



# INSTRUMENTATION IN CLASSROOM RESEARCH

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# Data and Instrumentation

- ▶ The term data refers to the kinds of information researchers obtain on the subjects of their research.
- ▶ The whole process of collecting data is called **instrumentation**.

# Key questions about Instrumentation

- ▶ **Where** will the data be collected?
- ▶ **When** will the data be collected?
- ▶ **How often** are the data to be collected?
- ▶ **Who** is to collect the data?

# Where did the instrument come from?

The researcher can acquire an instrument by

- ▶ finding and administering a previously existing instrument of some sort or
- ▶ administering an instrument, the researcher personally developed or had developed by someone else.

# Usability of an Instrument

- ▶ There are a number of practical considerations every researcher needs to think about, such as:
  - duration
  - directions and instructions
  - ethics
  - easiness of scoring
  - cost
  - availability

# Written Response vs Performance?

- ▶ Written response instruments include objective tests, short-essay examinations, questionnaires, interview schedules, rating scales and checklists.
- ▶ Performance instruments include any device designed to measure either a procedure or a product.

# Procedures & Products

- ▶ Procedures are ways of doing things, such as mixing a chemical solution, diagnosing a problem in an automobile, writing a letter, solving a puzzle, or setting the margins on a typewriter.
- ▶ Products are the end results of procedures such as the correct chemical solution, the correct diagnosis of auto malfunction, or a properly typed letter.

# Researcher Completed Instruments

- ▶ Rating scales
- ▶ Interview schedules
- ▶ Tally sheets
- ▶ Flowcharts
- ▶ Performance checklists
- ▶ Anecdotal records
- ▶ Time and motion logs



# Subject Completed Instruments

- ▶ Questionnaires
- ▶ Self-checklists
- ▶ Attitude scales
- ▶ Personality inventories
- ▶ Achievement/aptitude tests
- ▶ Performance tests
- ▶ Projective devices
- ▶ Sociometric devices

# Tests and Inventories used for Measurement

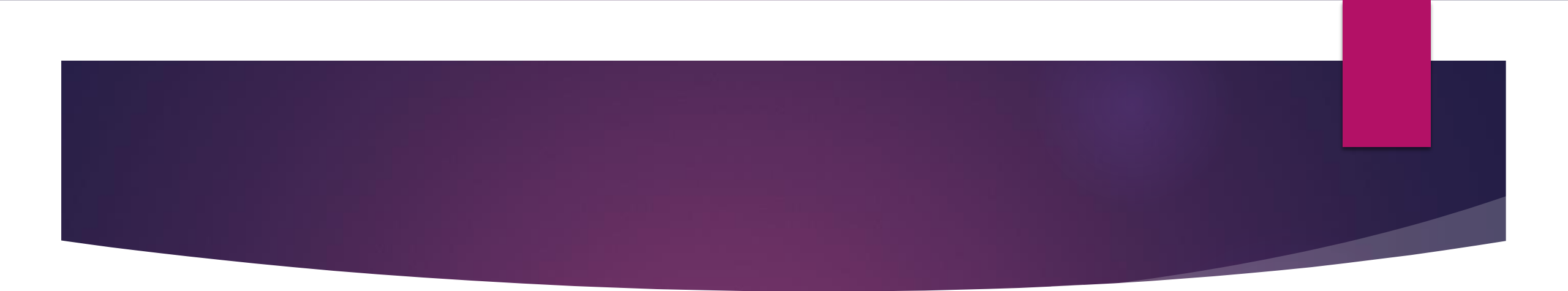
- ▶ Achievement tests in academic & skills areas
- ▶ Attitude inventories
  - ▶ Likert scale
  - ▶ Semantic differential
- ▶ Aptitude tests
- ▶ Personality measures
- ▶ Rating scales
- ▶ Observation systems

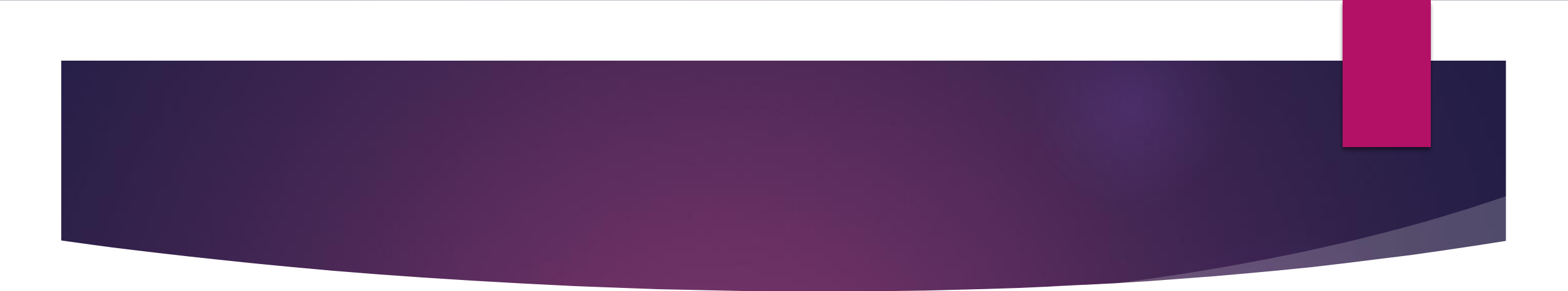
# Achievement Tests in Academic & Skills Areas

