

**Development of a Systematic Approach to
Identifying Technical Inservice Needs of Teachers**

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Teachers of vocational agriculture have a continuing desire and need for inservice education, especially in their technical area. One of the functions of departments of agricultural education historically has been to identify the most relevant topics to provide teachers during various inservice education workshops.

Identifying appropriate topics for inservice programs has been a perplexing problem. A variety of methods has been used to determine the needs of teachers and the importance of specific competencies. No method has been identified that combines importance of the subject and need for inservice education on the topic.

Until 1980, technical inservice workshops offered in Ohio were planned by an inservice committee of teacher educators and state supervisors of vocational agriculture. Topics were chosen from suggestions by selected teachers in the field based on their felt need and from discussions with other teachers. Teacher educators and state supervisors in agricultural education also identified possible subject areas as a result of observations of vocational agriculture programs and teachers. As vocational agriculture in Ohio grew and expanded in number and types of teachers and programs, the need for a more systematic approach to planning inservice programs became apparent.

One possible alternative method of identifying appropriate inservice topics has been suggested by Borich (1980) as discussed in the May-June issue of the *Journal of Teacher Education*. Borich presented a model that could be employed in conducting follow-up studies of preservice and inservice training. The model is based upon the existence of a difference between "what is" and "what should be." Borich maintains that a training program can apply the model by defining "what is" as the measured behaviors, skills, and the competencies of the trainee and "what should be" as the goals of the program. The differences between the two can then be used as a measure of effectiveness.

The Borich Needs Assessment Model appears to have merit. However, the model has not been tested and used in planning needed inservice programs. The intent of this study was to utilize the Borich model in a program of inservice planning.

Objectives

The major purpose of this study was to develop a system for identifying the technical inservice needs of teachers of vocational agriculture in Ohio. The specific objectives were as follows:

1. Identify the relative importance of specific technical agriculture topics as perceived by teachers.
2. Identify the relative knowledge of specific technical agriculture topics as perceived by teachers.
3. Identify the relative ability to provide application of specific technical agriculture topics as perceived by teachers. Determine the relationships among the three variables importance, knowledge, and application.

Methodology

The study was designed to utilize the Borich Needs Assessment Model (1980). Following the Borich model, these procedures were accomplished.

1. List of competencies. A list of topics was derived from suggestions by teachers and others as a result of earlier technical workshops and surveys. Faculty members reviewed and revised the topics and finalized the list for the survey instrument, taking into consideration the objectives of the vocational agriculture program.
2. Survey teachers. During the September 1980 area vocational agriculture teacher meetings, teachers of production agriculture and farm management completed the survey instrument. Teachers were asked to rate importance, knowledge, and application for each topic. These terms were defined on the survey instrument as follows:

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|--------------|--|
| Importance: | Importance of the topic to your job function. |
| Knowledge: | Your knowledge of this topic (your ability to accurately recall or summarize the subject matter). |
| Application: | Your ability to provide or to organize hands-on experiences for students (to have them apply the knowledge). |

The survey instrument had the following form, with one being low and five being high:

<u>Topic</u>	<u>Importance</u>	<u>Knowledge</u>	<u>Application</u>
1.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

A total of 307 teachers participated in the study.

- Rank competencies. The topics were then ranked according to the mean ratings obtained from the survey. For each topic, two relative weight scores were determined using the following formulas:

$$\text{Weighted Knowledge Score} = \frac{(\text{Importance Mean} - \text{Knowledge Mean})}{\text{Importance Mean}}$$

$$\text{Weighted Application Score} = \frac{(\text{Importance Mean} - \text{Application Mean})}{\text{Importance Mean}}$$

These relative weight scores were then ordered high to low. The topics with the greatest positive relative weight scores had the highest priority for being offered in a workshop for teachers.

- Compare high priority competencies with training program content. High priority topics determined from the above procedures were reviewed by teacher educators in the department. Topics were regrouped by departments within the College of Agriculture and listed in rank order on the basis of relative weight scores. Highest ranking topics were also reviewed in terms of the need for credit courses to be made available during the summer quarter. Since this was a needs assessment rather than evaluation survey, the need to compare topics with previous program content was not essential.
- Revise program or revise competency. As a final step, topics were presented to representatives of various departments in the College. Topics were scrutinized in terms of the availability of faculty to provide instruction, cost of instructional materials, potential enrollment, and time required to address the topic. Selected teachers of agriculture met with faculty of the departments to elaborate on the topics selected on the basis of the survey results.

