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Three Approaches for Assessing In-Service Training Needs Among Extension Workers of the Central Region of the Kingdom of Saudi Arabia

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Abstract. This study investigated the application of three approaches for assessing in-service training needs. These approaches are: perceived or self-reported needs, calculated needs by using Borich's formula, and calculated needs by using Training Needs Quotient formula. The sample of the study included 59 extension workers from the Central Region of the Kingdom. This sample represents about 32% of the total number of extension workers in this area. A questionnaire was designed, pretested, and applied for data collection. The areas of competency, which are essential for effective performance of extension work were included in the questionnaire. These areas are: management and organization of extension service, planning and evaluation of extension programs, extension methods and aids, rural development, research and evaluation, and technical agricultural subjects. The three approaches revealed that the respondent extension workers have considerably high degrees of training needs in all the investigated areas of educational competency. The study recommended that all the extension workers of the Central Region of the Kingdom should attend sufficient training programs to cover these areas.

Introduction

In-service training of extension staff is a key factor to the effective performance of all extension educational activities. Staff training, as stated by Swanson [1], is a term used to describe the programs and activities that are conducted by the organization for the purpose of maintaining and upgrading competencies of the staff to perform those tasks related to their jobs which aid the organization to reach its goals within its stated mission. The extension organization is responsible for the design and implementation of staff training programs which have the following general objectives: (1) to strengthen technical subject matter competencies, and, (2) to strengthen those educational process skills that aid in the delivery of programs to appropriate audiences [1]. Therefore, the assessment of training needs of extension workers is essential for the development of in-service training programs.

Knox [2] defines a "need" as a gap between a present, or initial, or existing set of circumstances and some changed set of circumstances. Both sets of circumstances can be defined in terms of knowledge, performance, and attitudes. An educational need, as defined by Knowles [3] p. 85, is any skill or competence that someone must learn for his own good or the collective good of a group or society. Borich [4] defined the training needs as: a discrepancy between an educational goal and trainee performance in relation to his goal. The process of identifying training needs can be conceptualized as a discrepancy analysis that identifies the two polar positions of "what is" and "what should be."

Caffarella [5] defines a "needs assessment" as a systematic procedure used to identify educational needs. In general, a need's assessment is the starting point for developing a curriculum, serving to determine the objectives and contents of an educational program to be aimed at a specific audience [6]. In the Kingdom of Saudi Arabia, lack of training opportunities for the extension workers, and the necessity to develop appropriate in-service training programs to upgrade their competencies in different areas of extension work, were verified and recommended by some studies. Among these studies are: Shibah and Al-zahrani [7], Shibah [8], Al-shenaifi [9], Al-zahrani and Shibah [10], Rizk and El-nassar [11], Shibah [12].

Extension work involves different functions and activities which necessitate that the extension worker should possess certain capabilities and competencies. Six areas of competency seem to be essential for the effective performance of extension activities. These areas have been applied, verified, and agreed upon by many authors and researchers in extension education. Each area includes a number of items. These areas and their content items are:

1. **Management and organization of extension service** (which includes 10 content items), as follows:

- objectives and organization of agricultural extension,
- responsibilities and competencies of extension workers,
- administrative planning,
- role and tasks of administrator in agricultural extension,
- making and executing appropriate decisions,
- office management,
- personnel management in agricultural extension,
- budget management and accounting,
- reporting and public relations, and,

- methods of training extension workers.

2. **Planning and evaluation of extension programs** (7 content items):

- scientific analysis of agricultural problems,
- identifying priorities in extension planning,
- data collection,
- development of annual plans of work,
- development of long range extension plans,
- execution of extension plans, and,
- program evaluation and determination of progress.

3. **Extension methods and aids** (6 content items):

- general understanding of extension methods,
- utilization of extension aids,
- utilization of method demonstration,
- utilization of result demonstration,
- utilization of extension fields, and,
- design and production of extension publications.

