

Study on Development of Cognitive Learning Scale to Measure the Knowledge - Level about Health Status

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ABSTRACT

Two hundred and fifteen items were initially constructed on the basis of promoting thinking rather than memorization and differentiate the well-known target people from the poorly known ones in relation to knowledge of health status. The scores from samples respondents were subjected to item analysis, comprising of item difficulty index and item-discrimination. The scores from subjects were computed for item analysis comprising of item difficulty and item discrimination index. Forty-seven items with difficulty index ranging from 30% – 80% and discrimination index ranging from 0.33 to 0.55 were included in the final format of the knowledge test. The reliability of the knowledge test was found to be 0.896 and 0.899 in split-half and test-retest methods respectively which was quite satisfactory ($P < 0.01$). Hence the knowledge test constructed was highly stable and dependable for measurement.

Key words: Cognitive learning scale; Health status; Knowledge level;

The quality and the quantity of food are the basic attributes of health condition of living beings. The health status of a population is therefore primarily dependent upon the dietary intake but the knowledge about health status including proper hygienic practices is the path to improve the nutritional status of an individual or a community. Knowledge was defined in this study included those behaviors and test situations which emphasized the remembering either by recognition or recall of ideas, material or phenomenon (Bloom et al. 1956). The knowledge about health status is related to different health habits, physical and mental health, child care, pregnancy management, family planning, nutritional requirements, health education etc. Availability of a reliable instrument to measure the knowledge levels about health status is essential besides anthropometric measurement for achieving this objective. In the absence of any such scale, at present an attempt has been made to develop a cognitive learning scale to measure the knowledge level of an individual about the health status.

METHODOLOGY

Item collection and selection: The content of knowledge test was composed of questions called items. Items for the test were compiled from different subject related sources for administering the target samples to know the knowledge level about their health status. The selected items should promote thinking rather than rote-memorization, and it should differentiate the well-known

target people from the poorly known ones and should have a certain difficulty value. Based on these two criteria 215 items were initially constructed for administering to the samples for item analysis and screened out further items. All the 215 items collected for construction of the knowledge test in objective form and were dichotomous or multiple-choice format.

Item analysis: The item analysis of a test yielded two kinds of information; item difficulty and item discrimination. The index of the item difficulty revealed how difficult an item was where as the index of discrimination indicated the extent to which an item discriminated to well inform individuals from the poorly informed ones. The items were checked and modified on the basis of pre testing and administered to randomly select 90 samples of three different zones- Municipality (30), Corporation (30), and Panchyat (30) area for item analysis. Each one of the 90 respondents, to whom the test was administered was given score 1 or 0 for each item according to whether the answer was right or wrong. The total number of the correct answers given by a sample out of 215 items was the knowledge score secured by him/her. After calculating the scores obtained by 90 samples, the scores were arranged in a descending order. These 90 samples were then divided into six equal group, each having 15 samples. Samples in each group were arranged in descending order according to the total score obtained by each one of them. These groups were

Table: 1. Difficulty and discrimination indices (e1/3) of the selected items of knowledge test

