



**RESEARCH PAPER**

**Item Difficulty in Item Analysis of Intelligence Test Items**

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**ABSTRACT**

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Item difficulty is more important technique for item analysis for selecting and rejecting the test items which is utilized by research scholar in present study. This is an effective technique to check the difficulty value of items and on the base of Item difficulty items revised and modified. In current study 1500 participants were recruited voluntarily of required age groups children, adolescence and adulthood. In first try out of test development was prepared 100 items intelligence test. With the help of difficulty valued find out the difficulty value of the intelligence items in Ms excel 2010 and SPSS. There 31 items of intelligence test were rejected on the base of very low and very high difficulty value. Inter correlation within types of intelligence test was high Accepted items item difficulty level was 0.5 and all around above it's or equal. Through item analysis we rejected 23 items those difficulty value was less than 0.5 and greater than 0.89. item difficulty range was 0.5- 0.88. Eigen values of intelligence types likewise linguistic, observational, mathematical and logical were .88, .776, .80 and .99 respectively. These Eigen values were in acceptable range, thus present intelligence test was reliable.

**Introduction**

Intelligence can be described as "a general mental ability, which includes, but is not limited to, the ability to think, plan, solve problems, objectively abstract, understand complex ideas, learn quickly, and learn from experience." (Kirtiputra, 2007).

The aim of the study was to assess students' nonverbal intelligence. The level of human intelligence can be affected by many factors. The study emphasizes that students from different cultures, languages and genders may differ in their nonverbal understanding. As Sternberg and Grigorenko (2004) suggest, behavior considered in one culture can be considered intelligent in another culture and vice versa. People in different cultures have different implicit (folk) theories of intelligence, so not a word means the same thing. The relationships between different aspects of intelligence may

differ in different cultures, with correlations being positive in one state and negative in another.

Rosselli and Ardila, 2003 Non-verbal tests, such as copying numbers, drawing maps, or listening to tones, can significantly affect an individual's culture.

Intelligence assessment is considered to reach a certain distance in diagnostic results, selection, process allocation, proficiency and entrepreneurship. Therefore, every effort is needed to install a region to add scientifically based and standardized intelligence, masking application regions from material content and standardized to a national standard. advisers on the status quo of ethical practices. Education occupies an important position in intelligence, especially verbal intelligence (Sternberg, 2010).

Intelligence is the driving force or ability to acquire and use knowledge and skills or inference when solving problems. It is a profound human wonder how conscious intelligence develops as a highly complex cognitive state in the human mind based on biological and physiological structures (Wang, 2009).

### **Nonverbal Intelligence**

Nonverbal intelligence test is an intelligence test designed to reduce the impact of language on the evaluation of higher cognitive processes such as memory, reasoning, symbolism and symbolic disorganization. Functional (signs of oral and nonverbal responses) and nonverbal (pantomime tools and nonverbal responses) (Ritter, 2011).

The Ladder R and the Universal Nonverbal Intelligence Test (UNIT) are in balanced order for 43 children (12 girls, 31 boys) classified as severe language disorders (mean age = 8.55, SD = 1.78). Given the severe language impairments of this population, it was concluded that both batteries provided an unbiased assessment of cognitive abilities. The qualitative strengths and weaknesses of both tests were discussed (Farrell, 2000).

Ansari and Iftikhar (cited by Gardezi, 2001) conducted a study to validate Raven standard progressive matrices for urban and rural students in Pakistan. It has been found that RSPM was useful as intellectual performance test for urban students. The usefulness of this test was limited to children at rural school.

In the United States, nearly 32 million Americans do not speak English in Korean, and nearly 2 million people do not speak English in English, the number of non-English Americans. Miller and Gilbert (2008) executed a study in which a sample of 204 teenagers gave two non-verbal intelligence tests with and without linguistic handicaps. The test results were compared, as well as the classification of individuals in diagnostic categories based on both tests. The results showed .

Azinar, Munzir. and Bahrun (2020) Investigating the exploration of learning effects in the second language as a 10-year-old children's intelligence guidelines in the unique Indian chennai environment. 30 boys and bilingual groups have 30 years old and bilingual, small, medium, medium tamil, medium and boys and bilingual groups randomly selected. Both language groups were tested in the Tamil version of Wigschler Information Scale for children. The results pointed out that the level of the second language capacity does not solve global intelligence and nonverbal

intelligence. The impact on non-intelligent intelligence components indicates only the level of the second linguistic capacity and the necessary elements of non-life and perceptual organizations are interdependent of the perceptual analysis capacity. The level of the second linguistic capacity does not affect logical reasoning and does not affect the perception of the flexible operation of the entire relationship and the code. When children are high at the level of second language technology, they are better done in oral information.