4. **Rural development** (8 content items):

- factors affecting rural life,
- migration and resettlement,
- methods of identifying problems in rural areas,
- adoption of agricultural technology,
- the role of social mores and traditions in extension work,
- utilizing local leaders in rural development,
- the role of mass media in rural life, and,
- designing and conducting social studies.

5. **Research and evaluation** (7 content items):

- methods of scientific research and evaluation,
- using research and evaluation results in extension program development,
- designing and conducting evaluation studies,
- designing and conducting research surveys in extension,
- knowledge of concepts and terms used in research,
- using statistical methods in data analysis , and,

- the role of research in improving extension.

6. **Technical agricultural subjects** (12 content items):

- conservation and maintenance of water,
- conservation and reclamation of soil,
- greenhouses,
- methods of irrigation and drainage,
- operation and maintenance of agricultural machines,
- fertilization of soil,
- identification of pests and plant pathology,
- management of poultry projects,
- pastures and their utilization in animal production,
- range management and proteciton,
- assessment of farm productivity, and,
- farm management.

The objectives of the study are as follows:

1) to compare three methods for identifying the in-service training needs of the extension workers of the Central Region of Saudi Arabia, concerning the areas, of competencies essential for the effective performance of their jobs.
2) to discover the extent to which the results highlight the needs among the Central Region extension workers for training in the six content areas under review.
3) to suggest appropriate recommendations based on these results.

Methodology

This study was conducted in the Central Region of the Kingdom of Saudi Arabia. A mail questionnaire was sent to 186 extension workers comprising all the extension workers in this region. A total of 62 extension workers respondeld to the questionnaire, out of which 3 questionnaires were excluded due to incomplete and/or unreliable answers. Therefore, the sample of the study was 59 extension workers representing 31.7% of the total number of extension workers. The six areas of educational competency, required for the effective performance of extension work, were included in the questionnaire. Those areas were represented by 50 content items. Each extension worker was asked to answer three questions: (1) how important is each content item to his work, (2) how much knowledge has he in each item, and (3) how much training does he need in each item. Based on a Likert scale, the possible responses to each question in each item were: 1,2,3,4,5, and the respondent was instructed to put a circle around the number which expresses his response to each item, considering that 1 represents the lowest degree, 2 "low", 3 "moderate", 4 "high", and 5 repreisents the highest degree "very high." Three approaches were used to measure the in-service training needs of the respondent extension workers. These approaches are as follows:

1. Perceived training needs, which represent the self-reported needs, were measured by the responses to the third question.

2. Calculated training needs were measured by using the responses to the first and the second questions. Two different formulas were used for that purpose:

$$Tn = (In - Kn)\, Ig\ , [4],$$

where: Tn = calculated training need,
In = level of importance of each competency perceived by a respondent,
Kn = the perceived amount of knowledge possessed by a respondent in a competency, and
Ig = the average mean score of the perceived importance of a competency by the whole sample of respondents.

$$TNQ = \frac{OSIJ}{MSIJ} \times 100\ , [13],$$

where: TNQ = training need quotient,
OSIJ = sum of observed scores of Jth individual for Ith item,
and: MSIJ = maximum score attributable to the Ith item rated by Jth individual.

Percentages, averages, standard deviations, and Pearsons product moment correlation coefficients were used for data presentation and analysis. Data was analyzed by using the Statistical Analysis System (SAS) in the computer center of the King Saud University.

Results and Discussion

Tables 1 through 6 present the results of the first and the second approaches "the perceived or self-reported needs, and the calculated needs by using Borich's (TN) formula." The review of these tables reveal that the respondent extension workers (REW) have considerably high degrees of in-service training needs in most of the content items included in the different areas of competency. Those results could be summarized as follows:

1. Management and organization of extension service

As shown in Table 1, considerably high proportions of the REW showed high degrees of perceived needs concerning all the content items included in this area. The average mean score of perceived needs in this area ranged from 3.13 to 3.74, with a standard deviation ranging from 1.03 to 1.43. The profile of the calculated needs in the same area was slightly different, since the high degrees of calculated needs were found in 7 content items only. The average mean scoreof calculated needs ranged from 1.29 to 3.97, with a standard deviation ranging from 3.57 to 5.13. Yet, the correlation coefficients, between the scores of the two approaches, were significant and positive in 8 content items, which indicate that the two approaches are associated in their results. The other important indication is that the REW were able to determine their in-service training needs objectively.

