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Development And Standardization Of A Problem Solving Ability Scale

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Abstract: Problem solving is a state of desire for reaching a definite goal from a present condition that either is not directly moving toward the goal, is far from it, or needs more complex logic for finding a missing description of conditions or steps toward the goal. In psychology, problem solving is the concluding part of a larger process that also includes problem finding and problem shaping. The study of problem solving ability scale is a significant one and for which the investigator has decided to develop and standardize a scale to measure it.

Keyword: Development , Ability Scale , Standardization , Psychology.

INTRODUCTION

Problem solving has two major domains: mathematical problem solving and personal problem solving where, in the second, some difficulty or barrier is encountered. Further problem solving occurs when moving from a given state to a desired goal state is needed for either living organisms or an artificial intelligence system. While problem solving accompanies the very beginning of human evolution and especially the history of mathematics, the nature of human problem solving processes and methods has been studied by psychologists over the past hundred years. Methods of studying problem solving include introspection, behaviorism, simulation, computer modeling, and experiment. Social psychologists have recently distinguished between independent and interdependent problem-solving. As there is no suitable tool available to study the school and college students and teachers' problem solving ability scale, the investigator have decided to construct and standardize a scale to measure the students and teachers problem solving ability. This Likert type scale is a five- point scale of "Always", "Often", "Sometime", "Rarely" and "Never". 50 items have been collected from the various sources like Experts in Psychology, Teacher Educators, Books, Journals, Internet and so on.

PILOT STUDY

This scale with 55 items has been administered to the sample of 200 students and teachers (100 Higher secondary school students and 100 Higher secondary, College teachers) studying in different higher secondary schools and working in different higher secondary schools and different colleges of Madurai District, Tamil Nadu, India, in order to carry out the pilot study. Then their responses have been scored carefully and their marks secured by all the samples have been arranged in the descending order from the highest scorer to the lowest scorer. Then they were subjected to item analysis.

ITEM ANALYSIS

The next step in the standardization of a problem solving ability scale after pilot study is to find out the t-value of each item, which forms the basis for item selection in order to build up the final scale. The Likert type scale calls for a graded response to each item on a five-point scale ranging from "Always", to "Never". The individual score for all the 200 students and teachers were ranked from the highest to the lowest score. Then 25% of the subjects with the highest total scores and 25% of the subjects with the lowest total scores were sorted out for the purpose of item selection. The high and low groups, were selected, formed the criterion groups and each group was made up of 50 students (Edward. L. Allen, 1957).

It may be recalled that each item is followed by five different responses of "Always", "Often", "Sometime", "Rarely" and "Never" in the problem solving ability scale. Then each item was taken individually and the number of teachers who responded "Always", "Often", "Sometime", "Rarely" and "Never" was found out both the high and low groups separately. Thus for all the 55 items, the number of students and teachers coming under each category was found out separately for both the high and low groups and the t-values for all the 55 items have been calculated with the formula suggested by Allen Edwards(1957). As many as 40 items having the t-value greater than or equal to 1.75 (Edward. L. Allen, 1957) have been chosen in order to form the final scale (vide: Table-I). Then this final scale has been administered to 200 students and teachers studying in different higher secondary schools and working in different higher secondary schools and different colleges of Madurai District, Tamil Nadu, India, in order to establish the scoring procedure, validity and reliability of this scale.

TABLE – I
ITEM SELECTED FOR ITTTS

Item Number	't' Value	Item selected
1	2.26	S
2	1.84	S
3	3.26	S
4	1.82	S
5	1.95	S
6	2.56	S
7	2.75	S
8	1.24	NS
9	1.92	S
10	2.46	S
11	2.68	S
12	2.58	S
13	1.42	NS
14	3.53	S
15	2.82	S
16	1.25	NS
17	3.24	S
18	1.24	NS
19	2.95	S
20	1.42	NS
21	2.26	S
22	4.42	S
23	3.92	S
24	1.08	NS
25	4.22	S
26	1.42	NS
27	3.52	S
28	0.94	NS
29	2.66	S
30	2.68	S
31	1.94	S
32	0.84	NS
33	2.85	S
34	1.92	S
35	1.26	NS
36	3.16	S
37	3.84	S
38	1.02	NS
39	1.82	S
40	2.48	S
41	2.24	S
42	1.06	NS
43	3.62	S
44	1.92	S
45	3.26	S
46	3.62	S
47	4.52	S
48	1.25	NS
49	2.42	S
50	3.30	S
51	1.42	NS
52	2.26	S
53	4.42	S
54	3.92	S
55	1.08	NS

S – Selected NS – Not selected

SCORING PROCEDURE

The scale has 40 items; an individual score is the sum of the scores of all the 40 items. The scores range from 0 to 160. Higher score indicates the high level of problem solving ability and the details of scoring are given in the following table.

The scoring to the response given by the respondents should be like the following

TABLE – II

Response	Score
Always	4
Often	3
Sometime	2
Rarely	1
Never	0

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RELIABILITY:

Reliability refers to the consistency with which a test measures, whatever it measures. The concept of reliability suggests both stability and consistency of measurement. The investigator calculated the reliability analysis and it was given in the following table.

TABLE – III
TABLE SHOWING THE RELIABILITY METHOD AND CO-EFFICIENT VALUES

METHOD OF RELIABILITY ANALYSIS	RELIABILITY CO-EFFICIENTS
Correlation between forms	0.624
Equal-length Spearman-Brown	0.664
Guttman Split-half	0.636
Unequal-length Spearman-Brown	0.636

VALIDITY:

Validity reveals the merits of our measurement. This problem solving ability scale was given to the experts (20 members) in order to find out its content validity. The experts agreed that the items in the scale provided adequate coverage of the concept. This problem solving ability scale also has construct validity.

PERCENTILE NORM:

The following table represents the percentile norm for this attitude scale.

PERCENTILE	SCORE RANGE	NORM
Below P_{25} (Q1)	Below55	Low level
P_{25} To P_{75} (Q1 to Q3)	Between 55 and 108	Average level
Above P_{75} (Q3)	Above 108	High level

CONCLUSION

The investigator believe that this scale would be a contribution to the field of problem solving ability in Psychology and those who want to measure the problem solving ability anywhere in this country will find this scale very useful.

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