



BLDE (Deemed to be University)
Shri B. M. Patil Medical College Hospital
and Research Centre Vijayapura
Medical Education Unit

**'Being a Competent
Medical Teacher'**

EDITOR

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10 ITEM ANALYSIS

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ITEM ANALYSIS: Development of strategies/procedures/steps to evaluate the quality of items (questions).

ITEM ANALYSIS

- Facility value synonym: item difficulty/difficulty index
- Discrimination index (item discrimination)
- Distractor efficiency
- PBS: Point Bi-serial Correlation

TEST ANALYSIS

- Reliability co-efficient
- Standard error of measurement

BANKING

- Item banking
- Ideal test
- Item levels
- Item cards

FACILITY VALUE

Synonym: ITEM DIFFICULTY / DIFFICULTY INDEX Number of students who answered the question right

FV: $[HAG + LAG / N] \times 100$

HAG: Higher ability group

LAG: Lower ability group

Interpretation of FV

>85% easy item

50-85% moderate item

<50% tough item

Significance of FV

- Differentiates skilled / unskilled students
- Assess the knowledge
- Helps in setting better paper design

Recommendations

- Start items with FV>85% ie easy items

DISCRMINATION INDEX

It's the ability of a question to discriminate between skilled and unskilled students

$$DI = 2X(HAG - LAG) / N$$

Interpretation of DI

Range: 0 – 1

It extends from -1 to +1

Recommended: > 0.25

Acceptable: 0.15 to 0.25

Discard item if DI < 0.2

Good item if DI is 0.35

DI having minus value are called “Negative discrimination”

Negative discrimination: if LAG answers better than HAG then DI value falls in minus value

Negative DI indicated either item is ambiguous or answer is wrong .

Significance of DI

Flaws in item can be identified

Improvements in item preparation

Misconceptions in learning can be identified

Quality and assessment.

DISTRACTOR EFFICIENCY

Distractor: options other than key is distractor

Good distractor: HAG not attracted to that option

Bad distractor : HAG attracted to that option

GOOD DISTRACTOR

LAG pick it as correct answer

HAG do not pick it as the correct answer

Should have a student response value of at least 20-30% POOR

DISTRACTOR

Not picked by LAG

Picked by HAG

Student response value of < 5% for each distractor

Point Bi Serial Correlation

It's a parameter which gives information about the 'fit' of an item with the remaining test.

SIGNIFICANCE:

PBS helps us to identify items which are not testing the same domain as rest of the test

This helps to improve the validity and reliability of the tests

Calculated as a correlation between the score on that item with the total score on the test *minus* that item

PBS value ranges from -1 to +1.

A large value indicates that students with high scores on that test are also getting that item right.

PBS between 0.15 to 0.35 are acceptable. Uses of item analysis

Assessing the quality of items used in test.

Improving items which may be used again in later tests

Eliminating ambiguous and misleading questions

Enhancing instructors skills in the construction of flawless items

Identifying specific areas of course content which need greater emphasis or clarity

Provides data for helping students to improve their learning – common

error/misconceptions/remedial work

Provides insights and skills which lead to the preparation of better tests on future.

TEST ANALYSIS

RELIABILITY COEFFICIENT: refers to the extent to which the test is likely to produce consistent scores.

Characteristics of reliability coefficient

The inter correlations among items : high the relative numbers of positive relationships, high the reliability

The length of the test : more lengthy more reliability

Content of the test : diverse the subject lower the reliability.

STANDARD ERROR OF MEASUREMENT (SEM)

- It is the concept related to reliability of test.
- Depends on the number of items in a test
- Formula
- SEM: $.4\sqrt{N}$
- N: NUMBER OF ITEMS IN TEST
- It is an additional reliability statistic calculated from the reliability estimate

Banking

- Pool of questions
- Ability to deposit, discover & retrieve questions
- It includes
- The content area
- Learning outcome being measured using that particular item
- Marks allocated
- Time allotted to answer the question
- FV of the item
- DI
- Source of question
- Uses of question banking

- Well arranged collection of questions
- Well organized topic wise
- Minimizes time & energy required to construct a test
- Helps to chose right question for right examination like for assessing skills/entrance exams/subject
- Facilitates monitoring the performance of question across varying testing criteria
- Quality assurance of questions – test – examination
- Enhances skills of item writing & reviewing
- Provides transparency to the evaluation process – builds faith in examination system
- Helps in setting uniform standards of teaching and assessment

ITEM LEVELS

ITEM CLASS	FACILITY VALUE	DISCRIMINATION INDEX
LEVEL I (best)	45% -75%	+ 0.2 or HIGH
Level ii (very easy)	76% - 91%	+0.15 to + 0.20
Level iii (very difficult)	25% - 44%	+0.10 to + 0.15
Level iv (too easy / too difficult)	< 24% / >91%	Any discrimination

IDEAL TEST

- Level i: 70%
- Level ii: 20%
- Level iii: 10%
- Level iv: never include

ITEM CARD

- Subject : Pathology
- Type Of Question : One Best Response
- Reference Number : 1
- Topic : cell injury
- Time of answering : 1 minute
- Mark : 1
- Prepared by :
- Question : ...?
- Answer : a/b/c/d
- Key : a

ITEM BANKING

REF NO	DATE	GROUP	SIZE OF GROUP	CHOSEN ANSWER	FV	DI	LEVEL
1	15.1.15	100	HAG (25)	A/B/C/D	57	0.45	I
			LAG (25)				
2	25.1.15	100	HAG (25)	A/B/C/D	62	0.5	I
			LAG (25)				

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- Tejender Singh, gupta p, daljit singh. Test & item analysis, Principles of Medical Education JP publishers 4th edition 2013:108-116.

SOFTWARE

- Remark office optical mark reading – scan /print export the data to SPSS data format
- Teleform 5 – Optical character recognition/optical mark reading – store your data as an SPSS data file
- Statistical package for social sciences (SPSS) data entry

FURTHER INFORMATION

- Validation and Item Analysis of MCQ'S by dr Kusum Verma, Professor of Pathology, AIIMS, NEW DELHI
- Engaging Academics with a Simplified Analysis of their MCQ Assesment Results by Geoffrey T Crisp & Edward J Palmer , University of Adelaide, Journal of University Teaching & Learning Practice Vol 4 (2), 2007 88-106