2. Planning and evaluation of extension programs

All the content items of this area were both perceived and calculated as highly needed by the REW. As presented in Table 2 the average mean score of perceived needs ranged from 3.58 to 3.88, with a standard deviation ranging from 1.11 to 1.27. On the other hand the average mean score of the calculated needs ranged from 2.25 to 5.09, with a standard deviation ranging from 4.06 to 5.56. The correlation coefficients were significant and positive in 6 content items.

3. Extension methods and aids

As shown in Table 3 all the content items included in this area were perceived and calculated as highly needed by the REW. The average mean score of perceived needs ranged from 3.43 to 3.58, with a standard deviation ranging from 1.12 to 1.24. The average mean score of calculated needs ranged from 1.76 to 3.20, with a standard deviation ranging from 4.73 to 5.57. Correlation coefficients were significant and positive in 5 content items.

4. Rural development

All the content items of this area were both perceived and calculated as highly needed by the REW. As shown in Table 4 the average mean score of perceived needs ranged from 3.05 to 3.84, with a standard deviation ranging from 0.89 to 1.34. The average mean score of calculated needs ranged from 1.23 to 3.39, with a standard deviation ranging from 3.76 to 5.52. Correlation coefficients were significant and positive in 7 content items.

5. Research and evaluation

All the content items of htis area were both percieved and calculated as highly needed by the REW. As shown in Table 5, the average mean score of perceived needs ranged from 3.57 to 3.98, with a standard deviation ranging from 1.10 to 1.26. The average mean score of calculated needs ranged from 3.24 to 5.49, with a standard deviation ranging from 4.52 to 7.29. Correlation coefficients were significant and positive in all the items of this area.

6. Technical agricultural subjects

As shown in Table 6, all the content items of this area were both perceived and calculated as highly needed by the REW. The average mean score of percieved needs ranged from 3.38 to 4.12, with a standard deviation ranging from 0.87 to 1.29. The average mean score of calculated needs ranged from 2.51 to 5.44, with a standard deviation ranging from 4.68 to 6.83.

To comapre the results of applying the second and the third approaches; "Borich's (TN) formula, and the training needs quotients (TNQ) formula"; the average total scores of the REW in each of the 6 areas of competency were used. As shown in Table 7, both approaches revealed a medium or high degrees of calculated training needs in all the areas of competency. The average mean score of calculated needs by using TN formula ranged from 2.49 to 4.27, with a standard deviation ranging from 2.96 to 4.63. The average mean score of calculated needs by using TNQ formula ranged from 67.2 to 431.2, with a standard deviation ranging from 17.7 to 21.8. Correlation coefficients between the scores calculated from the two formulas were significant and positive in the areas of competency.

Conclusions and Recommendations

Based on the results of the study the following conclusions could be reached:

1. The respondent extension workers have considerably high degrees of in-

Table 1. **Perceived and calculated training needs of the REW in the competency area of management and organization of extension service**

