

TOPIC 8

ITEM ANALYSIS

By the end of this topic, you should be able to:

1. Define item analysis;
2. Compute the difficulty index;
3. Compute the discrimination index;
4. Analyse the effectiveness of distractors in a question;
5. Discuss the relationship between the difficulty index and discrimination index of an item; and
6. Explain the role of an item bank in the development of tests.

ITEM ANALYSIS

A process which examines the responses to individual test items or questions in order to assess the quality of the items/questions and the test as a whole

Focus on

- * Item difficulty – Difficulty index (Indeks Kesukaran)
- * Item discrimination- Discrimination index
(Indeks Diskriminasi)
- * Distractor analysis – effectiveness of distractors

Difficulty Index

- indicates how difficult an item or a question is.

Procedure:

1. Mark the answer scripts and obtain the total score for each script
2. Arrange the answer scripts from the highest score to the lowest score.
3. Take out 27% of the total scripts from the High Marks Group and another 27% of the total scripts from the Low Marks Group

$$\text{Total scripts} = 45 \quad 27\% \times 45 = 12.15 = 12 \text{ scripts}$$

High marks group = 12 scripts

Low marks group = 12 scripts

4. Count the number of students from the both groups who get the correct answer.

SS

1

2



11

12

HIGH MARKS

GROUP (12)

Example:

What do you call the fertile area in the desert?

(A) mirage

(B) oasis

(C) water hole

(D) polder



34

35



45

LOW MARKS

GROUP (12)

	A	B	C	D	Blank
High Marks Group (n = 12)	0	11	1	0	0
Low Marks Group (n = 12)	3	2	3	4	0

Difficulty Index =
(p)

Total No. of SS with correct ans

Total No. of SS who answer qn

= R/T = 13/24 = .54

Interpretation of ρ (Rule of Thumb)

$>.70$ = Easy

$.30 - .69$ = Moderate

$<.29$ = Difficult



Task:

Compute the Difficulty Index

Which of the following is the most useful in weather forecasting?

(A) Anemometer (B) Thermometer (C) Barometer* (D) Rain gauge

Total No. of SS = 36

Options	A	B	C*	D	Blank
High Marks Group (n = 10)	0	2	7	1	0
Low Marks Group (n = 10)	0	2	4	3	1

* Key

$$P = 11/20 = .55 \text{ (Moderate difficulty)}$$

Discrimination Index

- indicates the extent an item/a question differentiate between good and poor students

$$D = \frac{R_H - R_L}{\frac{1}{2} T}$$

R_H = No. of SS in High Mark Group with correct ans

R_L = No. of SS in Low Marks Group with correct ans.

T = Total No. of SS in the analysis

Options

	A	B	C	D	Blank
• High Marks Group (n =12)	0	11	1	0	0
• Low Marks Group (n = 12)	3	2	3	4	0

$$D = \frac{11 - 2}{\frac{1}{2} (24)} = \frac{9}{12} = .75 \text{ (High discrimination)}$$

Interpretation of D – Rule of Thumb

D value	Description	Suggestion
>.40	High discrimination	Qn. is retained
.20 - .39	Moderate discrimination	Qn. is checked & revised
.10 - .19	Low discrimination	Qn. is removed or rewritten
.00 - Negative	No discrimination	Qn. is removed

Blood & Budd (1972)

Task:

Compute the Discrimination Index

Which of the following is the most useful in weather forecasting?

(A) Anemometer (B) Thermometer (C) Barometer* (D) Rain gauge

Total No. of SS = 36

Options	A	B	C*	D	Blank
High Marks Group (n = 10)	0	2	7	1	0
Low Marks Group (n = 10)	0	2	4	3	1

