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Construction And Validation Of Scale To Measure The Cognitive Ability Of Adolescent Students

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The study has been conducted to examine the Cognitive Ability ofAdolescent students in Government and Private schools.The Sample selected for investigation consists of 150 Adolescent studentsfrom Government and Private higher secondary Schools in and around Tirupattur District. The main objective of the present study is to develop a research tool to measure the Cognitive Ability of Adolescent students. The investigator has usednormative survey method for the study. The researcher had attempted to construct and standardize the Cognitive Ability Scale (CAS) to measure the Cognitive Ability of Adolescent students.

Key Words: Cognitive Ability, Adolescent students, higher secondary schools.

Introduction

Adolescence is a crucial stage of human development characterized by significant physical, emotional, and cognitive changes. During this period, individuals experience rapid growth in intellectual abilities such as reasoning, problem-solving, memory, and decision-making, which collectively form the foundation of cognitive ability. Assessing these abilities is essential for understanding how adolescents learn, adapt, and perform in academic and social contexts. Despite the importance of this developmental stage, there remains a need for standardized, reliable, and valid instruments specifically designed to measure cognitive ability among adolescents.

The construction of a Cognitive Ability Scale for Adolescents seeks to address this gap by developing a tool that accurately captures the cognitive dimensions relevant to this age group. Such a scale can help educators, psychologists, and researchers identify cognitive strengths and weaknesses, plan targeted interventions, and foster optimal intellectual development. The process of tool construction involves systematic steps, including defining dimensions, generating items, expert validation, pilot testing, and statistical analysis to ensure psychometric soundness.

Ultimately, this research aims to provide a scientifically grounded and culturally appropriate instrument that contributes to the assessment and understanding of adolescent cognition, thereby enhancing educational practices and developmental outcomes.

Objective

The main objective is to develop a research tool to measure the Cognitive Ability ofAdolescent students. The objective of studying Cognitive Ability among government and private school adolescents is to comprehensively understand, assess, and address the issues, ultimately contributing to the well-being, academic success, and positive development of adolescents in diverse educational settings and to gain a deeper understanding of how their cognitive processes develop and evolve during this crucial stage of development.

Description of the Tool -Cognitive Ability Scale (CAS)

Cognitive ability scale has been developed and validated by the investigator with the help of Research Supervisor. Many journals on Cognitive Ability, test construction procedures were used for the construction of the tool. The Cognitive Ability scale consisting of 30 questions constructed after having discussions with psychologists and experts in the field of education.The test has been prepared on five point rating scale.Students were asked to give their responses by making tick mark through five responses as Never, Rarely, Sometimes, Often and Always. The minimum score for the tool is 30 and maximum score of the tool is 150.

Item Analysis

The draft tool prepared by the investigator was administered on a sample of 150 higher secondary school students. The studentswere asked to mark their opinion among the given alternatives. Each statement has five alternative responses; namely Never, Rarely, Sometimes, Often and Always. Scoring was done for all the statements. The minimum score would be 30 and the maximum score would be 150. It is most efficient to do the checking as a single operation after all booklets have been scored.Item analysis was adopted for the final selection of statements.

The total scores were calculated separately and they were arranged in the descending order. The top 25% and the bottom 25% of scores alone were taken into account. The difference in means of the high and low groups for each item was tested for significance by computing the t-ratios. Items with t-value of 1.96 and above were selected for the final tool.

Thus, the final tool contains 25 items; the list of items with the t-value is presented in

Table-1. Split-half method was also used to find out the consistency of the test.

TABLE 1: ITEM ANALYSIS OF COGNITIVE ABILITY SCALE

S.No	t-value	Selected / Not Selected
1	3.267	Selected
2	4.714	Selected
3	1.691	Not selected

S.No	t-value	Selected / Not Selected
4	7.626	Selected
5	3.803	Selected
6	3.406	Selected
7	2.245	Selected
8	1.211	Selected
9	1.301	Not selected
10	3.123	Selected
11	4.735	Selected
12	3.364	Selected
13	2.956	Selected
14	3.438	Selected
15	5.487	Selected
16	3.755	Selected
17	4.263	Selected
18	0.329	Not selected
19	4.173	Selected
20	5.522	Selected
21	3.085	Selected
22	4.18	Selected
23	2.604	Selected
24	1.229	Not selected
25	2.629	Selected
26	3.323	Selected
27	3.542	Selected
28	3.123	Selected
29	4.714	Selected
30	1.391	Not selected

Reliability

The reliability of test can be defined as the correlation between two or more sets of scores on equivalent tests from the same group of individuals. A test score is called reliable when we have reasons for believing the score to be stable and trust worthy. Stability and trust worthiness depend upon the degree to which the score is an index of "true-ability" free from chance error.Test-retest (repetition) method was used to arrive at the reliability of the tool.

Repetition of a test is the simplest method of determining the agreement between the two set of scores; the test is given and repeated on the same group; and the correlation computed between the first and second set of scores. Given sufficient time between the two tests the administration results show the stability of the test scores. The value of correlation co-efficient

shows that there is high positive degree of correlation between the two tests and are given in Table-2.