- ▶ Achievement or ability tests measure an individual's knowledge or skill in a given area or subject.
- ▶ Published standardized tests can often be used effectively for research in achievement. The content of the test should be reviewed, as should any norms that may be used.
- ▶ Mostly used in schools to measure learning or the effectiveness of instruction.

# Attitude Inventories

- ▶ Subjects are asked to circle the word or number that best represents how they feel about the topics included in the questions or statements.

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- ▶ A commonly used scale is the Likert scale.
  - ▶ A Likert scale contains a number of points on a scale, quite often five, but typically an odd number.
  - ▶ The points have designations such as “strongly agree” to “strongly disagree.”

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- ▶ Semantic differential is another commonly used scale.
  - ▶ The semantic differential provides a series of bipolar adjective scales relative to a word or concept; the respondent indicates their feelings on the continuum of each scale.

# Aptitude Tests

- ▶ Aptitude tests assess the intellectual abilities that are not specifically taught in school.
- ▶ They intend to measure an individual's potential to achieve; they measure present skills and abilities.

# Personality Measures

- ▶ They are designed to measure certain traits of individuals or to assess their feelings about themselves.
- ▶ There are generally two types of personality measures: *Projective* & *Nonprojective*.

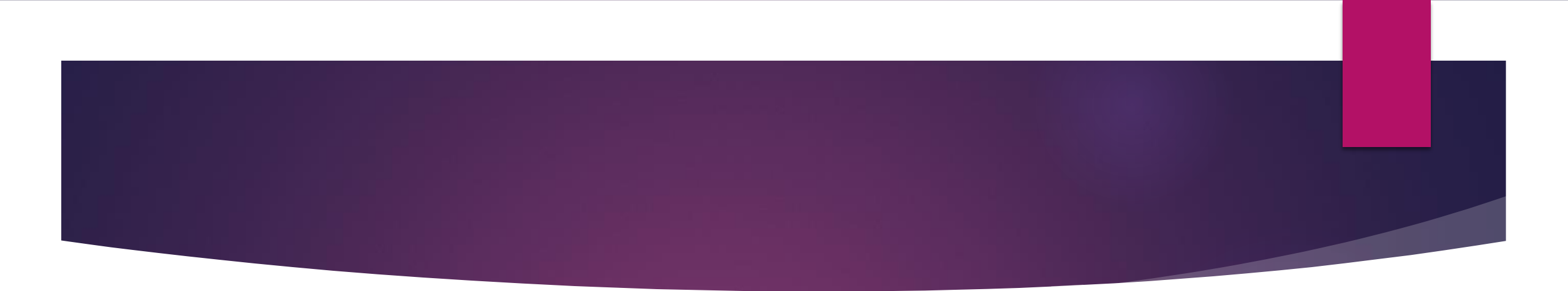


# Projective Devices

- ▶ It is an instrument with a vague stimulus that allows individuals to project their interests, preferences, anxieties, prejudices, needs, and so on through their responses.
- ▶ There is no right or wrong answer.
- ▶ Ex:  
[http://en.wikipedia.org/wiki/Rorschach\\_ink\\_blot\\_test](http://en.wikipedia.org/wiki/Rorschach_ink_blot_test)

# Rating Scales

- ▶ Rating scales contain items related to a concept, phenomenon, activity, or physical object; the respondent is asked to select a descriptor on a scale that most closely approximates his or her assessment of whatever is described in the item.
- ▶ Making a judgment about a behavior or a product.

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- ▶ The simplest of this construct is a numerical rating scale which provides a series of numbers, with each number representing a particular rating.
  - ▶ The graphic rating scale is an attempt to improve on the vagueness of numerical rating scales. It describes each of the characteristics to be rated and places them on a horizontal line on which the observer is to place a check.

# Performance Checklists

- ▶ A performance checklist consists of a list of behaviors that make up a certain type of performance, such as typing a letter, using a microscope etc.
- ▶ It is used to determine whether or not an individual behaves in a certain way when asked to complete a particular task.
- ▶ It only assesses the presence or absence of the desired behavior; no subjective judgments of how well the individual performs takes place.