* Key

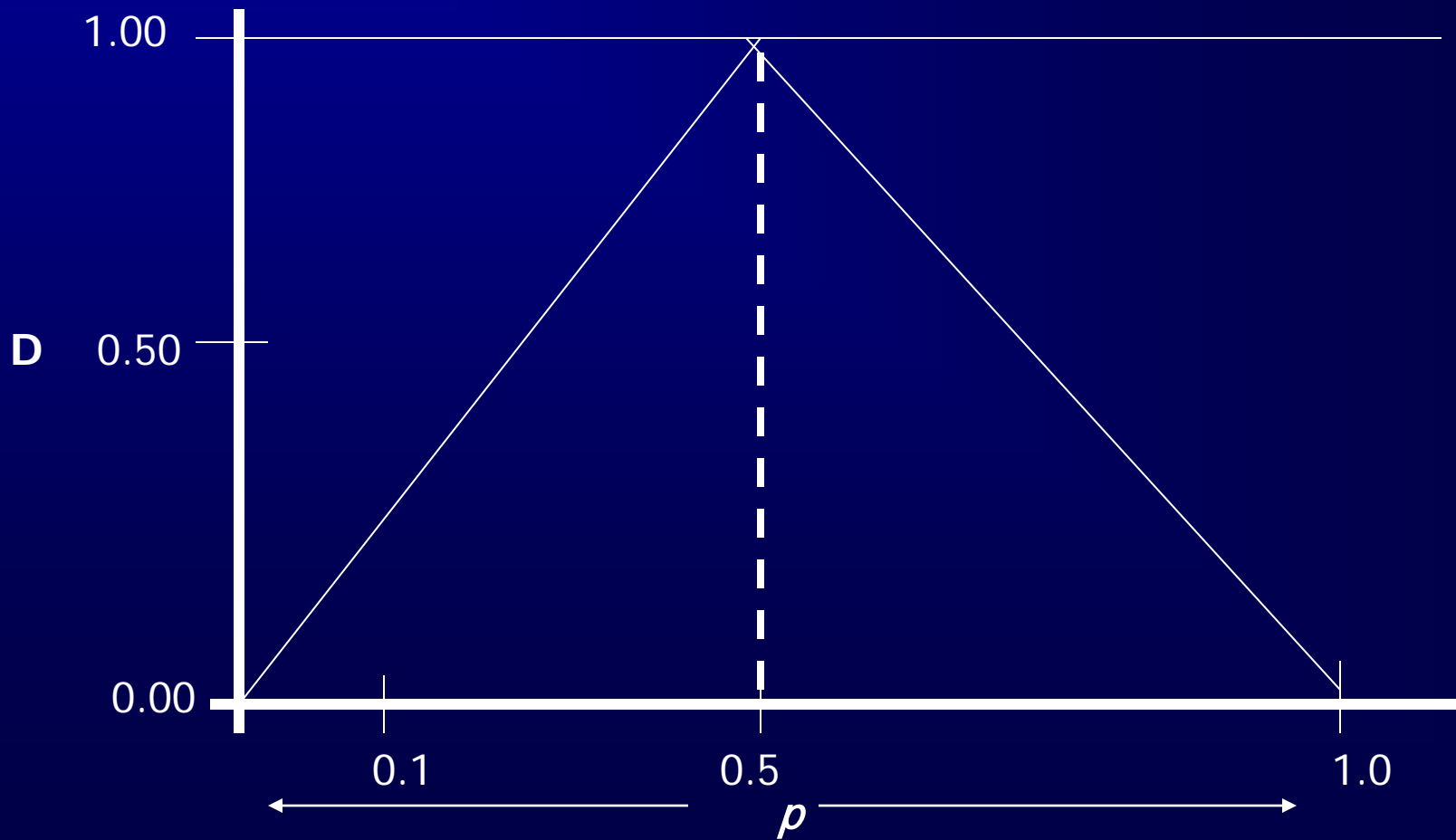
$$D = \frac{7 - 4}{\frac{1}{2}(20)} = \frac{3}{10} = .30 \text{ (Moderate discrimination)}$$

Discussion

- (1) If a question has a high difficulty index (approaching 1.00),
 - (a) what can you say about the question?
 - (b) what can you say about its item discrimination?

- (2) If a question has a low difficulty index (approaching 0),
 - (a) what can you say about the question?
 - (b) what can you say about its item discrimination?

Relationship Between Difficulty Index (p) & Discrimination Index (D)



Exercise 1

Can you compute the D & p ?

Item	No. of SS with Correct ans.		
	(1)	(2)	(3)
High marks grp (n = 10)	0	10	10
Low marks grp (n = 10)	0	0	10

What conclusion can you draw about the relationship between D & p from the above exercise?

Exercise 2

Can you compute the D & p ?

Item	No. of SS with Correct ans.		
	(1)	(2)	(3)
High marks grp (n = 20)	18	3	4
Low marks grp (n = 20)	3	0	6

What can you say about each item?

Distractor Analysis

The effectiveness of the distractors can be examined by visual inspection.

An effective distracter should

- (a) attract some responses
- (b) attract more responses from poor students than good students (i.e. discriminate negatively)
- (c) attract less responses than the key should

Exercise 3

Examine the quality of each item based on the difficulty index, discrimination index and distracter analysis.

Item 1

Option	A	B	C*	D
High marks group (20)	1	2	14	3
Low marks group (20)	4	5	4	7

* key

Item 2

Option	A	B	C	D*
High marks group (20)	7	4	1	8
Low marks group (20)	3	3	9	5

Item 3

Option	A	B	C*	D
High marks group (20)	0	0	13	7
Low marks group (20)	0	0	11	9

Item 4

Option	A*	B	C	D
High marks group (20)	14	4	2	0
Low marks group (20)	8	7	5	0

Item 5

Option	A	B*	C	D
High marks group (20)	7	13	0	0
Low marks group (20)	13	7	0	0

The Usefulness of Item Analysis to Teachers

- **Item analysis data can be used to select or revise test items for future use. This would improve the quality of test items and the test paper to be used in future. It also saves teachers' time in preparing test items for future use because good items can be stored in item bank.**
- **Item analysis data can be used for remedial work. The analysis will reveal the specific areas that the students are weak in. Teachers can use the information to focus remedial work directly on the particular areas of weakness.**

- **Item analysis data can reveal weaknesses in teaching and provide useful information to improve teaching. For example, items/tasks that students consistently fail to answer satisfactorily may suggest a need for more effective teaching strategies.**
- **The process of doing item analysis helps to improve teachers' skills in test construction. As teachers analyse students' responses to items, they become aware of the defects of the items and what causes them. When revising and rewriting the items, they gain experience and improve their skills.**

HAPPY READING