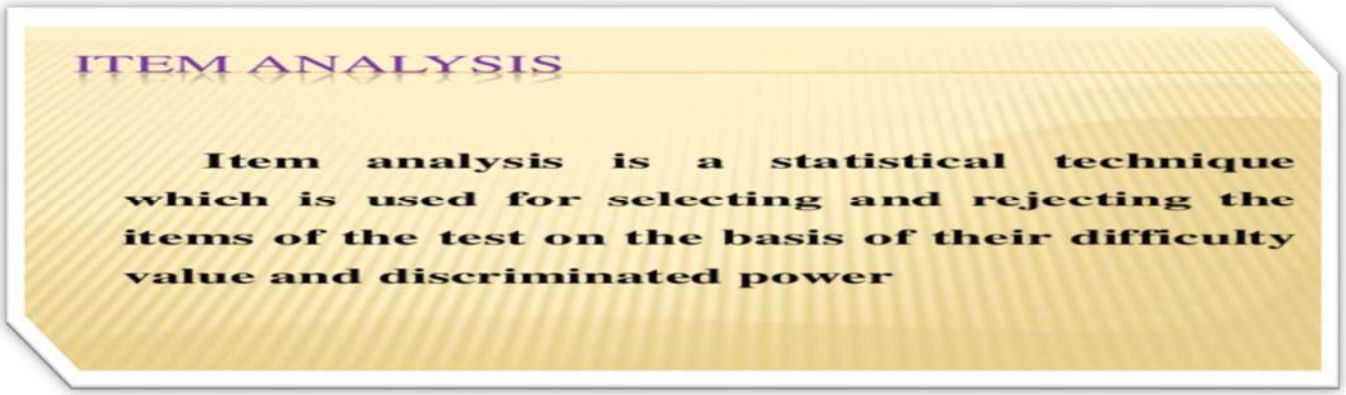
ITEM ANALYSIS

What is item analysis?

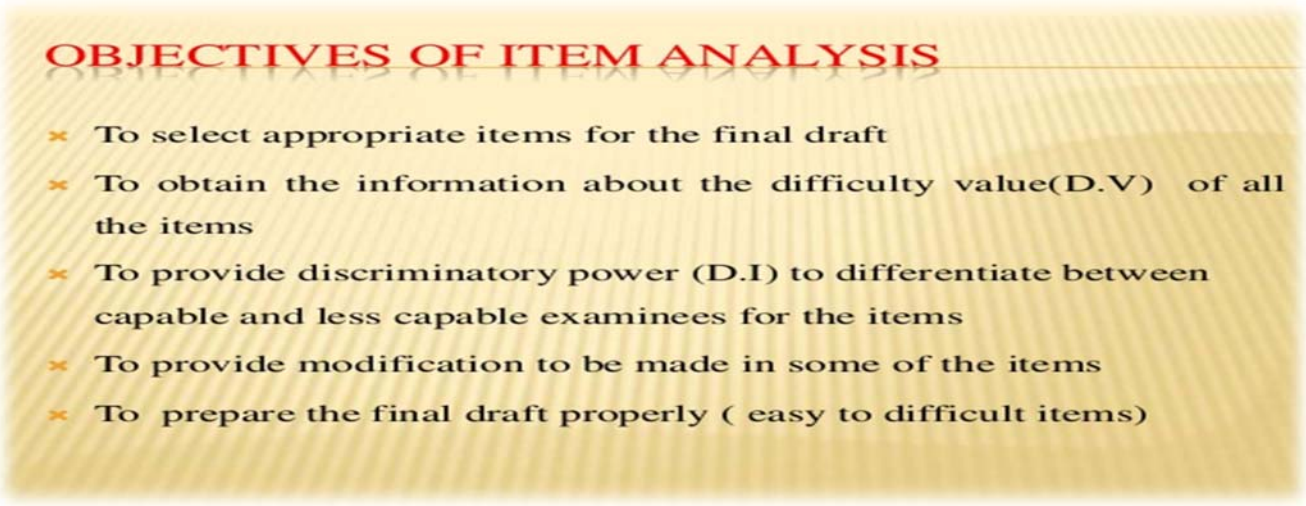


- Item analysis is a process which examines student responses to individual test items (questions) in order to assess the quality of those items and of the test as a whole.
- Item analysis is especially valuable in improving items which will be used again in later tests, but it can also be used to eliminate ambiguous or misleading items in a single test administration.
- In addition, item analysis is valuable for increasing instructors' skills in test construction, and it is an important tool to uphold test effectiveness and fairness.
- Item analysis is likely something educators do both consciously and unconsciously on a regular basis.
- In fact, grading literally involves studying student responses and the pattern of student errors, whether to a particular question or particular types of questions.
- But when the process is formalized, item analysis becomes a scientific method through which tests can be improved, and academic integrity upheld.

