

QUANTIFY AND INTERPRET DATA

Quantifying data is systematically assigning numbers to data allowing statistical analysis to be performed so that trends and relationships can be identified and interpreted. Through quantifying the data, the interpretation of data is possible. For test items, item analysis is used to quantify data so that defective test items are identified. Another way that data is quantified and interpreted is through descriptive statistics. Some of the data may need to be coded prior to performing statistics. In these cases, it is important to understand the scales of measurement: nominal, ordinal, interval, and ratio. The scales of measurement provide an understanding of what statistical procedures can be performed for different types of instruments. Item analysis, descriptive statistics, and assigned numbers allow the evaluator to pinpoint trends. Trends can be defined as a pattern or prevailing theme. These trends can reveal strengths and weaknesses within the instructional program. Interpreting data also involves analyzing the test results for validity and reliability. This section will discuss what an evaluator is looking for in the test results to find out if the test is valid and reliable. The use of computer programs can make the process of data interpretation an easier task. Data must be interpreted to identify the problems so that recommendations can be made and solutions generated.

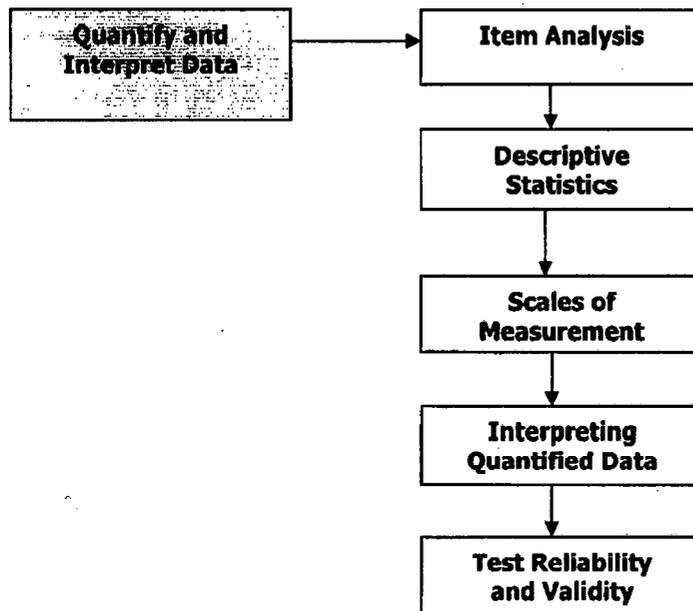


Figure 6-17. Quantify and Interpret Data.

ITEM ANALYSIS

Item analysis provides information about the reliability and validity of test items. Reliability and validity are discussed later in this section. There are two purposes for doing an item analysis. First, the analysis identifies defective test items. Secondly, it indicates areas where learners have not mastered the learning objective(s). Through item analysis, trends are identified as far as which test items are problematic. An example of one way to determine item difficulty and item discrimination can be found in Figure 6-18.

1. **Item Difficulty.** The frequency of students who answered an item correctly determines the level of difficulty. For example, if 45 of 50 students answer an item correctly, then the level of difficulty is low (.90) since 90 percent were able to answer correctly. However, if 10 out of 50 students answer correctly, then the level of difficulty is high (.20). The Individual Response Report in the Student Evaluation module of MCTIMS provides the number and percentage of students who answered each item correctly. This makes it easy to determine the level of difficulty of an item through percentages. The difficulty index is calculated below.

Difficulty Index (p). Proportion of students who answered item correctly.

$$p = \frac{\text{Number of students selecting correct answer}}{\text{Total number of students attempting the test item}}$$

$$p = \frac{45}{50} = .90$$

When Difficulty Index (p level) is less than about .25, the item is considered relatively difficult. When Difficulty Index (p level) is above .75, the item is considered relatively easy. Test construction experts try to build tests with an **average p level** (difficulty) of about .50 for the test.

2. **Item Discrimination.** A percentage of high-test scorers (U) are compared to a percentage of low-test scorers (L) to determine how both groups of test scorers performed on the same item. To perform item discrimination, a percentage of high-test scorers and low-test scorers must be designated. (Example: Compare the top 10% test scorers to the bottom 10% test scorers who answered the test item correctly.) If a high percentage from both groups missed the item, then more extensive evaluation of the test item and/or instructional process is needed.