# Tally Sheets

- ▶ Records the frequency of behaviors, activities or remarks

**RIBBON ROLLER DEFECTIVE-TYPE TALLY SHEET**

|                        |                        |
|------------------------|------------------------|
| Lot Number: <u>2M5</u> | Date: <u>July 1</u>    |
| Lot Count: <u>5030</u> | Checked By: <u>MRB</u> |

| TYPE                | CHECK      | SUBTOTAL  |
|---------------------|------------|-----------|
| Voids               | ///        | 3         |
| Tears in Foam       |            |           |
| Width Small         |            |           |
| Width Over          |            |           |
| Foam Diameter Small | //         | 2         |
| Foam Diameter Over  |            |           |
| Loam Location       |            |           |
| Foreign Material    | ### ### // | 12        |
| Insert ID small     |            |           |
| Insert Damaged      | /          | 1         |
| Misassembled        |            |           |
| Other               |            |           |
| <b>Grand Total</b>  |            | <b>18</b> |

Remarks: Foreign matter is green and is evenly dispersed when it occurs.

# Flowcharts

- ▶ Flowcharts are particularly helpful in analyzing class discussions since it indicates both number and direction of student remarks.

# Self-Checklists

- ▶ Individuals are asked to study a list of characteristics or activities and then mark the ones in which they have engaged for a particular length of time.
- ▶ <http://www.uchsc.edu/CIS/PBLChkList.html>

# Sociometric Devices

- ▶ They ask individuals to rate their peers in some way.



# Observation Systems

- ▶ An observation system is used for recording preselected behaviors in an attempt to quantify behavior in the situation being selected.
  - ▶ Time & Motion logs
  - ▶ Anecdotal records

# Time & Motion Logs

- ▶ A time and motion log is the observation and detailed recording over a given period of time of the activities of one or more individuals.

# Anecdotal Records

- ▶ It is a record of observed behaviors written down in the form of anecdotes.
- ▶ Observers should try to be as specific and as factual as possible to avoid evaluative, interpretive, or overly generalized remarks.

# Questionnaires

- ▶ Advantages: They can be given to a large number of people at the same time.
- ▶ Disadvantages: Unclear or seemingly ambiguous questions cannot be cleared, and the respondent has no chance to expand on or react verbally.

# Interview Schedules

- ▶ It includes a set of questions to be answered by the subjects of the study.
- ▶ It is usually carried out orally as opposed to questionnaires which are completed in a written format.

# Item Formats

- ▶ Selection items
  - ▶ True/false items
  - ▶ Multiple choice items
  - ▶ Matching items
- ▶ Interpretive items

# Types of Scores

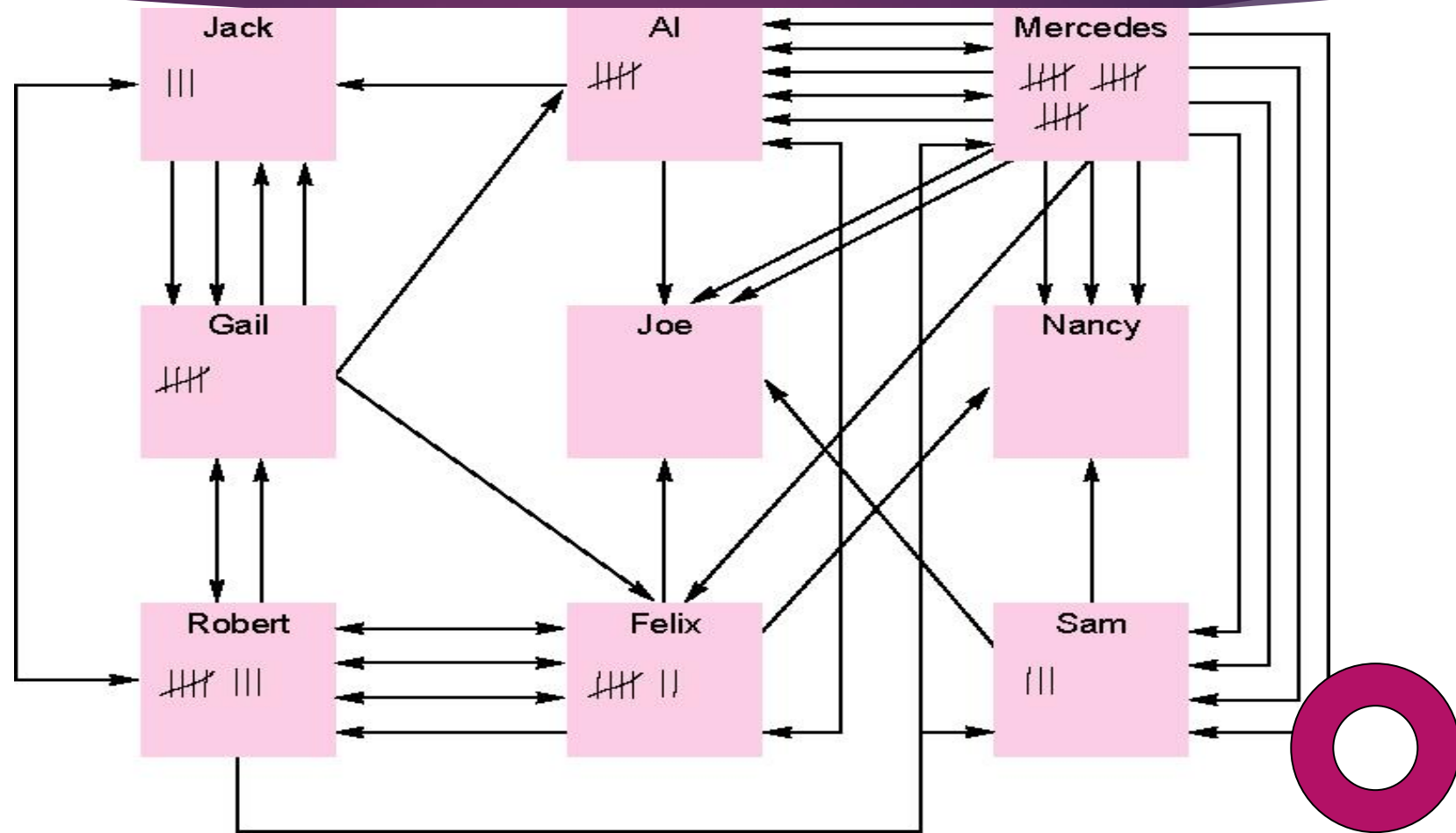
- ▶ Raw scores – initial score obtained.
- ▶ Derived scores – scores that have been derived from raw scores into more useful scores on some type of standardized basis.
  - ▶ Percentile rank
  - ▶ Standard score