Management and organization of extension service	Training needs										
	Perceived					Calculated					
	%	%	%			%	%	%			
Content items	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
–objectives and organization of agric. extension	16.6	21.1	61.3	3.61	1.22	32.2	40.7	27.1	3.97	3.99	0.612**
–responsibilities and competencies of extension workers	17.8	30.4	51.8	3.48	1.16	42.4	22.0	35.6	3.80	4.72	0.222
–administrative planning	21.4	30.4	48.2	3.34	1.12	30.5	25.4	44.1	2.55	4.40	0.444**
–role and tasks of administrator in agric. extension	15.8	38.6	45.6	3.39	1.18	13.6	47.5	38.9	1.52	4.05	0.358**
–making and performing appropriate decisions	18.2	27.3	54.5	3.53	1.18	15.3	35.6	49.1	1.84	4.70	0.147
–office management	24.5	28.1	47.4	3.33	1.17	20.4	37.3	42.3	1.29	4.75	0.412**
–personnel management in agric. extension	14.1	22.8	63.1	3.60	1.03	5.1	39.0	55.9	2.63	3.57	0.488**
–budget management and accounting	30.3	26.8	42.9	3.13	1.43	13.6	37.3	49.1	2.37	3.92	0.572**
–reporting and public relations	17.8	28.6	53.6	3.48	1.24	17.0	37.3	45.7	1.61	3.96	0.425**
–methods of training extension workers	13.8	24.1	62.1	3.74	1.15	11.9	25.4	62.7	2.32	5.13	0.482**

L = low (scores 1,2)
M = medium (scores 3)
H = high (scores 4.5)
r = pearson's correlation coefficient

* Significant at 0.05 level.
** Significant at 0.01 level.

Table 2. **Perceived and calculated needs of the REW in the competency area of planning and evaluation of extension programs.**

Planning and evaluation of extension Programs	Training needs										
	Perceived					Calculated					
	%	%	%			%	%	%			
Content items	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
– scientific analysis of agricultural problems	10.5	19.3	70.2	3.88	1.15	8.5	18.6	72.9	5.09	5.28	0.469**
– identifying priorities in extension	12.3	21.1	66.6	3.74	1.17	10.2	20.3	69.5	4.12	4.95	0.398**
– data collection	17.5	17.5	65.0	3.58	1.21	11.9	39.1	49.1	2.25	4.06	0.187
– development of annual plans of work	14.2	19.6	66.2	3.75	1.18	11.9	25.4	62.7	4.10	5.34	0.350**
– development of long range extension plans	15.8	17.5	66.7	3.67	1.27	15.3	23.7	61.0	4.14	5.56	0.451**
– execution of extension plans	12.3	29.8	57.9	3.65	1.14	23.7	22.0	54.3	2.38	5.27	0.335**
– program evaluation and determination of progress	17.5	14.0	68.5	3.61	1.11	13.6	18.6	61.8	3.86	5.15	0.372**

* Significant at 0.05 ** Significant at 0.01

Table 3. **Perceived and calculated training needs of REW in the competency area of extension methods and aids.**

Extension methods and aids	Training needs										
	Perceived					Calculated					
	%	%	%			%	%	%			
Content items	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
– general understanding of extension methods	24.6	26.3	49.1	3.47	1.24	18.7	25.4	55.9	2.71	5.57	0.242
– utilization of extension aids.	20.0	20.0	60.0	3.53	1.21	8.5	35.6	55.9	3.20	4.73	0.321**
– utilization of method demonstration	15.8	26.3	57.9	3.54	1.12	13.7	28.8	47.5	1.76	5.34	0.402**
– utilization of result demonstration	21.4	28.6	50.0	3.43	1.19	13.6	32.2	54.2	2.19	4.74	0.299**
– utilization of extension fields	19.3	22.8	57.9	3.58	1.21	13.6	37.3	49.1	2.43	5.06	0.381**
– design and production of extension publications	21.4	26.8	51.8	3.45	1.23	22.0	27.1	50.9	2.79	5.19	0.351**

* Significant at 0.05 level. ** Significant at 0.01 level.

Table 4. Perceived and calculated training needs of the REW in the competency area of rural development.