Need of the Item Analysis: Following are the needs of a test:

- To select the candidates
- To classify the candidates
- To provide the ranking to the candidates
- To promote the candidates
- To frame the statements about the future behavior of the candidates
- To establish the individual differences among the candidates

To achieve the above objectives a test need to have the appropriate items so that the test can differentiate the individuals in different categories like superior, average and inferior. Therefore for selecting the appropriate items for the final form of the test following may be the objectives of the item analysis:



Therefore we can say that the following may be the functions of Item Analysis:

- Item analysis can increase the efficacy of the exams by testing knowledge accurately.
- Item analysis not only can drive exam design, but it can also inform course content and curriculum.
- When it comes to item difficulty, it's important to note whether errors indicate a misunderstanding of the question or of the concept the item addresses.
- When a large number of students answer an item incorrectly, it's notable. It may be a matter of fine-tuning a question for clarity; is the wording of the question confusing? Are the answers clear?
- It could be that the material may have to be reviewed in class, possibly with a different learning approach.

Following three functions are the main functions of Item Analysis:

1. Selecting the appropriate items for the test
2. Rejecting in appropriate items, and
3. Modification in the structure of the items

Characteristics of an item:

There are two main characteristics of an item

1. Difficulty Value or Pass Percentage

"The difficulty value of an item is defined as the proportion or percentage of the examinee's who answer the item correctly"

2. Discriminating Power

Discriminating power further can be divided into two parts

(i) Item Reliability- “Item reliability may be defined as the degree to which an item differentiate high and low groups on the basis of the same test scores”

(ii) Item Validity- “Item validity may be defined as the degree to which the item differentiate between high and low groups on the basis of some criterion test score”

Item analysis can be performed in the following ways:

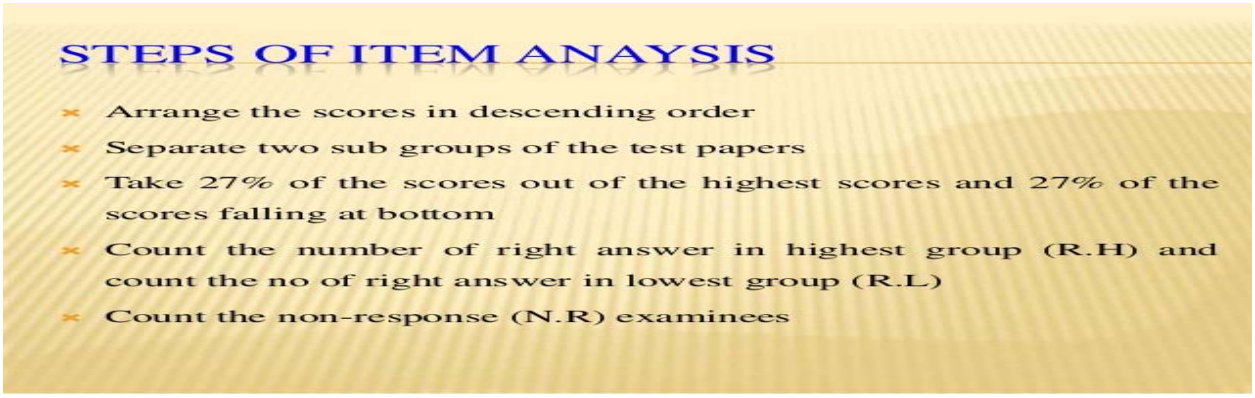
- **Item Difficulty:** It is about the exam question too easy or too hard? When an item is one that every student either gets wrong or correct, it decreases an exam’s reliability. If everyone gets a particular answer correct, there’s less of a way to tell who really understands the material with deep knowledge. Conversely, if everyone gets a particular answer incorrect, then there’s no way to differentiate those who’ve learned the material deeply.
- **Item Discrimination** -- Does the exam question discriminate between students who understand the material and those who do not? Exam questions should evaluate the varying degrees of knowledge students have on the material, reflected by the percentage correct on exam questions. Desirable discrimination can be shown by comparing the correct answers to the total test scores of students--i.e., do students who scored high overall have a higher rate of correct answers on the item than those who scored low overall? If you separate top scorers from bottom scorers, which group is getting which answer correct?