# Percentile Rank & Standard Scores

- ▶ Percentile rank refers to the percentage of individuals scoring at or below a given raw score.
- ▶ Standard score indicates how far a given raw score is from a reference point. They are particularly helpful in comparing an individual's relative achievement on different types of instruments.



# Participation Flowchart



# Excerpt from a Behavior Rating Scale for Teachers

**Instructions:** For each of the behaviors listed below, circle the appropriate number, using the following key:

5 = Excellent, 4 = Above Average, 3 = Average,  
2 = Below Average, 1 = Poor.

A. Explains course material clearly.

1      2      3      4      5

B. Establishes rapport with students.

1      2      3      4      5

C. Asks high-level questions.

1      2      3      4      5

D. Varies class activities.

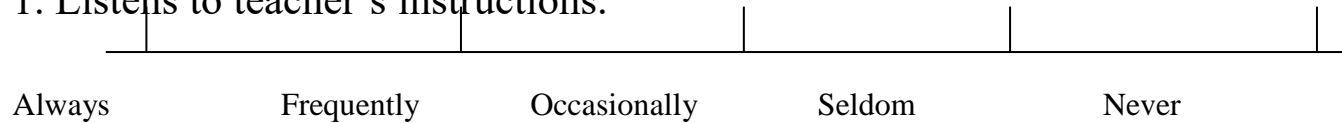
1      2      3      4      5



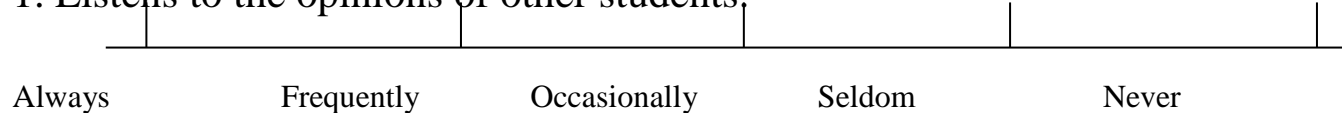
# Excerpt from a Graphic Rating Scale

*Instructions:* Indicate the quality of the student's participation in the following class activities by placing an X anywhere along each line.

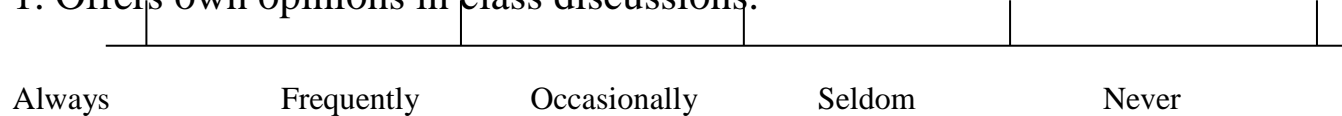
1. Listens to teacher's instructions.



1. Listens to the opinions of other students.



1. Offers own opinions in class discussions.



Thank  
you **so much**

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