Item Discrimination Index (D). Measure of the extent to which a test item discriminates or differentiates between students who perform well on the overall test and those who do not perform well on the overall test.

$$D = \frac{(\text{Number who got item correct in upper group}) - (\text{Number with item correct in lower group})}{\text{Number of students in either group}}$$

Some experts insist that D should be at least .30, while others believe that as long as D has a positive value, the item's discrimination ability is adequate.

There are three types of discrimination indexes:

- a. **Positive discrimination index** - those who did well (U) on the overall test chose the correct answer for a particular item more often than those who did poorly (L) on the overall test.
- b. **Negative discrimination index** - those who did poorly (L) on the overall test chose the correct answer for a particular item more often than those who did well (U) on the overall test.
- c. **Zero discrimination index** - those who did well (U) and those who did poorly (L) on the overall test choose the correct answer for a particular item with equal frequency.

| Item | U (10 stu) | M (10 stu) | L (10 stu) | Difficulty (U + M + L) | Discrimination (U-L) |
|------|---------------|---------------|---------------|---------------------------|-------------------------|
| 1 | 7 | 4 | 3 | 14 | 4 |
| 2 | 10 | 10 | 9 | 29 | 1 |
| 3 | 8 | 6 | 4 | 18 | 4 |
| 4 | 4 | 4 | 6 | 14 | -2 |
| 5 | 6 | 7 | 6 | 19 | 0 |
| 6 | 8 | 7 | 4 | 19 | 4 |
| 7 | 3 | 0 | 0 | 3 | 3 |
| 8 | 10 | 7 | 5 | 22 | 5 |
| 9 | 1 | 2 | 8 | 11 | -7 |
| 10 | 8 | 5 | 3 | 16 | 5 |

Figure 6-18. Item Analysis: Number of Learners Giving Correct Response in Each Criterion Group.

The table above shows a simple analysis using a percentage of 33 percent to divide a class into three groups – Upper (U), Middle (M), and Lower (L). For instance, if you have a class of 30 students, then the students would be divided by test scores into the following groups: 10 (U) students (33 percent), 10 (M) students (33 percent), and 10 (L) students (33 percent).

Using the above table, a measure of item difficulty is obtained by adding Upper (U) + Middle (M) + Lower (L). The difficulty index for item 2 is found by dividing 29 by 30 equaling .97 (97% of students answered correctly). Either the material is covered extremely well in the class or the question does not have convincing distracters. MCTIMS' Individual Response Report provides a look at the distracters and is discussed in the next section. On item 7, 3 students answered the question correctly. This is an Indicator that the material has not been covered adequately, the test question is poorly written, or answer is miskeyed.

A rough index (ratio) of the discriminative value (Upper test scorers compared to the Lower test scorers) of each item can be provided by subtracting the number of individuals answering an item correctly in the Lower (L) group from the number of individuals answering an item correctly in the Upper (U) group (Ex: U-L). Negative numbers indicate that there were more students from the Upper (U) group who missed the question. Positive numbers indicate that more students in the Lower (L) group missed the item. Zero indicates that there was no difference between the Upper (U) group and the Lower (L) group.

1. **Frequency of Collection.** Descriptive statistics should be calculated every time a test, questionnaire, survey, etc., is administered. Even if these data are not used immediately to summarize results in a report or to provide feedback to respondents, these data can be useful for future analysis to identify trends or relationships among groups.
2. **Types of Descriptive Statistics.** This section presents information and detail concerning descriptive statistics.
 - a. **Frequency.** Frequencies are determined by counting the number of occurrences. As example in Figure 6-20, the score 75 has a frequency of 3 because it occurs 3 times. Frequency counts are used to describe data (e.g., responses, scores, factors, variables) in raw numbers. Arranging variables into a frequency distribution makes the description of the variables easier than it would be if the scores were just listed in order. To illustrate, Figure 6-20 presents ten scores on a test and the same ten scores listed in a frequency distribution below.

Uses. Frequency counts are useful for counting the number of students who took a particular test, the number of students who passed a particular test, the number of students who selected answer A on item 13 of a test, the number of people who responded to a survey questionnaire, the number of people who rated an instructional program as effective, etc.