The data from item analysis can drive the way in which one can design his future tests. As noted previously, if student knowledge assessment is the bridge between teaching and learning--then exams ought to measure the student learning gap as accurately as possible.

Item analysis should bring to light both questions and answers as one revise or omit items from his test.

- Is the item difficulty level appropriate?
- Does the item discriminate appropriately?

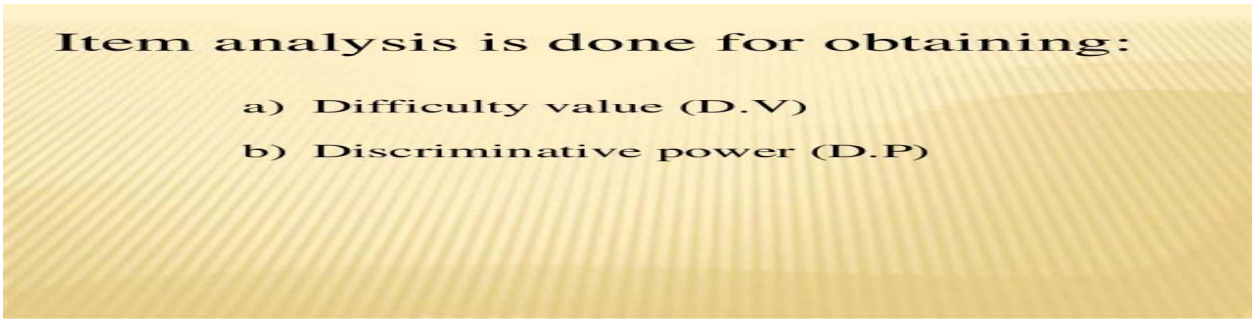
Procedural steps for performing item analysis:



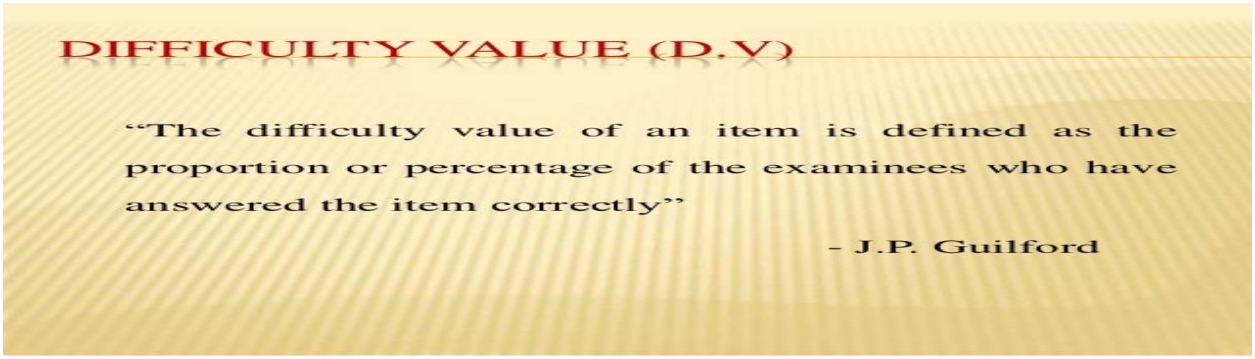
Dichotomization: It is the process of forming higher score group and lower score group as per the Kelly's Method. On the basis of obtained scores we have to consider only the top and bottom percentage in any of the following manner:

1. Considering Top 25% and Bottom 25%, discarding the middle 50% cases.
2. Considering Top 33% and Bottom 33%, discarding the middle 34% cases.
3. Considering Top 27% and Bottom 27%, discarding the middle 46% cases.

