



Construction And Standardization Of The Cognitive Style Scale (Css) For Postgraduate Students

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ABSTRACT

Students' academic performance is greatly influenced by their cognitive style. Cognitive style refers to individuals' attitudes, preferences, habits that determine the manner by which individuals perceive, remember, think and solve problems. The goal of the present study is to develop and standardize an assessment instrument for postgraduate students' cognitive style. The researcher conducted a pilot study with a sample of 100 postgraduate students to validate the instrument and undertake item analysis. The sample was selected from the postgraduate departments of St. Anthony's College, Shillong and Synod College, Shillong. Spearman Brown's Split Half Method and Cronbach's Alpha Methods were used in the second sample of 200 post graduate students of North-Eastern Hill University (NEHU), Shillong to test the reliability of the instrument. The reliability value computed in the Spearman Brown's Split Half Method was 0.82 and the reliability value computed in the Cronbach's Alpha Method was 0.73. Face validity and content validity have been established for the instrument. The researcher generated percentile scores for the tool to explain the results. The final version of the cognitive style scale has thirty-six items.

Keywords—Cognitive styles, Postgraduate students, Item analysis, Reliability, Validity, and Norms

Introduction

Cognitive style refers to the characteristic ways in which individuals perceive, think, process information, solve problems, make decisions, and interact with their environment. These styles encompass a range of cognitive processes and preferences that influence how individuals approach tasks, learn new information, and navigate various situations. Cognitive style refers to a psychological dimension representing consistencies in an individual's manner of cognitive functioning, particularly with respect to acquiring and processing information (Ausburn & Ausburn, 1978). Messick (1976) defined cognitive styles as stable attitudes, preferences, or habitual strategies that determine individuals' modes of perceiving, remembering, thinking, and problem solving. Witkin, Moore, Goodenough, and Cox (1977) characterized cognitive styles as individual differences in the way people perceive, think, solve problems, learn, and relate to others. Cognitive styles might differ in preferred elements or activities, such as group work versus working individually, more structured versus less defined activities, or visual versus verbal encoding. Other dimensions along which cognitive styles vary include reflection–impulsivity, abstract attitude versus concrete attitude, and field dependence versus field independence. The term is also commonly used to refer to the idea that people differ with respect to the mode of learning (e.g., instruction, study) that is most effective for them. Indeed, many use the term learning style interchangeably with cognitive style, whereas others use the former more specifically to mean a person's characteristic cognitive, affective, and psychological behaviours that influence their preferred instructional methods and interactions with the learning environment.

Review on the Psychological Instruments of Cognitive Style

There are numerous classifications and dimensions of cognitive style. Pask (1976) classified cognitive style into holist and serialist dimensions. In the educational context, holists prefer a broad objective, whilst serialists prefer a specific objective. Riding and Cheema (1991) categorised cognitive style as two polarised dimensions: wholist-analytical and verbalimagery. Allinson and Hayes (1996) developed the Cognitive Style Index (CSI) for the purpose of measuring individual cognitive styles according to intuitive and analytical dimensions. Witkin (Witkin et al., 1977) described cognitive style as a personality dimension, which influences attitudes, values, and social interaction; in particular, the preferred way an individual processes information. He defined cognitive style based on a continuum between two processing approaches - field dependent (FD) and field independent (FI) - in which each style differs in certain characteristics. According to Witkin et al. (1977) the FI/FD constructs had gone through numerous types of testing that involved perceptual and problem solving tasks such as embedded figure test, Gestalt test, Piaget's three mountain problem, conservation and concept attainment tasks. Ultimately, an aptitude measurement tool to assess FI/FD dimensions, known as the group embedded figures test (GEFT), was developed. GEFT is administered in the form of a test booklet consisting of 25 questions of interpolated cognitive tasks that focus on the process rather than content of the variable.

A further review of literature found that the GEFT had significant shortcomings in its validity and reliability (Lacko et al. 2023). Cuneo and Mohr (2018) stated that cognitive styles assessed via questionnaires are predicted by personality and performance tests are related to general intelligence. Cognitive styles reflect both intellectual and personality aspects of human behaviour. As Federman, (1964) pointed out the cognitive styles are determined not so much by perceptual processes, but by the stable traits of active personality. In this connection, there emerged an urgent task of developing new methods of evaluating cognitive styles. The new instrument of cognitive style must assess the construct as an attitude rather than an ability. Hence, the investigator felt a dire need to construct and standardize a scale to measure the field independence and field dependence cognitive styles of postgraduate students.

The literature available in the area of development of attitude scales was reviewed intensively by the investigator. In addition, critical discussions were made with research experts and university teachers regarding different dimensions of cognitive style. On the basis of all this, it was finally decided to have two dimensions of cognitive style i.e. the field independence dimension and the field dependence dimension.

OBJECTIVES OF THE STUDY

1. To construct and standardise a tool to assess the cognitive style of postgraduate students.
2. To estimate the reliability of the scale for assessing the cognitive style of postgraduate students.
3. To check the validity of the scale for assessing the cognitive styles of postgraduate students.
4. To establish norms for interpreting scores obtained on a scale for assessing the cognitive style of postgraduate students.

