Conceptual Framework of an *effective and efficient* Test management System

Lim TM

Faculty of Education and Languages

Open University Malaysia

Basic Functions of an Test Management System

- **To manage the development and storage of assessment items**

- **To automate the selection and generation of Test Items for assessment purposes by**

  - **Performing selection based on information from the Test specification Table**

  - **Performing selection based on analysis of metadata (such as difficulty index and discriminative index) generated.**
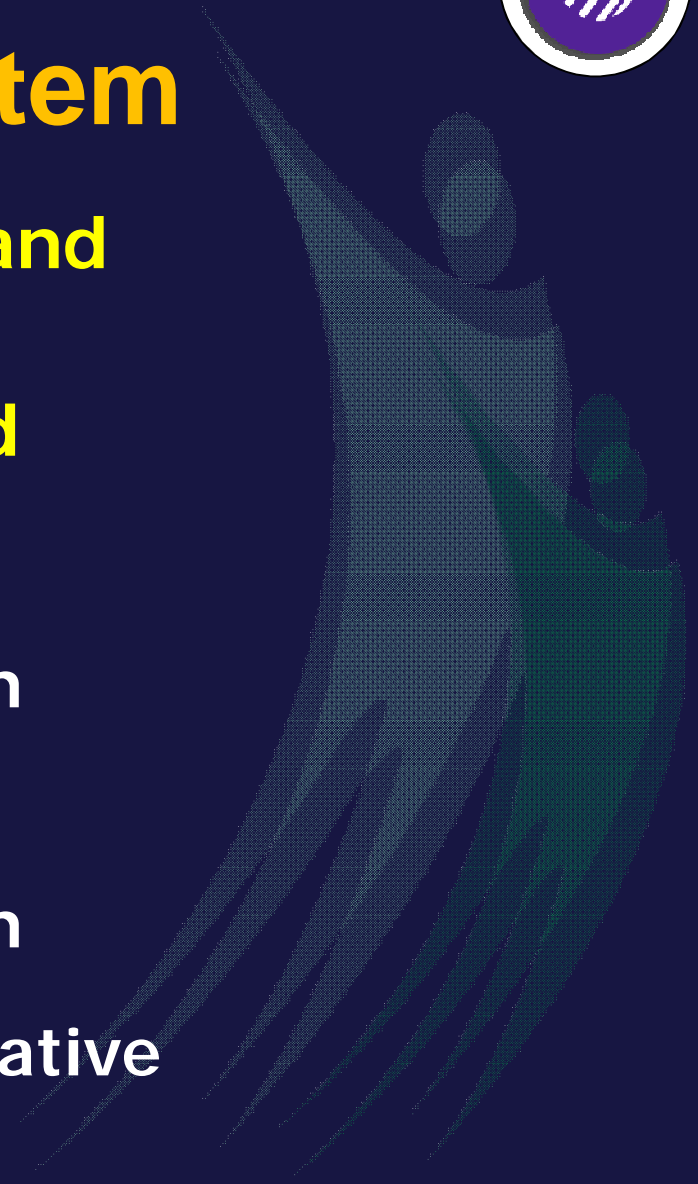
Difficulty Index p (value ranging from 0 to 1)
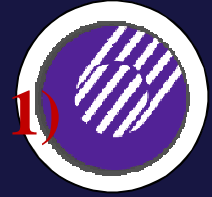
❑ **Item difficulty may be measured by calculating the difficulty index of the item**

❑ **For dichotomously scored items, difficulty index p is measured by**
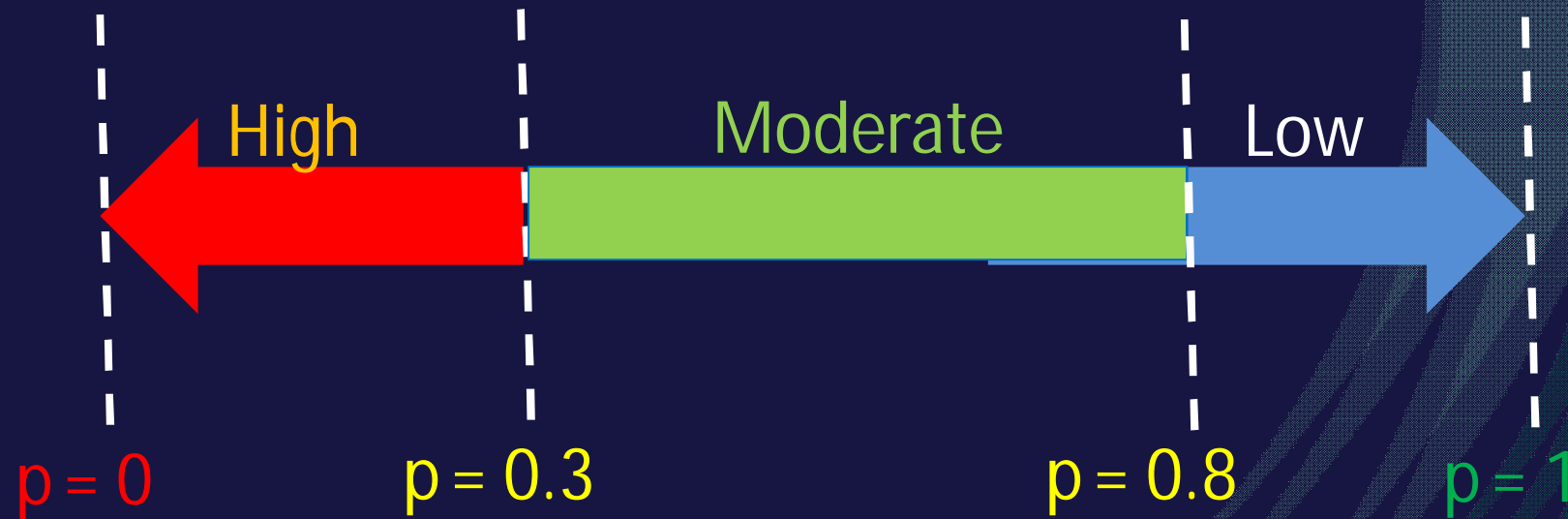
$$p = \frac{N_c}{N_T}$$