Rural development	Training needs										
	Perceived					Calculated					
	%	%	%			%	%	%			
Content items	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
– factors affecting rural life	15.4	30.9	54.7	3.13	1.09	18.7	28.8	52.5	2.77	5.52	0.277*
– migration and resettlement	32.8	30.9	36.3	3.05	1.33	23.7	39.0	37.3	1.23	3.76	0.346**
– methods of identifying problems in rural areas	12.3	36.8	50.9	3.33	0.89	17.0	18.6	64.4	3.39	5.38	0.319**
– adoption of agricultural technology	7.2	25.0	67.8	3.84	0.99	11.9	23.7	64.4	2.99	5.31	0.467**
– the role of social mores and traditions in extension work	21.1	31.6	47.3	3.32	1.23	10.2	35.6	54.2	2.95	4.33	0.183
– utilizing local leaders in rural development	16.1	28.6	55.3	3.57	1.13	17.0	30.5	59.5	2.01	4.50	0.463**
– the role of mass media in rural life	22.3	24.1	53.6	3.44	1.33	13.6	37.3	49.1	2.65	4.51	0.406**
– designing and conducting social studies	23.2	26.8	50.0	3.38	1.34	16.9	27.1	56.0	2.57	4.24	0.533**

* Significant at 0.05 level. ** Significant at 0.01 level.

Table 5. Perceived and calculated training needs of REW in the competency area of research and evaluation.

Research and evaluation	Training needs										
	Perceived					Calculated					
	%	%	%			%	%	%			
Content items	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
– methods of scientific research and evaluation	12.5	10.7	76.8	3.96	1.13	16.9	20.3	62.8	4.15	6.23	0.465**
– using research and evaluation results in extension program development	14.0	15.8	70.2	3.77	1.24	10.2	15.3	74.5	5.49	5.78	0.301*
– designing and conducting evaluation studies	12.5	19.6	67.9	3.82	1.13	6.8	25.4	67.8	4.15	4.52	0.422**
– designing and conducting research surveys in extension	16.1	28.6	55.3	3.57	1.26	10.2	32.2	57.6	3.24	4.73	0.555**
– knowledge of concepts and terms used in research	17.6	21.1	61.3	3.70	1.10	11.9	22.0	66.1	3.86	5.62	0.455**
– using statistical methods in data analysis	17.9	21.4	60.7	3.68	1.19	11.9	23.7	64.4	4.64	5.95	0.329**
– the role of research in improving extension	9.1	20.0	70.9	3.98	1.18	13.6	16.9	70.5	4.34	7.29	0.375**

* Significant at 0.05 level. ** Significant at 0.01 level.

Table 6. Perceived and calculated training needs of the REW in the competency area of technical agricultural subjects.

Technical agricultural subjects	Training needs										
	Perceived					Calculated					
	%	%	%			%	%	%			
Content items	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
–conservation and maintenance of water	6.8	24.1	69.1	3.93	1.02	10.2	18.6	71.2	5.44	6.80	0.264*
–conservation and reclamation of soil	8.8	17.5	73.7	3.96	1.13	18.5	22.0	69.5	5.32	6.83	0.376**
–green houses	5.3	21.1	73.6	4.12	0.93	8.5	30.5	61.0	4.03	5.61	0.435**
–methods of irrigation and drainage suitable for the area	12.3	22.8	64.9	3.84	1.16	8.5	27.1	64.4	4.63	5.98	0.430**
–operation and maintenance of agricultural machines	7.0	21.1	71.9	3.91	0.87	10.2	20.3	69.5	5.22	5.87	0.293*
–fertilization of soil	8.8	17.9	73.3	3.96	1.14	8.5	25.4	66.1	4.93	6.41	0.395**
–identification of pests and plant pathology	7.2	19.6	73.2	4.09	1.12	13.6	22.0	64.4	4.03	6.66	0.421**
–management of poultry projects	21.8	27.3	50.9	3.38	1.28	17.0	30.5	52.5	2.51	4.68	0.402**
–pastures and their utilization in animal production	18.2	18.2	63.6	3.56	1.18	3.4	32.2	64.4	4.21	4.86	0.418**
–range management and protection	27.3	14.5	58.2	3.45	1.29	18.5	35.6	45.9	3.47	4.99	0.345**
–assessment of farm productivity	5.4	26.8	67.8	3.91	0.94	11.9	25.4	62.7	3.70	5.75	0.327**
–farm management	7.2	25.0	67.8	3.88	0.95	11.9	22.0	66.1	3.74	5.97	0.329**

* Significant at 0.05 level ** Significant at 0.01 level

Table 7. Calculated training needs of the REW in the six arease of competency by using TN formula and TNQ formula.