Analysis

From the theory that served as a basis for the Borich model, it was hypothesized that there would be a significant difference among the rankings of the topics by importance scores, knowledge scores, and application scores. If the hypothesis was supported, then the evidence would show that selecting topics for inservice on the basis

of importance rankings or knowledge rankings or application rankings as perceived by vocational agriculture teachers would be less reliable than selecting topics based upon a combination of rankings.

The Friedman Two-Way Test of Analysis of Variance was applied using the rankings of the three variables (importance, knowledge, and application) for the 12 topics. Table 1 shows the results of the test. For all topics but one, there was a significant difference in the rankings of the topics.

Since the Friedman Test verified that there was a significant difference among the rankings of the inservice topics, the next step was to determine how the various rankings were related. Kendall tau coefficients were computed between Importance Mean and the following:

1. Knowledge Mean
2. Application Mean
3. Weighted Knowledge Score
4. Weighted Application Score

Table 2 shows the coefficients for the Kendall tau correlations.

An examination of the relationships among the rankings is an important part of the process. In analyzing the relationship between the importance score for each topic and the corresponding knowledge score, significant ($p < .001$) relationships exist ranging from Kendall tau coefficients of .18 to .33, with an additional relationship of .02. In comparing importance score to application score, Kendall tau coefficients ranged from .23 to .44.

Following the Borich model, the difference between the importance score and the knowledge score was determined, and then multiplied by the importance score. The same procedure was followed, substituting application scores for knowledge scores. Each of these weighted scores was compared with importance score. Kendall tau coefficients ranged from .44 to .70 for the relationship between importance and weighted knowledge scores. Kendall tau coefficients ranged from .39 to .63 for the importance scores correlated with weighted application scores. Higher coefficients were expected for the correlations with weighted scores than with raw scores because of the effect of the multiplication factor of the importance score.

Although the correlations between importance scores and weighted scores were stronger, these scores do not exceed a moderate correlation range (Kendall tau=.4 to .7). This point indicates the value of the Borich model in determining inservice education needs for teachers of vocational agriculture. If the importance scores were correlated more strongly with the weighted knowledge scores or the weighted application scores, then a case could be built supporting the use of only importance scores in determining inservice needs. Since the

Table 1
 Relationship Between Ranking of Twelve
 Inservice Education Topics Using
 Friedman's Two-Way ANOVA^a

Topic	Mean ranks			Chi-square
	Importance	Knowledge	Application	
1	2.51	1.79	1.70	116.62
2	2.32	1.85	1.83	46.71
3	2.45	1.75	1.80	89.37
4	2.44	1.79	1.76	89.21
5	2.42	1.83	1.75	80.51
6	2.35	1.82	1.83	55.67
7	2.42	1.79	1.79	82.21
8	2.42	1.83	1.76	81.03
9	2.39	1.81	1.80	67.78
10	2.07	2.02	1.91	4.47 ^b
11	2.35	1.82	1.83	54.95
12	2.51	1.70	1.79	119.64

^a $p < .001$

^b Not significant $p < .001$

Table 2
 Relationship Between Ranking of Twelve
 Inservice Education Topics and Weighted Scores
 Using Kendall Tau Coefficients^a

Topic	Importance with knowledge	Importance with application	Importance with weighted knowledge score	Importance with weighted application score
1	.02 ^b	.23	.70	.63
2	.18	.34	.66	.56
3	.28	.41	.59	.48
4	.25	.38	.60	.51
5	.25	.39	.57	.51
6	.31	.38	.54	.41
7	.33	.41	.50	.40
8	.26	.32	.60	.52
9	.24	.44	.44	.40
10	.24	.38	.45	.39
11	.25	.32	.47	.45
12	.28	.36	.58	.44

^a $p \leq .001$

^b Not significant $p < .001$

correlations are moderate at best, then there is clearly value in utilizing importance, knowledge, and application scores to determine needed topics for inservice education.

Conclusions

From the results of this study it can be concluded that teachers ranked the 12 inservice topics differently on the basis of importance, knowledge, and application. With one exception, the ranking of the topics varied significantly in all aspects. This verifies Borich's argument. The procedure of using only the importance rankings or the knowledge rankings or the application rankings may not be valid. A combination of two or more rankings must be considered to form conclusions regarding inservice education needs.

The results from using the Borich model appear to be promising. Priorities can be based on more than a survey of desires or felt needs. The model incorporated importance of specific topics and the knowledge of the topics as perceived by the rater. The model provided defensible data in identifying important topics in which teachers need further knowledge.

Reference

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