where N_c = Number of students who answer the item correctly

and N_T = Total number of students answering the item

Item Difficulty Level: Examples

Number of students who answered each item = 100

Item No.	No. Correct Answers	% Correct	Difficulty Level
1	30	30	High
2	50	50	Medium
3	70	70	Medium
4	90	90	Low

For well –written items ...

- *There is a greater portion of students in the upper group that provide or select the correct answer; and*

- *There is a greater portion of students in the lower group that provide or select the wrong answer*

Discrimination Index D (value ranging from -1 to +1)

Item discrimination is measured by discrimination index D, that is:

$$D =$$

" proportion of correct answers from Upper Group -

- proportion of correct answers from Lower Group "

where

Upper Group – the top 30%

Lower Group – the bottom 30%

(based on overall test scores)

How is the calculation of D?

- **For each item, subtract the number of students in the lower group who answered correctly from the number of students in the upper group who answered correctly.**

- **Divide the result by the number of students in ONE group .**
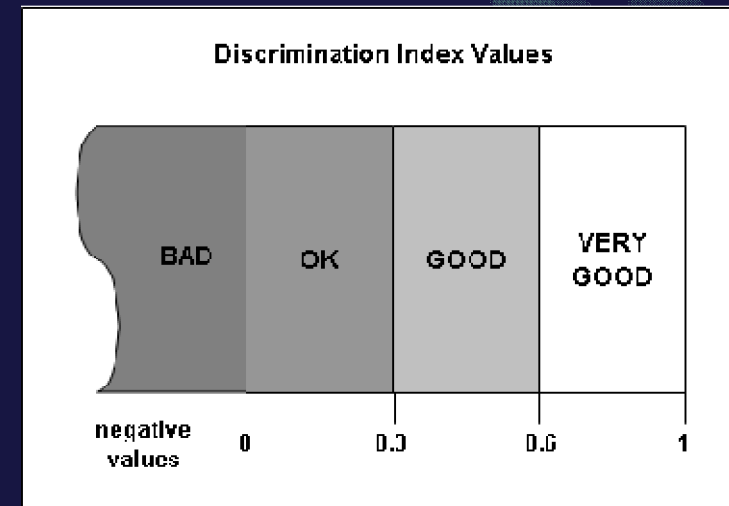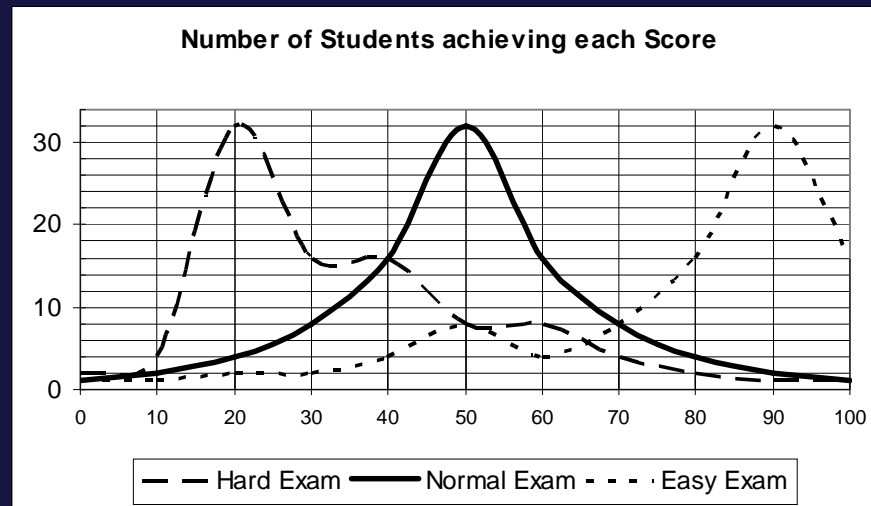
Using Excel to find Discrimination Index

No	Name	Test Scores	Answer for Item #
1	Ahmad	86	C
2	Ali	75	W
3	Mui Ling	73	C
4	Siva	62	C
5	David	60	W
6	Suriani	58	W
7	Marilyn	55	C
8	Nurul	54	W
9	Mohamad	43	W
10	Danny	35	W

No of Correct Answer from Upper Group	No of Correct Answer from Lower Group	Total No of Students from Upper (or Lower) Group	Discrimination Index of Item #
2	0	3	0.67

Excel Formula

No of Correct Answer from Upper Group	No of Correct Answer from Lower Group	Total No of Students from Upper (or Lower) Group	Discrimination Index of Item #
=COUNTIF(H7:H9,"C")	=COUNTIF(H14:H16,"C")	3	=(J7/L7)-(K7/3)

What is a "good" value for D?

Number of Students achieving each Score

- - - Hard Exam   — Normal Exam   · · · Easy Exam

Discrimination Index Values

BAD | OK | GOOD | VERY GOOD

negative values   0   0.3   0.6   1

- For exams with a normal distribution, a discrimination of 0.3 and above is good; 0.6 and above is very good.
- Values close to 0 mean that most students performed the same on an item.
- The index should never be negative.