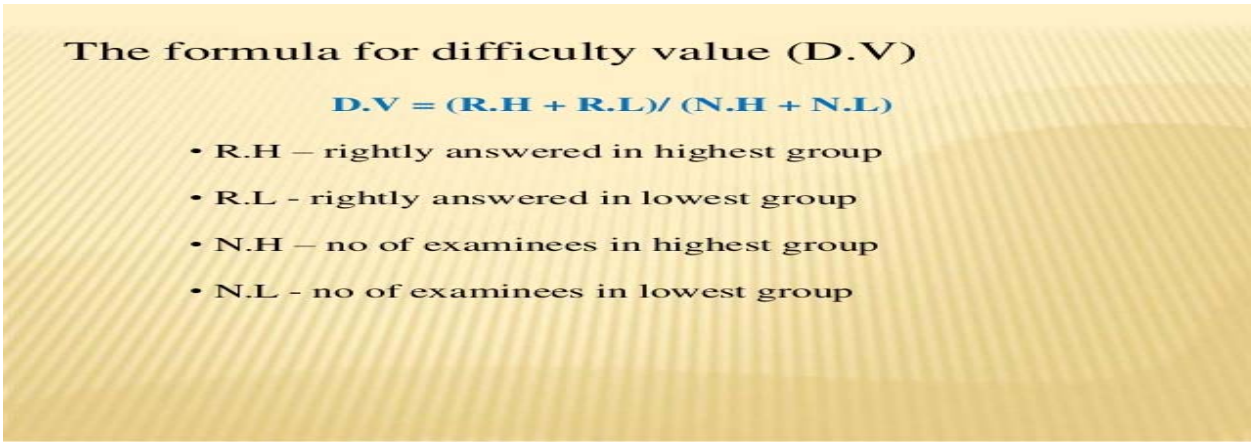
From the above, the third one (Kelly's Method of dichotomization) is the most promising one.



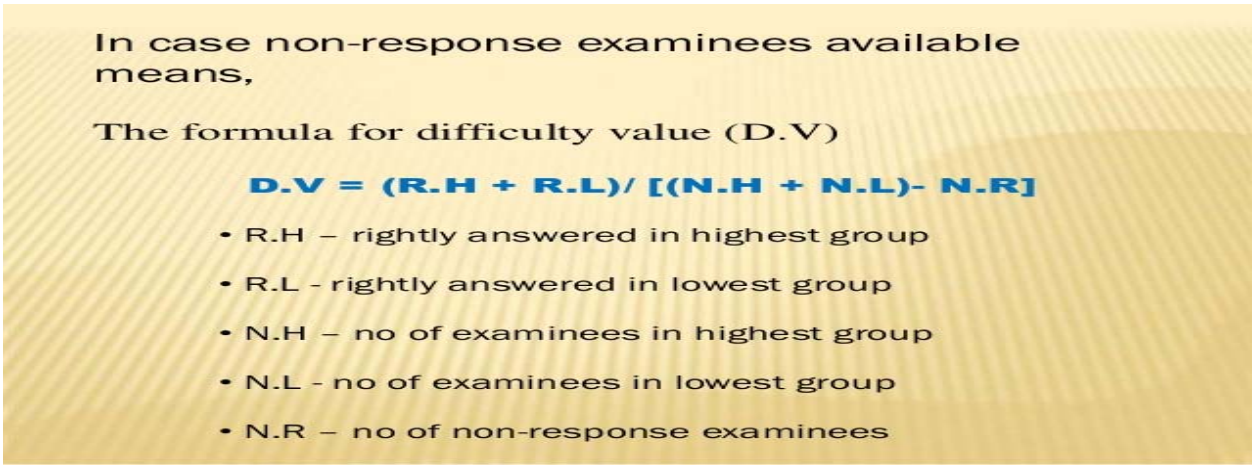
Difficulty Value: Guilford defined Difficulty Value as:



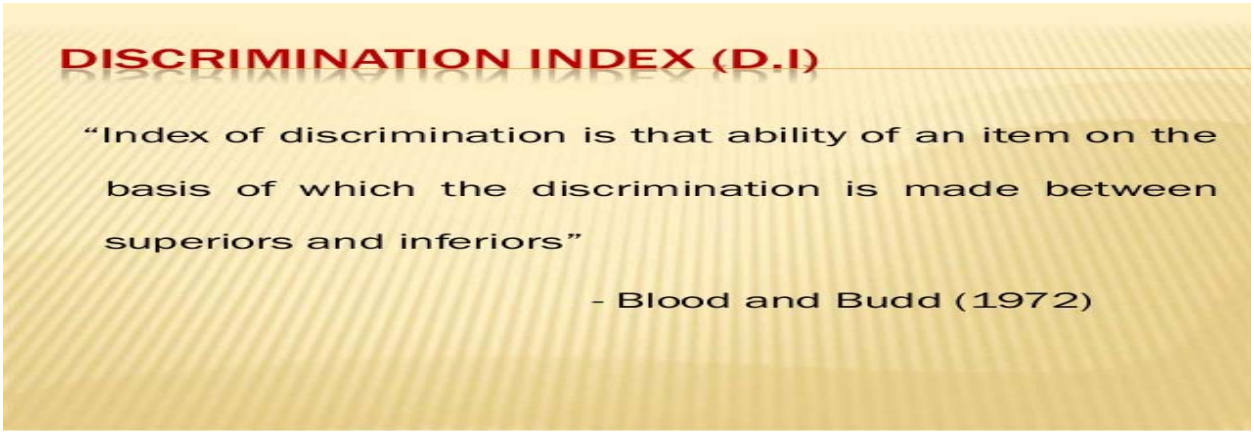
The formula for calculating the difficulty value of an item is



The formula for calculating the Difficulty Value if there are some examinees are such that they are not giving any response to an item



Discrimination Index: Blood and Budd defined the Discrimination Index as:



Following are the types of Discrimination Index:

ZERO DISCRIMINATION OR NO DISCRIMINATION

- The item of the test is answered correctly or know the answer by all the examinee's
- An item is not answered correctly any of the examinee

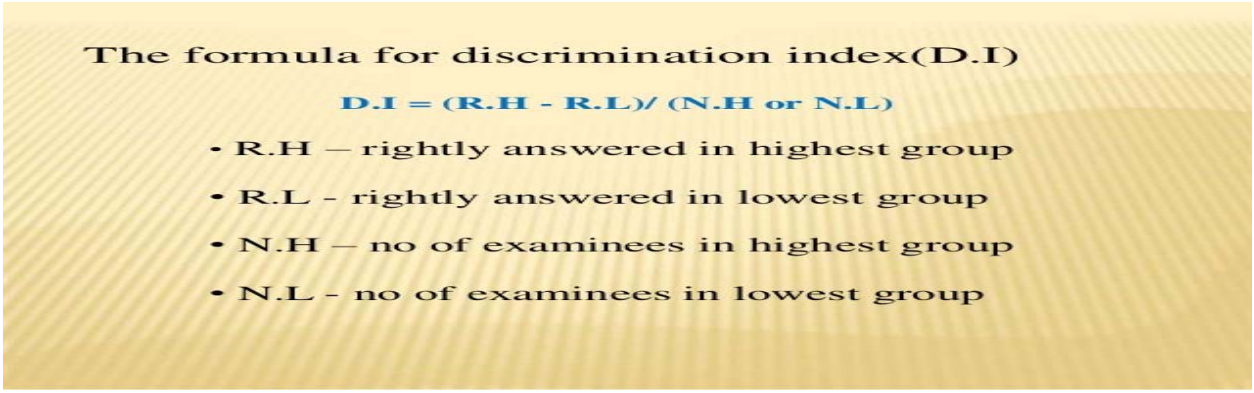
POSITIVE DISCRIMINATION INDEX

An item is correctly answered by superiors and is not answered correctly by inferiors. The discriminative power range from +1 to -1.

