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Article

Item Analysis

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Introduction

Item is a single question on a test or a single statement on a scale. Analysis is a process of organizing and detailed examination of data.

Definition

A statistical process of selecting or rejecting of each item in the test on the basis of difficulty value and discrimination index.

Phases of Test

- Phase I - Try out
- Phase II - Item analysis
- Phase III - Item revision

Item Analysis a Put line

Type of test items

a) Selected response

- Multiple choice
- Likert scale
- Category
- Q-Sort

b) Constructed response

- Free response
- Fill in the blanks
- Essay tests
- Port folios
- In basket technique

1. Parts of test items

- Stimulus or item stem
- Response format or method
- Condition governing the response
- Procedures for scoring the response

2. Writing test items guideline

- Define clearly
- Generate a pool of potential items

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- Monitor ready level
- Use unitary items
- Avoid long items
- Break any response "set"

3. Item analysis

a) Item difficulty measures
b) Item discrimination measures

- Discrimination index D
- Item - total correlation

c) Multiple choice distracter analysis

4. Item response theory

- Item characteristics curve
- Adaptive testing using computers

Types of Item Analysis

1. Qualitative Item Analysis

- Subjective process
- Evaluating an item in terms of content and form-content validity

2. Quantitative Item Analysis

- Evaluating an item in terms of statistical properties.

Purposes is to:

- Select appropriate items.
- Identify the defect in items.
- Provide modification in items.
- Identify weakness and strength.
- Understand behaviour of items (poor or biased item).
- Control the quality of a test.
- Evaluate the students.
- Find out group performance.
- Increase skills in test construction.
- Improve teaching methods and techniques.

Steps

Step I: Arrange the test score in descending order (highest to lowest).

Step II: Divide the scores into two sub-groups and tally it.

- Group I: High scoring (first 27% upper group)
- Group II: Low scoring (last 27% lower group)

27% is best to compromise between two desirable contradictions by making both groups as large and different as possible.

Step III: Calculate difficulty value (DV)

Step IV: Calculate discrimination index (DI)

Step V: Check each item for distracters (distracter analysis), mis- key, ambiguity and functionality (since lack of functionality leads to a greater possibility of guessing).

Item Difficulty or Difficulty Value

The difficulty value of an item is defined as the proportion or percentage of the examinees who have answered the item correctly. P value ranges from 0 to 1.00.

Difficulty Value

The formula for difficulty value (D.V)

D.V = (R.H + R.L) / (N.H + N.L)

- R.H - rightly answered in highest group
- R.L - rightly answered in lowest group
- N.H – no of examinees in highest group
- N.L –no of examinees in lowest group

In case of non-response examinees available means difficulty value:

D.V= (R.H + R.L) / [(N.H + N.L)-NR] were NR - no of non-response examinees.

Table 1

D.V	Item Evaluation	Action
0.00-0.20	Very difficult item	Items with low D.V and high D.V should be discarded. P = 0.50 is the best Ideal range 0.30 to 0.70
0.21-0.40	Difficult item	
0.41-0.60	Average/Moderately difficult item	
0.61-0.80	Easy item	
0.81-1.00	Very easy item	

Discrimination Power/ Index

It is the discrimination ability of an item on the basis of which the discrimination is made between superiors and inferiors (upper and lower), the discriminative power ranges from +1 to -1.

Types

Zero Discrimination and No discrimination

The item of the test is correctly answered or an item is not answered correctly by any one.

Positive Discrimination

The item is correctly answered by upper group and not correctly answered by lower group.

Negative Discrimination

The item is correctly answered by the lower group and not correctly answered by upper group.

The formula for discrimination index (D.I)

D.I= (R.H - R.L) / (N.H or N.L)

Another method for discrimination index if using Likert scale for data collection then the correlation between each item scores with total scores should be carried out.

Table 2

Result (DI)	Item evaluation	Action
Negative or Zero	Very poor item	Discard
0.010.19	Poor item	Discard / Change
0.20-0.29	Marginal item	Revise (need improvement)
0.30-0.39	Good	Retain (Subject to improvement)
0.40 and above	Very good	Retain

Distractor Analysis

It is to find out how distracters were able to function effectively to draw the attention of an examines away from the correct answer. The number of times each distracter is selected is noted in order to determine the effectiveness of the distracter. Distracters should be equally attractive and correct choice should be based on knowledge, where knowledge is lacking, choice should be random.

Distracter should be selected by enough number of students to be a viable one. The acceptable value depends on the difficulty of the item.

Example. A question with 4 items taken by 100 examinees and out of that 70 examines were answered correctly item A, the remaining 30 examines would select from three distracters. If all 30 examines selected the item D then distracters B & C are useless and if B & C are selected by 15 examinees each, Item D is not an effective distracter.

Conflict of Interest: None

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