Boekstra, Bartels and Boomsma (2007) are studied by vertical gene tests to support the stability of oral and not shoe technologies, and the association between these possibilities is stronger because the associations are older. Verbal and nonverbal intelligence measurements were collected from Dutch twin pairs aged 5, 7, 10, 12 and 18 years. Stability in verbal and nonverbal skills was high, with correlations over time ranging from 0.47 for the 13-year period to 0.80 for shorter time periods. Artificial equation modeling showed an increase in heritability with increasing age from 48% (verbal) and 64% (non-verbal) at 5 years of age to 84% and 74% at 18 years of age. Genetic influences seem to be the driving force behind stability. The stability of nonverbal ability was fully explained by genes. Continuity of language skills was explained by genetic and combined environmental influences. The overlap between verbal and nonverbal skills was fully explained by genes affecting both skills. The genetic association between linguistic and nonverbal IQ increased from .62 in early childhood to .73 in young adulthood.

Laros and Tellegen (2004) performed SON-R 5.5-17 individual tests of nonverbal intelligence on children aged 5.5-17 years. In this study of 83 Brazilian and 51 Dutch children, we assessed the presence of cultural bias in three subtests that used specific subjects and situations. Altogether fourteen items were biased, of which ten favored the Dutch children and four the Brazilian children. Taking into account that the total number of items investigated is 80, the cultural disadvantage for Brazilian children is rather small. This study made clear which items of the three subtests should be improved, not only for reasons of cultural bias, but also because children, irrespective of their cultural background, encountered problems with the recognition of several pictures.

Vista and Care (2010) conducted a research on gender differences in variance and means on a non-verbal Ability test (NNAT) by using a national sample of public school students from the Philippines. They have been tested using non-verbal skills test (NNAT) using the size of 2,700 sixth selections of public schools throughout the country. Relationships Variatz (VRS) and VRS logs were calculated. The ratio report is calculated that each level of skill is calculated and a good rock is tested. The average score in three years was generally analyzed in normal general differences and three subgroups. He suggested that data in the average score shows the difference in absence or trivia. However, the tail of the distribution shows the difference between men and women, with high volatility between men in the upper half of the distribution and high volatility between women in the lower half of the distribution.

## **Logical Mathematical Intelligence**

Logical-mathematical intelligence is one of the maximum dominant additives of a couple of intelligences in arithmetic studying due to the fact it may be constructed in all subjects in arithmetic. Logical-mathematical intelligence is the cappotential of college students in phrases of numbers and common sense, which includes the competencies to technique phrases and numbers, to apply common sense and examine issues logically, to discover formulation and to do investigations scientifically. The reason of this have a look at is to explain the logical-mathematical talents of excessive faculty college students. A overall of 25 seventh-grade college students in a junior excessive faculty in Banda Aceh participated on this have a look at, however simplest 3 of them, with excessive, medium, and coffee standards of logical-mathematical intelligence primarily based totally at the check consequences, have been decided on to look at and examine their logical-mathematical talents. Data have been carried out from a check and interview. The tool used on this have a look at turned into a pupil check sheet. The consequences confirmed that simplest a small quantity of college students (3 out of 25) had logical-mathematical intelligence withinside the signs of numeracy and problem-solving. Then, it may be concluded that the college students' logical-mathematical intelligence remains low and wishes to be similarly investigated.

## **Multiple Intelligences**

Estimated intelligence (WAIS-RS group assessment) affects gender differences in facial recognition and linguistic and nonverbal anecdotal memory tasks in 99 women and 88 men aged 20–40 years. I studied the impact. Results were higher for males than for females in the WAIS-RS subtest information, while the reverse was true for number symbols. Women showed a higher level of performance in linguistic anecdotal memory tasks and facial recognition than men, but there was no gender difference in nonverbal anecdotal memory tasks. Estimated intelligence in both males and females had a positive relationship with most anecdotal measures of memory, with the exception of female facial recognition. In recognition, the performance of women's face recognition was not associated with the expected intelligence that suggests that it is not related to various cognitive processes (Herlitz & Yonker, 2002).