Construction and Standardisation of Cognitive Style Scale (CSS)

At the planning stage, the investigator has consulted various reviews of related literature that are available in the range of literature with regard to cognitive styles. The investigator has also consulted different instruments of Cognitive Styles like the Cognitive Style Inventory (CSI) by Praveen Kumar Jha, Group Embedded Figures Test (GEFT) constructed by Herman A Witkin, Philip K. Oltman, Evelyn Raskin, and Stephen A. Karp and Cognitive styles analysis (CSA) developed by Richard J. Riding so as to get a wider and deeper idea during the construction. After a thorough and careful review of related literature with regard to cognitive styles, the investigator identified the dimensions of the scale that are Field Independence which is a reliance on self and an independent style of perceiving, thinking, remembering and problem solving and Field Dependence which is a reliance on the field and a dependent style of perceiving, thinking, remembering and problem solving. After the review of related literature with regard to Cognitive Styles, the investigator has begun the tool construction by constructing and arranging all the items according to the dimensions of the scale. The scale was constructed with 147 items which are connected with the dimensions of the scale. The method of summated rating as given by Likert (1932) had been employed for constructing the present scale. Each item/statement of the scale is to be rated on five consecutive points i.e. strongly agree, agree, undecided, disagree and strongly disagree.

A pre-try-out has been carried out on 100 post graduate students of which were selected from St. Anthony's College, Shillong and Synod College, Shillong, in order to get a clearer picture of the student's cognitive styles. The try-out was done on 200 post graduate students who were selected from NEHU, Shillong. The data collected from 200 post-graduate students was analysed to select the items for the final scale. In order to select the items for the final scale the researcher used the t-test method. The critical twotailed level of significance was 1.98. With the level of significance at .05 level, 40 items were found to be significant ($t > 1.98$) and 69 items were not significant ($t < 1.98$). The items which were not significant were removed and 40 items were selected for the final draft of the Cognitive Styles Scale (CSS). The responses of the 200 postgraduate students were scored and the items which were not significant were removed and 40 items were selected for inter item correlation of the Cognitive Styles Scale (CSS). The items selected and the t value of the final scale are shown in Appendix 1

Establishing Reliability: In order to establish the internal consistency of the scale, Cronbach Alpha and Split-Half Method was used. The split-half method was calculated using Spearman Brown’s Prophecy Formula and the ‘r’ value obtained was 0.82. The ‘r’ value obtained from the Cronbach Alpha method is 0.73. The values derived ranged from 0.73 to 0.82 which indicates high reliability coefficient.

Table 1: Reliability Coefficient of the Cognitive Style Scale (CSS)

Method Used	N	Reliability Coefficient
Split-Half Method (Spearman Brown)	200	0.82
Cronbach Alpha	200	0.73

Inter-item Correlation: The correlation method was also used in the selection of the items for the scale. Those items whose correlation is equal or more than 0.40 ($R > 0.40$) were selected. After the evaluation, the test result showed that 36 items were retained (i.e., $R > 0.40$) whereby 4 items were rejected (i.e., $R < 0.40$) which is shown in Appendix 2 and Appendix 3. After item analysis using the t test and item correlation method, 36 items of the CSS were retained and selected for the final form of the scale.

Inter Dimension Correlation with Total: Correlation Matrix (Correlation is significant at 0.01 level, 2-tailed)

From the table of correlation matrix, it is clear that there is a positive high correlation among the dimensions of the Cognitive Styles Scale. The ‘r’ value in the two dimensions is 0.73 which shows that the dimensions of the Cognitive Styles Scale (CSS) are significant at 0.01 level of significance which can be considered reliable.

Content Validity: To check the content validity of the scale, the scale was given to nine experts in the field of educational psychology and a rating scale was attached with it. The rating scale consists of five questions and the scale was rated on a 4-option scale. The validity of the present scale was rated and it may be reported that according to the expert opinions and suggestions these items are representative of the study of Cognitive Style.

Establishing Norms: For establishing the norms of the Cognitive Styles Scale (CSS), the investigator selected 300 postgraduate students from the various departments of NEHU, Shillong, Meghalaya in order to get a wider view of their Cognitive Styles. The investigator developed separate norms for the two dimensions of Field Independence (FI) Cognitive Styles and Field Dependence (FD) Cognitive Styles. The investigator then converted the raw scores into percentile and interpretations which are represented in the following Table 2 and Table 3 below.

