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CONSTRUCTION AND STANDARDIZATION OF ATTITUDE TOWARDS CHEMISTRY SCALE FOR HIGHER SECONDARY ADW SCHOOL STUDENTS.

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Abstract
An attempt has been made to construct and standardized the attitude towards chemistry scale among the higher secondary ADW school students. A well structured scale was administrated among them. The sample consists of 100 students randomly selected from the higher secondary ADW School Vellore District. Initially it was constructed with 69 statements. The chi-square test used to standardize the tool and finally 55 statements were retained for the final study.

Key Words: Attitude toward Chemistry, Chi-Square Test, Higher Secondary ADW School Students.

1. Introduction

Attitude

The study of Attitudes is a key and sometimes controversial issue within Social Psychology. Petty &Cacioppo define an attitude as "a general and enduring positive or negative feeling about some person, object or issue."

An attitude is a mental state of readiness exerting directive or dynamic influence upon individuals' response to all objects and situations with which it is related.

The attitude is the degree of positive or negative effect associated with some psychological objects namely institution, ideal, symbol, phrase, slogan job or idea towards which people can differ with respect to positive or negative effect (Thurstone 1946).

Chemistry

Chemistry is one of the oldest subject with which human beings here been familiar with for centuries. Chemistry the subject that deals with the elements and probes the properties of the elements – composition, structure, chemical bonds the electrons and other sources of energy.

All the subjects that are taught at school or college level find their source in chemistry is one or other way. All the modern subject life physics, biology, geology, technology, medicine, genetics, bio-medical nutrition, etc. find base only in chemistry and no subject can remain isolated from chemistry because chemistry is the mother of all other subjects.

2. Rational For Construction the Tool

The level of attitude towards chemistry can be measured by observation-longitudinal method and getting responses from children through a scale-survey method. There are several attitudes towards chemistry scale for higher secondary ADW school students. Hence there is need to construct a tool to measure the attitude towards chemistry of higher secondary ADW school students.

3. Operational Definitions

Attitude: The way you think and feel about someone or something.
Chemistry: A science that deals with the composition, structure, and properties of substances and with the transformations that they undergo.

Higher Secondary Students: Higher secondary students refer the students studying a two year course called as higher secondary after the completion of 10 years schooling. Also in this is the students refer the first year student.

4. Objective of the Study

The main objective of the study is to develop a research tool which measures the level of attitude towards chemistry.

5. Pilot Study

To standardize the scale constructed by the investigator, pilot study was conducted to check whether; the statements framed are significant to assess the attitude towards chemistry. So to conduct the pilot study, the questionnaire was administered to 100 students of higher secondary ADW school students in Vellore district and their responses were sought. There are 69

statements in the scale. The tool contains statements accompanied by five alternatives options strongly agree (SA), agree(A), undecided(UD), disagree(DA) and strongly disagree(SDA). The positive statements are scored as with given different responses are as follows SA-5, A-4, UD-3, DA-2 and SDA-1. The scores given to the responses of negative statements are as follows SA-1, A-2, UD-3, DA-4 and SDA-5. The scoring key given in the following table 1.

Table 1,Scoring Key for the Attitude towards Chemistry (Pilot Study)

Nature of the Items	SA	A	UD	DA	SDA
Positive: 1, 2, 4, 7, 8, 9, 12, 14, 15, 16, 17, 18, 19, 20, 23, 26, 27, 28, 31, 35, 37, 38, 42, 43, 45, 48, 49, 51, 54, 55, 56, 57, 58, 59, 60, 62, 64, 67	5	4	3	2	1
Negative: 3, 5, 6,10, 11, 13, 21, 22, 24, 25, 29, 30, 32, 33, 34, 36, 39, 40, 41, 44, 46, 47, 50, 52, 53, 61, 63, 65, 66, 68, 69	1	2	3	4	5

Positive Statements 38, Negative Statements 31

6. ITEM Analysis

One of the important steps in standardization of any research tool is item analysis. For this purpose, the investigator collected 100 self-rated attitude towards chemistry scale sheets from the respondents. Each item was scored by using the rating point as stated above. The individual scores for the entire 100 samples were calculated and arranged in the manner of highest to the lowest score. From the arranged scores, only the upper 27% of the sample constituting the high scores and the lower 27% constituting the lower scores were selected for the purpose of item selection. The high and low groups, thus selected formed the criterion groups.

7. ITEM Selection

After the pilot study, the investigator decided to seek whether the observed responses are really significant or merely chance of fluctuations. Therefore the null hypothesis was set for each item. Chi-square technique was used for the item analysis process. The Chi-square values for all statements calculated using the following formula,

$$\chi^2 = \Sigma \frac{(f_o - f_e)^2}{f_e}$$

f_o -observed frequencies
f_e- expected frequencies

The chi-square values of 100 statements for a df of 4 from the (N-1)=5-1=4.

The table value for a df 4 of 0.01 level is 13.277.

This is evident that χ^2 values of the items which are greater than 13.277 were significant at 0.01 level.

From that, it was concluded that the deviations of the observed responses from the expected distribution were really significant for 55 items out of 69 items and not merely a matter of chance. Therefore, 55 items in the scale were retained for the final study. A few verbal changes, whenever found necessary during pilot study were carried out in the final tool. The selected items with chi-square value are given in below table 2.