Walker et al (2010) explore the effects of diverse cultural background and non-Western educational background on Wechsler Adult Intelligence Scale-Third edition (WAIS-III) and Wechsler Memory Scale-Third Edition (WMS-III) performances in moderate-severe traumatic brain injury within an outpatient rehabilitation setting. Participants were aged 16-65 years and met careful selection criteria. IQ, index and age-scaled subtest scores were compared across three groups: (a) English-speaking background (n = 130), (b) culturally and linguistically diverse background and education completed in English (n = 33), and (c) culturally and linguistically diverse background and non-English education (n = 33). Cultural backgrounds included people of Asian, European, Middle Eastern, African and Oceania origin. Results were that the English-educated culturally and linguistically diverse group performed lower than the English-speaking background group on some verbal WAIS-III measures; effect sizes were small-moderate. The non-English-educated culturally and linguistically diverse group performed lower than both groups on several WAIS-III and one WMS-III measure, with large effect sizes.

Intelligence is an idea associated with behaviours which might be valued in a social and cultural context. Since the status quo of formalised schooling for position of spatial intelligence in inventive domain names and not noted the seminal practices in instructional settings and mirror at the volume to which they provide Gardner. However, interpretations of this paintings have tended to emphasize the improvement of spatial intelligence. We assignment practitioners to observe their diagnosed as spatial intelligence are sizable regions of human capability. Spatial contribution that spatial intelligence performs in mathematical and scientific literate and numerate. However, a cautious evaluation of rather innovative human beings in the place of arithmetic and science, and reputation of the effect of developmental trajectory of intelligence to discover a way to facilitate the intelligence has been highlighted in latest years alven though the paintings of Howard formal schooling. Intelligence, hence, has been valued in folks who are rather Westernized business society, schooling has centered at the improvement of generation in an Information Age indicates that different behaviours broadly of perspectives, along with a neuropsychological perspective, and makes use of Gardner's literacy and numeracy abilities and has mentioned the ones regions as vital in domain names.

The article explores spatial intelligence withinside the sciences from a variety possibilities for kids to illustrate and increase their spatial intelligence. Intelligence is a idea associated with behaviours which might be valued in a social and cultural context. Since the established order of formalized training for function of spatial intelligence in creative domain names and left out the seminal practices in academic settings and replicate at the quantity to which they provide Gardner. However, interpretations of this paintings have tended to emphasize the improvement of spatial intelligence. We mission practitioners to study their recognized as spatial intelligence are great regions of human capability. Spatial contribution that spatial intelligence performs in mathematical and scientific literate and numerate. However, a cautious evaluation of incredibly innovative human beings in the region of arithmetic and science, and reputation of the effect of developmental trajectory of intelligence to discover the way to facilitate the intelligence has been highlighted in current years alven though the paintings of Howard formal training. Intelligence, hence, has been valued in folks that are incredibly Westernized commercial society, training has centered at the improvement of generation in an Information Age shows that different behaviours broadly of perspectives, inclusive of a neuropsychological perspective, and makes use of Gardner's literacy and numeracy abilities and has recounted the ones regions as vital in domain names. The article explores spatial intelligence withinside the sciences from a variety possibilities for kids to illustrate and expand their spatial intelligence.

Spatial intelligence, which also has been referred to as spatial ability, involves be voluntarily reproduced or combined. The above mentioned elements are, in my (Rogers, 1995). Spatial intelligence includes an ability to perceive and represent sequential reasoning used with linguistic representations, such as text, and case, of

visual and some of muscular type. Conventional words or other signs have the manipulation of information presented in a visual, diagrammatic or Einstein, spatial representations include diagrams, drawings, maps and models. as elements in thought are certain signs and more or less clear images which can

Spatial intelligence can be inferred from the ability to invoke and use particular symbolic form in contrast to verbal, languagebased modality (Lohman et al, 1987). Spatial intelligence may manifest as a particular aptitude for thinking Reasoning with spatial representations differs substantively from the involves cognitive interaction with spatial information to solve problems

### **Spatial Intelligence**

The words or the language, as they are written and spoken, do not seem to play and communicating spatially. For example, Einstein (1949), the most the visualspatial world accurately and to form and manipulate mental images to be sought for laboriously in a secondary stage, when the above mentioned associative play is sufficiently established and can be reproduced at will. (p. 147) representations and reasoning. In addition to imagery, as identified by in the following reflection: renowned scientist of the twentieth century, highlighted his thinking processes any role in my mechanism of thought. The psychical entities which seem to serve (Gardner, 1983).