Figure 6-20. Frequency Distribution.

| FREQUENCY | |
|---|------------------|
| Test Scores: 75, 75, 85, 90, 60, 65, 65, 75, 100, 85 | |
| Frequency Distribution | |
| Score | Frequency |
| 100 | 1 |
| 90 | 1 |
| 85 | 2 |
| 75 | 3 |
| 65 | 2 |
| 60 | 1 |

Appropriate Scale of Measurement. Frequency counts can be performed on data represented by nominal, ordinal, interval, and ratio scales (Scales of Measurement will be discussed in detail later in this section).

Graphic Representation. Frequency distribution data can be readily interpreted by the use of graphs.

- (1) The simplest graph, known as a frequency polygon, involves representing the frequency count (expressed in raw numbers or by percent) on the Y-axis (vertical). Test scores should be divided into equal intervals and plotted on the X-axis (horizontal). Using the data in Figure 6-20 and grouping the test scores in three intervals, Figure 6-21 displays the frequency distribution in graphic form. A frequency polygon is useful for displaying data within a group or data across groups. An example of data within a group is student scores on a test. Subsequent class scores can be plotted on the same graph to display data across groups.

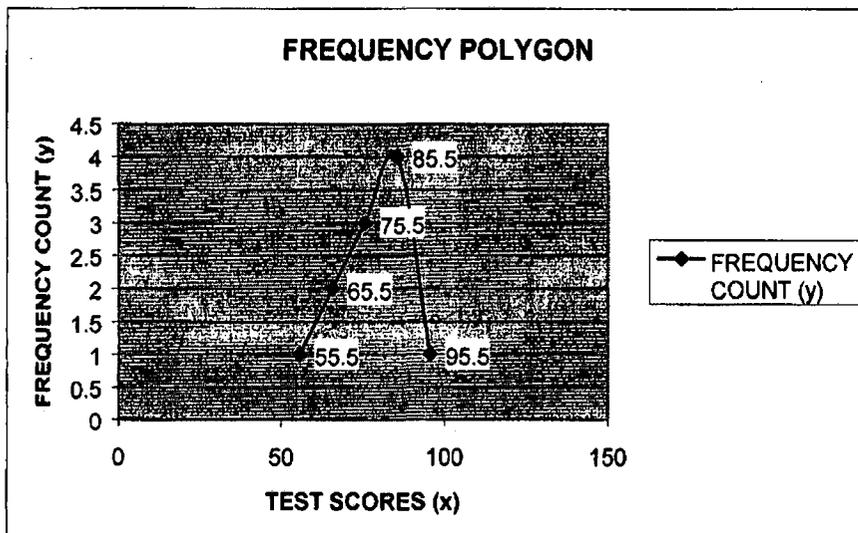
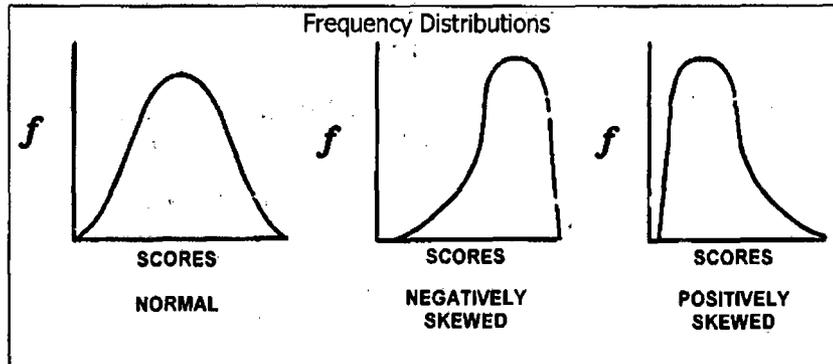


Figure 6-21. Frequency Polygon.

- (3) Figure 6-22 presents different frequency distributions in graphic form. A frequency distribution is said to be "normal" when it represents a bell-shaped curve. It is important to graph data to see if it is "normal" before performing any statistical analyses. A frequency distribution in which scores trail off at either the high end or the low end of the spectrum is said to be skewed. Where these scores trail off is referred to as the "tail" of the distribution. If the tail of the distribution extends toward the low or negative end of the scale, the distribution is considered negatively skewed; if the tail extends toward the high or positive end of the scale, the distribution is positively skewed.