S. No.	f				F	DI	DisI
	G1	G2	G5	G6			
1	13	5	2	1	29	32.22222	0.5
2	13	5	2	1	27	30	0.5
3	12	5	2	1	28	31.11111	0.466667
4	12	6	4	2	36	40	0.4
5	14	10	4	4	46	51.11111	0.533333
6	13	6	4	3	37	41.11111	0.4
7	12	9	5	2	44	48.88889	0.466667
8	14	7	4	2	42	46.66667	0.5
9	14	3	2	0	28	31.11111	0.5
10	13	7	6	5	50	55.55556	0.3
11	13	5	4	4	40	44.44444	0.333333
12	10	5	5	1	36	40	0.3
13	14	9	8	2	57	63.33333	0.433333
14	10	7	4	2	40	44.44444	0.366667
15	10	5	4	2	32	35.55556	0.3
16	14	9	6	3	47	52.22222	0.466667
17	13	7	4	3	41	45.55556	0.433333
18	14	9	7	3	52	57.77778	0.433333
19	14	5	7	2	38	42.22222	0.333333
20	12	7	2	2	28	31.11111	0.5
21	15	6	4	1	39	43.33333	0.533333
22	15	10	5	6	54	60	0.466667
23	15	11	8	4	60	66.66667	0.466667
24	9	3	1	0	27	30	0.366667
25	10	8	7	1	46	51.11111	0.333333
26	13	6	4	2	41	45.55556	0.433333
27	13	11	7	2	52	57.77778	0.5
28	13	12	7	3	58	64.44444	0.5
29	13	11	9	4	60	66.66667	0.366667
30	13	11	7	2	54	60	0.5
31	13	10	5	2	50	55.55556	0.533333
32	11	6	3	0	35	38.88889	0.466667
33	10	6	3	1	32	35.55556	0.4
34	11	9	5	5	49	54.44444	0.333333
35	10	3	3	0	27	30	0.333333
36	12	5	2	0	29	32.22222	0.5
37	15	12	10	7	69	76.66667	0.333333
38	15	13	9	8	70	77.77778	0.366667
39	15	13	11	5	68	75.55556	0.4
40	11	13	9	4	57	63.33333	0.366667
41	12	9	6	2	44	48.88889	0.433333
42	13	10	6	7	51	56.66667	0.333333
43	12	9	4	2	41	45.55556	0.5
44	15	10	7	6	60	66.66667	0.4
45	14	13	10	4	65	72.22222	0.433333
46	14	11	8	7	61	67.77778	0.333333
47	12	11	7	6	59	65.55556	0.333333

f = Frequencies of correct answers given for each group of respondents. (N=10 for each group)
 F = Total frequencies of correct answers. (N=60)
 DI = Difficulty index (P), DisI= Discrimination Index (E 1/3) named as G1, G2, G3, G4 G5, G6, respectively. For item analysis the middle two groups (G3, G4) were rejected. The first two groups (G1, G2) and last two groups (G5, G6) were considered for computation of item difficulty and item discrimination indices. The range of the scores obtained by the four groups of the respondents were as follows: G₁= 88–122, G₂=121 – 98, G₅=6–47, G₆= 46 –31. The maximum score was obviously

215, which could be scored when all the 215 items were answered correctly. The data pertaining to the correct responses from the items in respect of these four groups were tabulated.

Item difficulty index: The difficulty index of an item was defined as the proportions of correct answer given by the samples to that particular item. This was calculated by the formula:

$$P_i = n_i \times 100 / N_i$$

Where,

P_i = Difficulty index in percentage of ith item.

n_i = Number of respondents giving correct answer to ith item.

N_i=Total number of samples to whom ith item was administered.

Item discrimination index: The discrimination index was obtained by calculating the Phi-Coefficient as formulated by Perry and Michael (1951). However, Mehta (1958) in using E 1/3 method to find out item discrimination emphasized that this method was analogous to, and hence, a convenient substitute for the Phi-Coefficient. The method suggested by Mehta (1958) was adopted for the present study. The formula by which the item discrimination index was calculated is given below:

$$E\ 1/3 = (S_1 + S_2) - (S_5 + S_6) / N/3$$

Where, S₁, S₂, S₅ and S₆ were the frequencies of correct answers in G₁, G₂, G₅, G₆ groups respectively, and

N= Total number of respondents in the sample of item analysis.

RESULTS AND DISCUSSION

Selection of items for test: Two criteria viz item difficulty index and item discrimination index were considered for selection of items in the final format of the knowledge test.

The underlying assumption in the statistics of item difficulty was that the difficulty was linearly related to the level of individual's knowledge about health status. When a respondent passed an item, it was assumed, as Coombs (1950) described, that the items was less difficult than his ability to cope with it. In the present study, items with difficulty index ranging from 30 to 80 and discrimination index ranging from 0.33 to 0.55 were included in the final format of the knowledge test. The knowledge test had all total 47 items which fulfilled both the criteria were selected for the final format of knowledge test (Table No.1 & 2).

