curriculum as perceived by teachers, principals, and superintendents in Nebraska [Electronic version]. *The Journal of Agricultural Education, 36*(3), 1-7.

Keppel, G. (1991). *Design and analysis : A researcher's handbook, 3rd Edition*. Edgewood Cliffs, NJ: Prentice-Hall, Inc.

Layfield, K.D., & Dobbins, T.R. (2000). *An assessment of South Carolina agriculture teachers' inservice needs and perceived competencies*. A paper presented at the 27th Annual National Agricultural Education Research Conference: San Diego, CA.

McKillip, J. (1987). *Need analysis for the human services and education*. Newbury Park, CA: Sage Publications, Inc.

Nebraska Department of Education. (2000). *Nebraska Agricultural Education Teacher Directory, 2000-20001.* [On-Line] Available: http:/www.neaged.org

Moody, L.D. (2001). *Identifying and prioritizing agriculture and natural resources curriculum needs of Nebraska secondary and post-secondary institutions*. Unpublished doctoral dissertation, University of Nebraska, Lincoln.

Newman, M.E., & Johnson, D.M. (1994). Inservice education needs of teachers of pilot agriscience courses in Mississippi. *Journal of Agricultural Education, 35*(1), 54-60.

Popham, W.J. (1993). *Educational evaluation* (3rd ed.). Needham Heights, MA: Allyn and Bacon.

Schlautman, N.J. (1989). *Agricultural mechanics instruction in Nebraska secondary vocational agriculture programs for the 1990s*. Unpublished masters thesis: University of Nebraska, Lincoln.

Siekman, D.M. (1974). *A descriptive analysis of the curriculum in vocational agriculture in selected public high schools in Nebraska (for the school year 1972-73).* Unpublished masters thesis: University of Nebraska, Lincoln.

Soriano, F.I. (1995). *Conducting needs assessment: a multidisciplinary approach*. Thousand Oaks, CA: Sage Publications, Inc.

Umbaugh, W.L. (1979). *A comparison of agricultural mechanics competencies needed and competencies possessed by vocational agriculture teachers in Nebraska.* Unpublished masters thesis: University of Nebraska, Lincoln.

Waters, R.G., & Haskell, L.J. (1989). Identifying staff development needs of cooperative extension faculty using a modified Borich needs assessment model. *Journal of Agricultural Education, 30*(2), 26-32.

Witkin, B.R., & Altschuld, J.W. (1995). *Planning and conducting needs assessments: a practical guide.* Thousand Oaks, CA: Sage Publications, Inc.

Witkin, B.R., & Altschuld, J.W. (2000). *From needs assessment to action: transforming needs into solution strategies*. Thousand Oaks, CA: Sage Publications, Inc.

Identifying and Prioritizing Agricultural and Natural Resources Curriculum Needs of Nebraska Secondary Schools

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The researchers are commended for engaging an important topic—curriculum development needs—from multiple perspectives held by secondary agriculture teachers. The study's questionnaire items were drawn from existing *Curriculum Framework and Content Standards* for Nebraska. A web-based survey was used to collect data. Teachers' perceptions (importance, knowledge, performance, and consequence) were elicited for 409 achievement indicators covering ten subject matter areas. Wisely, the researchers randomly assigned five of the ten content areas to each teacher, thus reducing the possibility of "response fatigue"; the final rate of return was 63%. Selected responses of early and late respondents were compared; no significant differences were found. A discrepancy needs assessment model was employed for data analysis, one that relied on Borich's mean weighted discrepancy score (MWDS) procedures.

Due to the nature of the study ("16,750 pieces of information" were collected), the findings were quite robust and generative. However, some of the study's "recommendations" may exceed its findings. Undoubtedly, they represent the investigators' positions, and indeed may be valid, but their "connectedness" to specific findings appears questionable. Accordingly, the researchers are encouraged to recast them as *implications* where appropriate. The authors are also urged to modify their language to describe more aptly certain findings and conclusions, e.g., Teachers' perceptions of student performance instead of merely "Student performance . . ." (see p. 11). Selected questions and observations follow:

1) The variable "consequence," i.e., teachers' perceptions of their students' performance, was an interesting finding, especially, since "teachers reported that their students were "'highly proficient'" in all ten subject matter areas." Would a more direct assessment of student performance confirm or disconfirm this finding? Further, 32% of teachers reported "0-5 years" teaching experience; presumably, *some* had no inservice experience. So, were they "qualified" to make this assessment? If not, were their responses excluded from the analysis?

2) Teachers perceived that their knowledge for the content area natural resources was at the "'A minus'" level; however, more than one-half (42) reported no formal course work for that area. How should one interpret this finding?

3) Additional clarity about data analysis could be provided by explaining in more detail the steps used to calculate the MWDS. Moreover, because of the study's questionnaire design, i.e., "teachers who did not rate the area important were not required to rate their knowledge, performance or consequence," how useful are the MWDS rankings for planning future professional development activities for agriculture teachers in Nebraska?

4) Are there inherent contradictions related to "conduct[ing] community needs assessments regarding curriculum needs" (and, presumably, responding to those needs) and the larger aim to create "a seamless, articulated curriculum" for secondary agricultural education statewide?