Figure 6-22. Frequency Distributions.



b. **Measures of Central Tendency.** While frequency distributions typically represent a breakdown of individual scores or variables among many, it is often useful to characterize a group as a whole. Measures of central tendency are measures of the location of the middle or the center of a distribution. The definition of "middle" or "center" is purposely left somewhat vague so that the term "central tendency" can refer to a wide variety of measures. Three measures of central tendency are the mode, median, and mean. The mean is the most commonly used measure of central tendency. Figure 6-23 provides a description and sample of how to determine each.

Figure 6-23. Measures of Central Tendency.

| Measures of Central Tendency | |
|-------------------------------------|--|
| Mode | The mode is the most frequently occurring response or score. Sample Test Scores: 52, 78, 85, 88, 90, 93, 93, 100 Mode = 93 NOTE: More than one mode can exist in a set of data. |
| Median | The median is the score above and below which 50 percent of the scores in the sample fall. It is sometimes referred to as the "breaking point." 1. Place numbers in order from least to greatest. 2. If number of scores is even, then the median is the central number or midpoint. 3. If number of scores is odd, then add the two middle scores and divide by two. Sample Test Scores: 52, 78, 85, 88, 90, 93, 93, 100 $88+90=178/2=89$ Median = 89 |
| Mean | Mean is the "average" score. Sample Test Scores: 52, 78, 85, 88, 90, 93, 93, 100 $52+78+85+88+90+93+93+100 = 679/8 = 84.875$ Mean = 84.875 |

Figure 6-24 provides the scales of measurement (to be discussed next), the data types (i.e., test items, questionnaires), and how the measures of central tendency can be used for each.

- (1) **Mode.** As the most frequently occurring response, mode is simple to compute. The mode is not affected by extreme values. However, it is usually not very descriptive of the data so it is important that other measures of central tendency are used to describe the data.
 - A. Mode is useful for determining what most students score on a given test or test item.
 - B. Mode is particularly useful for determining what response most students select in a multiple-choice test item, thereby allowing analysis of the item's ability to clearly discriminate between correct and incorrect responses (a good multiple-choice test item has a clear "correct" response and several plausible distracters).
- (2) **Median.** Median is useful for splitting a group into halves. The median is the middle of a distribution; half the scores are above the median and half are below the median. The median is less sensitive to extreme scores than the mean and this makes it a better measure than the mean for highly skewed distributions. For example, the median income is usually more informative than the mean income.
 - A. The median is not affected by extreme values and it always exists.
 - B. Though median is easy to compute, the numbers must be properly ordered to compute the correct median.
- (3) **Mean.** Mean is the "average."
 - A. Mean is calculated to produce an average response per test item across a class or to produce an average response per respondent.
 - B. Mean is also useful for determining overall attitudes toward a topic when using a Likert rating scale. For example, using a five-response Likert scale, a student rates the overall effectiveness of a course by answering 20 questions concerning course content, instructor performance, use of media, etc. The value circled for each response can then be summed for a total score. This score is then divided by the number of questions (20) to come up with the mean. In this case, the mean is a total rating of course effectiveness.

C. Mean is generally the preferred measure of central tendency because it is the most consistent or stable measure from sample to sample. The mean is good measure of central tendency for roughly symmetric distributions but can be misleading in skewed distributions since it can be greatly influenced by extreme scores. For example, ten students score the following: 20, 86, 88, 94, 92, 90, 40, 88, 76, and 83. Although the mean is 76, it hardly reflects the typical score in the set. Mode or median may be more representative of that group's performance as a whole. When the distribution of scores is widely dispersed, median is the most appropriate measure of central tendency. For example, if five students achieved test scores of 60, 65, 70, 72, and 74, and three students achieved scores of 90, 95, and 100, the overall class score should be reported as a median score. Since the scores achieved by the second group of students are much higher than those of the first group, calculating a mean score would inflate the value of the scores achieved by the lower scoring group. In this example, the mean score is 78, while the median score is 73. When a distribution is extremely skewed, it is recommended that all three measures be reported and the data be interpreted based on the direction and amount of skew.