### **Gender Differences**

There is a gender difference in brain activity for mouth and orchard content capabilities provided by Jausovec and Jausov (2009), visual and audio means. Everything indicates that the classification process of visual events for women is more efficient than men.

Over the past decade, it is mainly the need to develop and use intelligence and use of intelligence and the need to increase the number of students on other languages and exciting backgrounds and provide a minority ethnic assessment. / Or McCallum, a population that does not speak in (McCallum, 2003).

Researchers have also studied gender-specific differences in 20 countries in 20 countries, China BAC studies in Germany and Scotland have shown that men surrender considerably and higher than women for women. General information, they have also explained that this difference between countries and populations is consistent, although there are major differences. At the level (Adrian & Buchanan, 2005, such as in Naderi et al., 2010). Sluis et al. (2005) We investigated whether the observed gender differences in the intelligence test subtest were due to general gender differences in intelligence. Men performed better than women in three of ten subtests (information, arithmetic, and matrix reasoning) called symbol substitution scores, but women performed better in only one paddy field subtest.

### **Items Analysis**

Many test creators aim to verify that their tests' content validity by having external experts assess the items for relevance, difficulty, clarity, and other factors. Although this technique is commonly accepted, a closer examination exposes a number of flaws that must be avoided if professional counsel is to be truly beneficial.

First, I present a taxonomy of jobs that test creators assign to experts, as documented in the literature on techniques for obtaining expert input. Second, I examine a sample of 72 test development reports to determine the most prevalent current methods for selecting and consulting specialists. The results show that the selection of experts is frequently arbitrary, and the queries addressed to experts are typically vague. Given these findings, I delve more into the conditions that must be met for their contributions to be beneficial in assuring test content validity. Finally, it is necessary to develop and standardize precise recommendations on this subject (Beck, 2020).

Items difficulty levels between 0.30 and 0.70, according to Nunnally and Bernstein (1994) are considered acceptable items because they are neither too challenging nor too easy for test takers. Things having a difficulty level greater than 0.70 and a difficulty level less than 0.30 were rejected as being too easy and challenging respectively. Because they do not contribute significantly to the utility of items for discriminating across test takers. The diversity of test scores and precision in discrimen.

### Material and Methods

This is the cross-sectional research conduct for developing intelligence test with three types of intelligence linguistic, Mathematical, Spatial and logical. For study purpose developed four pool of items for four different types of intelligence. 100 items of intelligence test which were divide in 25 numbers of items for each type of intelligence. These items were selected with the help of experts like wise psychologist, psychiatrists on the base of the items judgmental validity. For measuring the systematic difficulty value for concern population, participants were hired from four different stages of life children, adolescence, adult and adulthood. Recruited total numbers of participants were 1500, while children, adolescences, adult and adulthood were hired 200, 500, 500 and 300 respectively by applying the simple random sampling technique. Before conducting the research researcher get the approval to internal research committee. Then research scholar get the institutional consents and as well participants consents and informed them about purpose of study and your participation is purely voluntarily no monetary reward for your valuable participation. After collecting data to participants pay thanks of them, after completing the data collection phase we made the item analysis by using excel and SPSS and find out the difficulty value of intelligence test all items for accepting and rejecting the items of the test.

### Results and Discussion

**Table 1**  
**Co relation within the factors of intelligence test**

Factors	Linguistic IQ	Observational IQ	Mathematical IQ	Logical IQ
Linguistic IQ	1.00			
Observational IQ	.90	1		

Mathematical IQ	.78	.85	1	
Logical IQ	.80	.74	.71	1

Note:  $P < .05$

Table I is indicating the strong relationship with the same factor and also with cross the factors. This is illustrating the there is association within the factors. Thus, all these factors are measuring the same subject matter.

**Table 2**  
**Factor Analysis of intelligence test**

Types of intelligence	Eigen values
Linguistic IQ	.88
Observational IQ	.776
Mathematical IQ	.80
IQ test	.998

Note: IQ= intelligence quotation

Table II is illustrating the Eigen values of the intelligence types which is less than .998 and greater than .50 thus this is a reliable construct