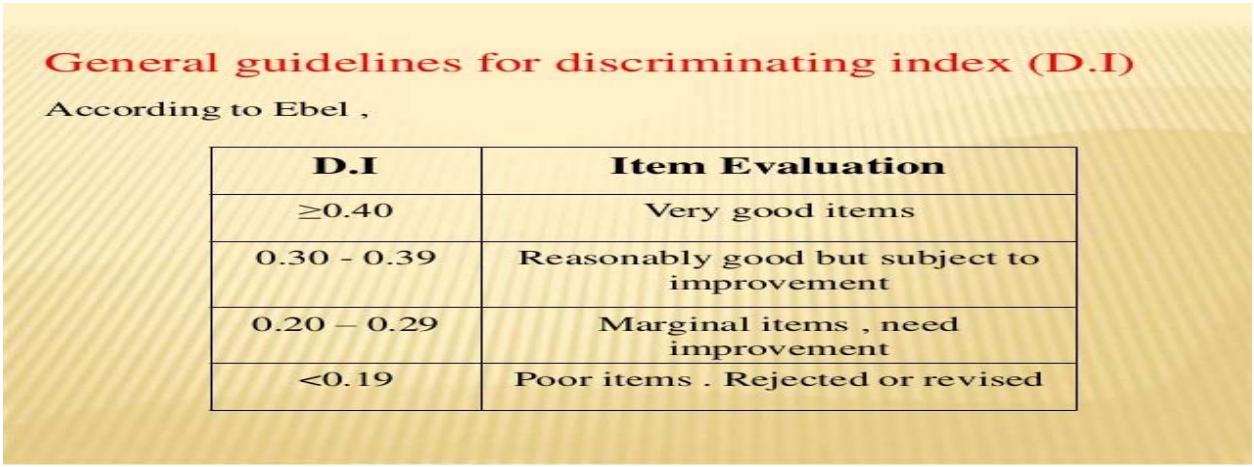
NEGATIVE DISCRIMINATION INDEX

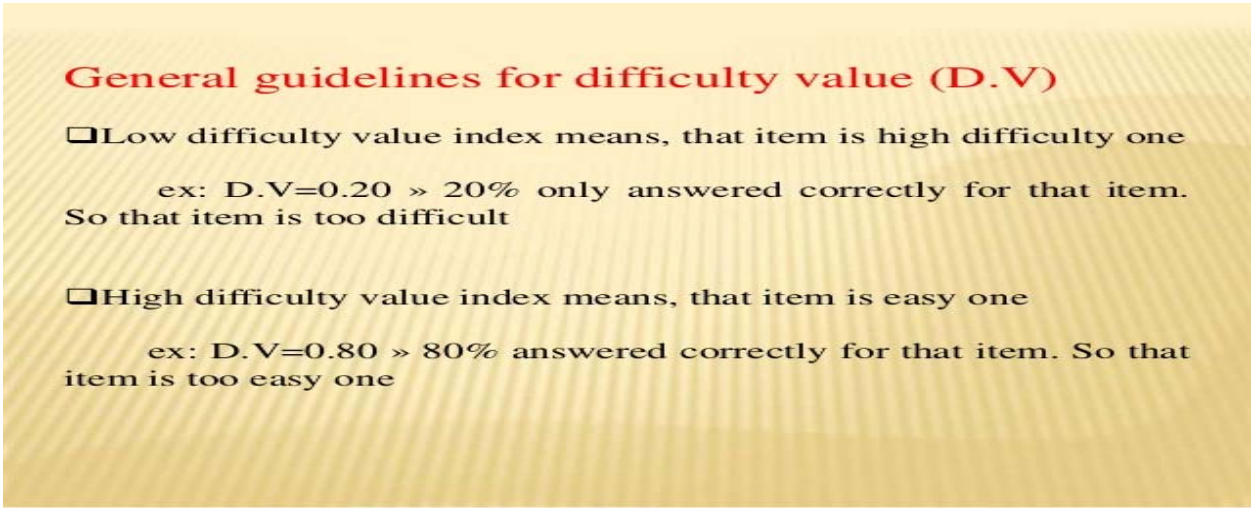
An item is correctly answered by inferiors and is not answered correctly by superiors.

The formula for the determination of the value of Discrimination Index is given as:



According to Ebel the following criterion are looking important for the selection of an appropriate item in the light of its Discriminating Index and Difficulty Index:





D.V	Item Evaluation
0.20 – 0.30	Most difficult
0.30 - 0.40	Difficult
0.40 – 0.60	Moderate difficult
0.60 – 0.70	Easy
0.70 – 0.80	Most easy

How are the Difficulty Value and Discrimination Power related?

Relationship between difficulty value and discrimination power

- Both (D.V & D.I) are complementary not contradictory to each other
- Both should considered in selecting good items
- If an item has negatively discriminate or zero discrimination, is to be rejected whatever the difficulty value

Criterion for the selection of appropriate item for the final form of the test

CRITERIA FOR SELECTION AND REJECTION ITEMS

- Positive discrimination index only selected
- Negative and zero discrimination index items are rejected
- High and low difficulty value items are rejected

References:

- Research Methodology – R. P. Bhatnagar
- Research Methodology – Lokesh Kaul
- Educational Research
- Educational and Mental Measurement - R. A. Sharma

Web References:

- www.washington.edu
- www.uwosh.edu
- www.geneseo.edu
- en.wikipedia.org