Areas of competency	TN Formula					TNQ formula					
	%	%	%			%	%	%			
	L	M	H	$\bar{X}$	S.D	L	M	H	$\bar{X}$	SD	r
–management and organization of extension service	18.7	49.0	32.3	2.49	2.96	17.0	49.3	33.7	67.2	18.6	0.530**
–planning and evaluation of extension programs	30.6	33.7	35.7	3.71	4.16	27.2	35.4	37.4	72.0	21.8	0.373**
–extension methods and aids	35.7	42.2	22.1	2.51	3.88	32.3	43.9	23.8	67.7	21.8	0.389**
–rural development	34.0	37.1	28.9	2.57	3.50	32.3	47.3	20.4	65.0	20.1	0.488**
–research and evaluation	34.0	39.1	26.9	4.27	4.49	28.9	37.4	33.7	431.2	17.7	0.506**
–technical agricultural subjects	27.2	30.3	42.5	4.27	4.63	22.1	38.8	39.1	74.2	18.3	0.400**

* Significant at 0.05 level ** Significant at 0.01 level

service training needs in all the areas of competency. Therefore, sufficient training programs which cover these areas should be designed and attended by all the extension workers of the Central Region of the Kingdom.

2. The three approaches, used for assessing in-service training needs were consistent in their results. Two important implications are worth mentioning:

– the respondent extension workers were able to assess their training needs objectively. This ability could reflect an indication of high perception and awareness of their needs and their high aspirations for professional development.

– there is no necessity to use more than one approach to assess training needs, in the sense that one approach could replace the other two approaches, and consequently could be enough for needs assessment. It is important to note that this implication is only applicable for the Central Region of the Kingdom, and therefore, should be tested and verified in other Regions of the Kingdom.

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ثلاثة مداخل لتقدير احتياجات التدريب أثناء الخدمة للمرشدين الزراعيين بالمنطقة الوسطى بالمملكة العربية السعودية

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ملخص البحث. استهدفت هذه الدراسة تقدير احتياجات التدريب أثناء الخدمة للمرشدين الزراعيين وذلك باستخدام ثلاثة مداخل مختلفة وهي مقياس الاحتياجات المدركة، وقياس الاحتياجات المحسوبة باستخدام معادلة بوريك، وكذلك قياس الاحتياجات باستخدام معادلة معامل الاحتياجات التدريبية المحسوبة. وقد شملت الدراسة **٥٩** مرشدًا زراعيًا من العاملين في المنطقة الوسطى بالمملكة وهي عينة تشكل نحو **٣٢**٪ من إجمالي المرشدين الزراعيين العاملين في هذه المنطقة. وقد تم تصميم استمارة استبيان لجمع بيانات الدراسة وتم اختبارها مبدئيًا وتطبيقها على المرشدين الزراعيين المبحوثين. واشتملت هذه الاستمارة على مجموعة من الأسئلة تتعلق بقياس احتياجات التدريب أثناء الخدمة للمرشدين الزراعيين في المجالات التي تعتبر ضرورية للأداء الفعال لوظيفة المرشد الزراعي، وهذه المجالات هي: إدارة وتنظيم الخدمة الإرشادية، تخطيط وتقويم البرامج الإرشادية، طرق ومعينات الإرشاد الزراعي، التنمية الريفية، الأبحاث والتقويم، والموضوعات الزراعية الفنية.

وقد تبين من نتائج الدراسة وجود درجات عالية من احتياجات التدريب أثناء الخدمة للمرشدين الزراعيين المبحوثين في جميع المجالات التي شملتها الدراسة، كما اتضح وجود إتساق في نتائج تطبيق المداخل الثلاثة موضع الاختبار. وقد أوصت الدراسة بضرورة تنظيم وعقد دورات تدريبية أثناء الخدمة للمرشدين الزراعيين بالمنطقة الوسطى في المجالات التي شملتها الدراسة.