Table 2: Reliability Co-Efficient of Cognitive Ability

S.No.	Method of Reliability	Values
1.	Test-retest (Repetition)	0.83
2	Split-Half	0.86

Validity

The appropriateness, meaningfulness and usefulness of the specific inferences made form test scores. In research, if findings are to be appropriate, meaningful and useful, they need to be valid.The first essential quality of valid test is that it should be highly reliable. Besides, the content or face validity, the investigator intended to arrive intrinsic validity. Guilford (1950) defined the intrinsic validity as "the degree to which a test measures what it measures." The square root of reliability gives the intrinsic validity. Therefore, the intrinsic validity of Cognitive Ability scale is 0.86.

Description of the Final Tool

The final tool with 25statements consisting of both positive and negative statements was prepared in English version with 5-point rating scale based on Likert's type.
The tool has 5 dimensions with 5 statements each.
The Tool has 19 positive and 6 Negative statements.

Table 3 -Dimensions of the tool

S. No.	Dimensions of the tool	Statement Numbers	No. of Statements
1	Memory	1 - 5	5
2	Attention	6 - 10	5
3	Problem Solving	11 - 15	5
4	Decision Making	16 - 20	5
5	Reasoning	21 - 15	5

Table 4 -Nature of statement

Nature of statement	**S. No. of Statements**
Positive Statements	1,4,8,9,10,11,12,13,14,15,16,17,18,20,21,22,23,24,25
Negative Statements	2,3, 5,6,7, 19

The minimum score for the tool is 25 and maximum score of the tool is 125

SCORING PROCEDURE

For the purpose of statistical analysis, the data need to be quantified. To quantify the data, the following scoring procedure was adopted. In the Cognitive Ability scale among Higher Secondary students, against each item Five responses were given. To quantify the scales, 5 gradations, namely Never, Rarely, Sometimes, Often and Always were offered the scores

1,2,3,4 and 5 respectively for positive statements and vice-versa for negative statements. Scores were given to the positive and negative statements of each component in the tool are explained in the table given below. To quantify the data, the following scoring procedure was adopted.

Table 3.6 Scoring procedure

S. No.	Choice of Items	Scoring Value	
		For positive statements	**For Negative Statements**
1	Always	5	1
2	Often	4	2
3	Sometimes	3	3
4	Rarely	2	4
5	Never	1	5

FINAL TOOL

Cognitive Ability Scale (CAS)

S. No.	Statement	Never	Rarely	Some times	Often	Always
	Memory					
1	I can recall specific details from a recent event or conversation.					
2	I forget important dates or deadlines.					
3	I experience difficulty in remembering information for exams or tests.					
4	I can remember names and faces after an initial introduction.					
5	I rely on memory aids, such as notes or reminders, in my daily life.					
	Attention					
6	I get distracted by external stimuli while trying to focus on a task.					
7	Concentrating for a prolonged period of time is a challenge for me.					
8	I am able to switch my attention between different tasks without difficulty..					

S. No.	Statement	Never	Rarely	Some times	Often	Always
9	I practice mindfulness or meditation to improve my focus.					
10	In a group setting, I find it easy to focus during discussions or presentations.					
	Problem-solving					
11	I Can identify potential solutions when faced with a problem.					
12	I seek different perspectives when attempting to solve a complex issue.					
13	I use creative thinking to generate innovative solutions to challenges.					
14	When faced with a problem, I break it down into smaller, manageable parts for easier resolution.					
15	I do believe collaboration with others enhances problem-solving outcomes.					
	Decision-making					
16	I consider the potential consequences before making a choice.					
17	I'm able to weigh the risks and benefits when facing a decision-making.					
18	I seek advice from others before making a significant decision.					
19	My emotions influence my decision-making process.					
20	When making decisions, I trust my intuition.					
	Reasoning					
21	I am able to analyze and evaluate information to form logical conclusions.					
22	I actively seek out new information and perspectives to enhance my reasoning abilities.					
23	I recognize and address cognitive biases that may impact my reasoning.					
24	I engage myself in critical thinking exercises to enhance my analytical skills.					
25	I challenge my own assumptions and beliefs during the reasoning process.					

Conclusion

The construction of the Cognitive Ability Scale for Adolescents marks an important advancement in the assessment of cognitive functioning during a critical stage of human development. This tool was carefully designed to measure key domains such as memory, attention, reasoning, decision making and problem-solving which are essential for academic

achievement and everyday functioning. Through systematic item development, expert validation, and pilot testing, the scale demonstrates strong psychometric properties, ensuring both reliability and validity. Tailored specifically for the adolescent age group, it captures the unique cognitive transitions occurring during this developmental period.

The scale provides educators, psychologists, and researchers with a standardized and culturally sensitive instrument for identifying cognitive strengths and weaknesses among adolescents. Its application can guide interventions, support individualized learning plans, and inform future research on adolescent cognitive growth. Continued validation across diverse populations will enhance its generalizability and effectiveness. Overall, the Cognitive Ability Scale for Adolescents offers a valuable contribution to psychological assessment and developmental research.

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