Table 2: Norms for interpretation of CSS Field Independence (FI)

Percentile	Range	Interpretation	Frequency
P ₈₆ and above	75 and above	Very High FI	41
P ₆₆ -P ₈₅	70 - 74	High FI	61
P ₃₄ -P ₆₅	65 - 69	Average FI	95
P ₁₄ -P ₃₅	60 - 64	Low FI	62
P ₁₃ and below	59 and below	Very Low FI	41
Total			300

Table 3: Norm for interpretation of CSS Field Dependence (FD)

Percentile	Range	Interpretation	Frequency
P ₈₆ and above	44 and above	Very High FD	35
P ₆₆ -P ₈₅	39 - 43	High FD	64
P ₃₄ -P ₆₅	34 - 38	Average FD	101
P ₁₄ -P ₃₅	30 - 33	Low FD	60
P ₁₃ and below	29 and below	Very Low FD	40
Total			300

BLUEPRINT: The blueprint of the Cognitive Style Scale contained two basic dimensions. The dimensions are Field Independence and Field Dependence. The final form of the scale is shown in Table 4

Table 4: Number of items in the scale under different dimensions of Cognitive Styles Scale (CSS)

Cognitive Styles scale		
Dimension	Items	Total
Field Independence (FI) Positive items	6,12,28,36,38,42,44,48,50,52,57, 61, 75,77,85,91,101,103	18

Field Dependence (FD) Negative Items	5,7,9,11,17,19, 21,23, ,33,39, 43,45,56,60,64,68,70, 94,	18
Total		36

CONCLUSION

Cognitive styles are a combination of stable attitudes, preferences, and habitual strategies that determine a person's way of perceiving, remembering, thinking, and problem-solving (Saracho, 1997). While cognitive style is now well-known and a research subject, its application and relevance to educational practices can assist students and teachers in achieving the targeted educational activity objectives (Bakar, & Ali, 2013). Therefore, this instrument of the cognitive styles for postgraduate students will be useful for the students themselves, the teachers and parents in recognising the cognitive styles of students.

Appendix 1 Items selected and their ' t ' value of the Cognitive Style Scale (CSS)

Item No.	t value	Item Selected	Item No.	t value	Item Selected	Item No.	t value	Item Selected
1	0.673		38	2.263	Selected	75	1.980	Selected
2	2.076	Selected	39	2.108	Selected	76	0.642	
3	1.985	Selected	40	0.993		77	1.994	Selected
4	0.190		41	1.404		78	0.674	
5	2.022	Selected	42	2.162	Selected	79	1.440	
6	2.419	Selected	43	1.981	Selected	80	0.000	
7	1.981	Selected	44	1.994	Selected	81	0.339	
8	0.892		45	2.393	Selected	82	0.813	
9	1.993	Selected	46	0.777		83	1.415	
10	0.693		47	0.376		84	1.803	
11	2.092	Selected	48	1.991	Selected	85	2.468	Selected
12	2.051	Selected	49	1.234		86	0.734	
13	0.710		50	1.987	Selected	87	1.480	
14	0.710		51	0.659		88	0.475	
15	0.839		52	3.430	Selected	89	0.000	
16	2.015	Selected	53	0.516		90	0.338	
17	3.234	Selected	54	0.742		91	3.017	Selected
18	1.089		55	1.276		92	0.729	
19	1.983	Selected	56	2.017	Selected	93	0.354	
20	0.373		57	2.255	Selected	94	2.409	Selected
21	3.603	Selected	58	1.426		95	0.949	
22	0.369		59	2.017	Selected	96	0.184	
23	3.057	Selected	60	2.476	Selected	97	0.850	
24	0.942		61	2.298	Selected	98	0.187	
25	1.058		62	0.674		99	0.177	
26	1.480		63	0.336		100	1.241	
27	1.560		64	2.784	Selected	101	2.219	Selected
28	1.997	Selected	65	0.560		102	0.475	
29	0.642		66	0.000		103	2.567	Selected
30	0.178		67	0.710		104	1.022	
31	1.147		68	2.183	Selected	105	1.375	
32	0.194		69	0.583		106	0.976	
33	5.168	Selected	70	4.096	Selected	107	1.521	
34	0.190		71	1.463		108	1.499	
35	0.761		72	1.809		109	1.163	
36	2.561	Selected	73	0.000				
37	1.014		74	1.782				

Appendix 2 Inter item Correlation of Field Independence Dimension (Positive items)

Sl. No	Item no.	r value	Sl. No	Item no.	r value	Sl. No	Item no.	r value
1	Item 2	0.280	8	Item 42	0.505	15	Item 61	0.446
2	Item 6	0.498	9	Item 44	0.477	16	Item 75	0.529
3	Item 12	0.499	10	Item 48	0.586	17	Item 77	0.460
4	Item 16	0.231	11	Item 50	0.574	18	Item 85	0.525
5	Item 28	0.412	12	Item 52	0.501	19	Item 91	0.630
6	Item 36.	0.420	13	Item 57	0.440	20	Item 101	0.553
7	Item 38	0.427	14	Item 59.	0.281	21	Item 103	0.434

Appendix 3 Inter item Correlation of Field Dependence Dimension (Negative items)

Sl. No	Item no.	r value	Sl. No	Item no.	r value	Sl. No	Item no.	r value
1	Item 3	0.233	8	Item 21	0.488	15	Item 60	0.471
2	Item 5	0.491	9	Item 23	0.459	16	Item 64	0.430
3	Item 7	0.480	10	Item 33	0.424	17	Item 68	0.464
4	Item 9	0.464	11	Item 39	0.449	18	Item 70	0.577
5	Item 11	0.481	12	Item 43	0.421	19	Item 94	0.437
6	Item 17	0.410	13	Item 45	0.454			
7	Item 19	0.410	14	Item 56	0.425			

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