Table 2,Independent sample χ^2-test for the Item Selection

Item No.	Chi-Square	Df	Level of Significant	Remarks
1	80.200	4	0.01(S)	Significant
2	43.100	4	0.01(S)	Significant
3	24.700	4	0.01(S)	Significant
4	48.400	4	0.01(S)	Significant
5	30.300	4	0.01(S)	Significant
6	44.600	4	0.01(S)	Significant
7	32.500	4	0.01(S)	Significant
8	31.600	4	0.01(S)	Significant
9	51.300	4	0.01(S)	Significant
10	169.000	4	0.01(S)	Significant
11	22.300	4	0.01(S)	Significant
12	71.700	4	0.01(S)	Significant

13	24.900	4	0.01(S)	Significant
14	26.500	4	0.01(S)	Significant
15	71.000	4	0.01(S)	Significant
16	51.100	4	0.01(S)	Significant
17	82.500	4	0.01(S)	Significant
18	**9.700**	**4**	**0.046(NS)**	**Not Significant**
19	25.500	4	0.01(S)	Significant
20	53.500	4	0.01(S)	Significant
21	**9.200**	**4**	**0.056(NS)**	**Not Significant**
22	**12.200**	**4**	**0.071(NS)**	**Not Significant**
23	179.300	4	0.01(S)	Significant
24	21.700	4	0.01(S)	Significant
25	46.400	4	0.01(S)	Significant
26	38.000	4	0.01(S)	Significant
27	31.500	4	0.01(S)	Significant
28	36.800	4	0.01(S)	Significant
29	**10.000**	**4**	**0.040(NS)**	**Not Significant**
30	53.500	4	0.01(S)	Significant
31	**10.900**	**4**	**0.028(NS)**	**Not Significant**
32	34.700	4	0.01(S)	Significant
33	**5.500**	**4**	**0.240(NS)**	**Not Significant**
34	**7.400**	**4**	**0.116(NS)**	**Not Significant**
35	35.300	4	0.01(S)	Significant
36	53.900	4	0.01(S)	Significant
37	70.200	4	0.01(S)	Significant
38	56.300	4	0.01(S)	Significant
39	**11.500**	**4**	**0.021(NS)**	**Not Significant**
40	58.500	4	0.01(S)	Significant
41	**3.500**	**4**	**0.478(NS)**	**Not Significant**
42	52.100	4	0.01(S)	Significant
43	35.200	4	0.01(S)	Significant
44	**9.100**	**4**	**0.059(NS)**	**Not Significant**
45	43.600	4	0.01(S)	Significant
46	23.200	4	0.01(S)	Significant
47	**1.700**	**4**	**0.791(NS)**	**Not Significant**
48	77.900	4	0.01(S)	Significant
49	**7.300**	**4**	**0.121(NS)**	**Not Significant**
50	56.000	4	0.01(S)	Significant
51	43.200	4	0.01(S)	Significant
52	39.000	4	0.01(S)	Significant
53	23.200	4	0.01(S)	Significant
54	62.000	4	0.01(S)	Significant
55	72.300	4	0.01(S)	Significant
56	**11.300**	**4**	**0.023(NS)**	**Not Significant**
57	108.500	4	0.01(S)	Significant
58	16.700	4	0.01(S)	Significant
59	78.600	4	0.01(S)	Significant
60	55.300	4	0.01(S)	Significant
61	24.100	4	0.01(S)	Significant
62	27.700	4	0.01(S)	Significant
63	20.100	4	0.01(S)	Significant
64	50.500	4	0.01(S)	Significant
65	**3.100**	**4**	**0.541(NS)**	**Not Significant**
66	52.500	4	0.01(S)	Significant
67	63.100	4	0.01(S)	Significant
68	37.900	4	0.01(S)	Significant
69	23.600	4	0.01(S)	Significant

8. Percentile norms

Norms have been worked out for the attitude towards chemistry scale of higher secondary ADW schools students. The percentile norms are given in the Table.

Percentile	Score Range	Norm
Percentile 25	Up to 231	Low Level
Percentile 25 to 50	232 to 242	Average level
Percentile 75	242 and above	High level

9. Reliability

Reliability refers to the consistency with which a test is measured. The concept of reliability suggests both the stability and the consistency of the measurement. The investigator calculated by using test-retest method and it was found to be 0.820.

10. Validity

The attitude towards scale was given to the experts in order to find out its content validity. The experts agreed that the items in the scale provided adequate coverage to the concept.

11. Final Study

The final form of the inventory consists of 55 items. Each item set against two five alternative responses i.e. strongly agree, agree, undecided, disagree and strongly disagree. The scoring key given in below Table 3.

Table 3, Scoring Key for the Attitude towards Chemistry (Final Study)

Nature of the Items	SA	AG	UD	DA	SDA
Positive Statements: 1, 2, 4, 7, 8, 9, 12, 14, 15, 16, 17, 18, 19, 20, 23, 24, 25, 29, 31, 32, 34, 35, 36, 38, 40, 43, 44, 45, 46, 47, 48, 50, 52, 54	5	4	3	2	1
Negative Statements: 3, 5, 6, 10, 11, 13, 21, 22 26, 27, 28, 30, 33, 37, 39 41, 42, 49, 51, 53, 55	1	2	3	4	5

12. Conclusion

The scale for the final study consists of 55 items with standardized structure and will be very useful to measure the level of attitude towards chemistry among the higher secondary ADW school students.

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