Scoring Method: The summation of scores for correct replies over all the items of a particular respondent indicated his/her level of knowledge about health status. The range of scores was, therefore, from 0 to 47.

Reliability of knowledge test: The reliability of the knowledge test developed was tested in two ways.

1. *Split-half method:* All the 47 items of the knowledge test were first arranged randomly (simple random sampling) and then divided in to two parts. In these two sets, one set having 23 items with odd numbers and other set having 24 items with even numbers were administered to 50 respondents separately. The coefficient of correlation

Table: 2. Selected items on knowledge level towards health status

S. No	Items	Answer
1	What is over weight?	
2	What is under weight?	
3	What is obesity?	
4	Do you think sugar rich foodstuffs are necessary to make a balanced diet?	
5	Do you think that the nutritive value of foods will be minimised due to cooking?	
6	Do you think that nutritional aspect is necessary for judging the food products and processing?	
7	Do you think that vegetables are the source of fibre? *What is the nutritional importance of milk & milk products?	
8	Source of protein	
9	Source of vitamin B2	
10	Do you think that fats and oil are source of energy?	
11	What should be the gap between two consecutive meals? (Minimum 3-4 hrs)	
12	Do you think that intake of fruits in an empty stomach is good for health?	
13	What is an ideal age for pregnancy? (18-35yrs)	
14	Do you think that only breast milk is sufficient for the growth & development of the baby up to 6months? *What are the symptoms of the under nutrition?	
15	Easy falling of hair	
16	Develop rashes in face	
17	Develop dermatitis	
18	Develop angular stomatitis	
19	Crack formation on the tongue	
20	Xerosis	
21	Roughness & rashes in the skin	
22	How long sleeping is necessary for adults? (8-10 hrs/day)	
23	What should be the minimum water intake daily for an adult? (2-3lit/day)	
24	What is the first immunization of the baby? Colostrums feeding	
25	What is an ideal time for starting complementary feeding?	
26	Do you think that only women are under vulnerable part of our society? Why the breast milk is better than non human milk?	
27	Easily digestible	
28	Clean & pure	
29	No cost	
30	No preparation time	
31	Give strength to the baby	
32	Natural immunization	
33	Do you think breast-feeding have any role to postpone the next pregnancy?	
34	What should be the age gap between two children? Minimum 2yrs	

35	Which type of cooked foods gives more nutritious value at a time? (Mixture of cereals & pulse)
36	Which type of diet is preferable for gastritis, & any operation cases? (Bland diet) Depending on the general perception what is the sign of Good health status of a normal person?
37	Good posture
38	If the weight is proportion to the height & age
39	Skin is clean & smooth
40	Eyes are bright & clear
41	Tongue is pink , uncoated, moist What should be the protective measures for worm borne Disease?
42	Proper inspection of food products
43	Proper inspection of cooking products
44	Proper disposal of waste products
45	Maintaining of the sanitary hygiene
46	Don't you agree that fast food is good for health?
47	If the cook is affected by some contaminated diseases, does there any possibilities to affect the other's health status through foods which is cooked by that person?

(Correct answer-1) (Incorrect answer-0)

between two sets of scores was computed and the value 0.896 was found to be significant at 1% level. The reliability co-efficient, thus obtained, indicated that the “internal consistency” of the knowledge test developed for the study was quite high.

2. Test-Retest method: The knowledge test with 47 items was administered to 30 respondents, twice at an interval of 15 days. The co-efficient of correlation value was 0.899, which was found to be significant at 1% level. Hence, the knowledge test constructed was highly stable and dependable for measurement of this variable.

Content Validity of Knowledge Test: In the final selection of items, care was taken to include items covering the entire universe of relevant behavioural aspects of the respondents with respect to knowledge about health status. Items were collected through various sources including specialists and hence it was assumed that the scores obtained by administrating this test-measured knowledge of the respondents as intended.

CONCLUSION

Reliability co-efficient found through the reliability knowledge test indicated ‘internal consistency’ developed was quite high. The co-efficient of correlation value was found to be significant at 1% level and the knowledge test constructed was highly stable and dependable.

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