**Table 3**  
**Difficulty value of the Intelligence test items**

	ID	Item no	ID	Item no	ID	Item no	ID
1	0.20	26	0.71	51	0.52	76	0.83
2	0.40	27	0.72	52	0.73	77	0.89
3	0.29	28	0.46	53	0.52	78	0.86
4	0.30	29	0.65	54	0.44	79	0.56
5	0.34	30	0.55	55	0.69	80	0.66
6	0.50	31	0.64	56	0.72	81	0.45
7	0.44	32	0.63	57	0.71	82	0.68
8	0.56	33	0.62	58	0.52	83	0.55
9	0.81	34	0.61	59	0.42	84	0.34
10	0.84	35	0.64	60	0.42	85	0.68
11	0.34	36	0.35	61	0.22	86	0.4
12	0.45	37	0.55	62	0.52	87	0.2
13	0.45	38	0.69	63	0.62	88	0.66
14	0.69	39	0.57	64	0.62	89	0.67
15	0.57	40	0.66	65	0.52	90	0.62
16	0.71	41	0.57	66	0.72	91	0.67
17	0.52	42	0.67	67	0.52	92	0.34
18	0.44	43	0.04	68	0.41	93	0.66
19	0.45	44	.034	69	0.41	94	0.69
20	0.25	45	.05	70	0.21	95	0.63
21	0.55	46	0.61	71	0.51	96	0.71
22	0.65	47	0.51	72	0.61	97	0.56
23	0.64	48	0.51	73	0.61	98	0.67
24	0.54	49	.045	74	0.51	99	0.56
25	0.33	50	.07	75	0.71	100	0.89

Above table showing the difficulty value of the IQ test items range of difficulty value is 0.2-0.89 accepted item difficulty value is 0.5 and 0.8 not more the it's following



items difficulty value was not appropriated therefore rejected 1, 2, 3, 4, 5, 7, 11, 12, 13, 18, 19, 20, 25, 28, 43, 44, 45, 49, 50, 54, 59, 60, 61, 68, 69, 70, 81, 84, 86, 87 & 92 .

## Discussion

Current study of test construction tries to find out the difficulty value of the items for accepting and rejecting the suited items for intelligence test. For item analysis used item correlation in table one for measuring the inter factor correlation which is more high within the factors or cross the factors. Which indicating the consistency of the intelligence test . all factors strongly co relating with each other means, they are measuring the same purpose of the test intelligence. The significant high positive correlations area unit indicator of merging validity that intern supports the construct validity. the numerous high correlation statistics will be cited because the proof that new cluster intelligence check measures a similar ability space as that gence tests (Anastasi & Urbina, 2017; Furr & Bacharach, 2014; Kane, 2013).

Table II illustrating the Eigen values of the intelligence test are in acceptable range of factor analysis for IQ types. Thus intelligence test types developed by the researchers in a test development process were reliable and authentic for measuring the intelligence.

Table three representing the difficulty value of the intelligence test items, thirty one items were rejected on the base of in appropriate difficulty value of the tests items. 69 items were accepted in initial item analysis stage in light of the item difficulty level. In present study we preferred appropriate difficulty value items which were not easiest and more difficult for concern population.

Items difficulty levels between 0.30 and 0.70 according to Nunnally and Bernstein (1994) are considered acceptable items Items difficulty levels between 0.30 and 0.70 according to Nunnally and Bernstein (1994) are considered acceptable items because they are neither too challenging nor too easy for test takers. Things having a difficulty level greater than 0.70 and a difficulty level less than 0.30 were rejected as being too easy and challenging respectively.

Because they do not contribute significantly to the utility of items for discriminating across test takers. The diversity of test scores and precision in discrimination they are neither too challenging nor too easy for test takers. Things having a difficulty level greater than 0.70 and a difficulty level less than 0.30 were rejected as being too easy and challenging respectively.

Because they do not contribute significantly to the utility of items for discriminating across test takers. The diversity of test scores and precision in discrimination among distinct groups of examinees are influenced by item difficulty.

Furthermore, too easy and more difficult items do not contribute in test reliability (Kane, 2013; Kline, 2005). The data demonstrates that item difficulty varies with many of things falling in the medium ranges with an average difficulty level of 0.50. The data revealed that 9 items were too simple (difficulty value > 0.70) and 2 items were too difficult (difficulty value > 0.70). (Difficulty level less than 0.30). Items that did not meet the established criteria were discarded. Items with difficulty levels ranging from 0.30 to 0.70 were chosen because they were neither too challenging nor too easy for the test takers. The average difficulty level of all items was roughly 0.50 according to a careful analysis of the data. The  $p > 0.50$  difficulty rating showed that 0.50% of the group passed the item while the other 50% failed (Anastasi & Urbina, 2017; Kane, 2013).

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