Figure 6-24. Type of Data Measured By Central Tendency.

| Measure of Central Tendency | Measurement Scale | Instrument Type | Type of Data Measured |
|-----------------------------|--|--|--|
| Mode | Nominal Scale | Student Data Test Data Questionnaires Interview | Most frequent score Most frequent answer |
| Median | Ordinal Scale Interval Scale Ratio Scale | Test Data | Useful for splitting groups in halves i.e. Mastery and Non-Mastery |
| Mean | Ordinal Scale | Test Data Questionnaires Interview | Avg. response per test item Avg. response per respondent Overall attitudes toward topic/total rating of course effectiveness |
| | Interval Scale Ratio Scale | Test Data Questionnaires Interview | Allows comparisons of individuals to overall class mean (test scores, responses to particular items) |

c. **Variability.** The variability of a set of scores is the typical degree of spread among the scores. Range, variance, and standard deviation are used to report variability.

(1) **Range.** Range is the difference between the highest and the lowest scores in the set. Range is typically not the best measure of variability because it is dependent upon the spread in a set of scores, which can vary widely. For example, 10 students take a test and score as follows: 100, 92, 94, 94, 96, 100, 90, 93, 97, and 62. The range of scores varies from 100 to 62 so the range is 38 (100-62 = 38). If the lowest score were dropped, the range would be 10 (100-90 = 10), which more accurately reflects the sample. Range serves as a rough index to variability and can be useful to report when the mean of a set of scores is not really representative due to a wide ranging of scores.

(2) **Variance.** Variance is a more widely accepted measure of variability because it measures the average squared distance of the scores from the mean of the set in which they appear. An example of how to determine variance from a population is shown in Figure 6-25. The variance (136) is the average of the squared deviation of the scores and is used to calculate standard deviation, which is the most widely accepted measure of variability.

| Student Scores (X) | X-Mean | (X-Mean) ² |
|--------------------|-------------|-----------------------|
| 100 | 100-88 = 12 | 144 |
| 90 | 90-88 = 2 | 4 |
| 70 | 70-88 = -18 | 324 |
| 80 | 80-88 = -8 | 64 |
| <u>100</u> | 100-88 = 12 | <u>144</u> |
| 440 | | 680 |

Number of Scores = 5

Mean = $\frac{\sum X}{\text{Number of Scores}} = \frac{440}{5} = 88$

Variance = $\frac{\sum (X-\text{Mean})^2}{\text{Number of Scores}} = \frac{680}{5} = 136$

Standard Deviation = $\sqrt{136} = 11.7$

Figure 6-25. Variance and Standard Deviation of Test Scores.

- (3) **Standard Deviation.** Standard deviation is the square root of the variance for a set of variables. Standard deviation can reflect the amount of variability among a set of variables, responses, characteristics, scores, etc. In Figure 6-25, the variance score is 136. When the square root of 136 is taken, the standard deviation is 11.7. This means that the average distance of the students' scores from the class mean is 11.7. As another example, the mean score on a test is 70 with a standard deviation of 10. Thus, the average amount students deviated from the mean score of 70 is 10 points. If student A scored a 90 on the test, 20 points above the mean score, we interpret this as a very good score, deviating from the norm twice as much as the average student. This is often referred to as deviating from the mean by 2 standard deviation (SD) units (z score or standard score). If student B scored a 30 on the test, 40 points below the mean score, we interpret this as a very bad score, deviating from the norm four times as much as the average student.

SCALES OF MEASUREMENT

Scales of measurement specify how the numbers assigned to variables relate to what is being evaluated or measured. It tells whether a number is a label (nominal), a ranking order (ordinal), represented in equal intervals (interval), or describing a relationship between two variables (ratio). The type of measurement scale used affects the way data is statistically analyzed. Scales of measurement represent the varying degree of a particular variable. Figure 6-30 provides the types of statistical analysis that can be performed for different instruments using the scales. Sample questions illustrating the use of the following scales can be found in Section 5604, Design Evaluation Instruments.

1. **Nominal Scale.** A nominal scale measurement is simply a classification system. For instance, observation data can be labeled and categorized into mutually exclusive categories. Nominal numbering involves arbitrarily assigning labels to whatever is being measured. Assigning a 1 to a "yes" response and a 0 to a "no" response is an example of nominal numbering; so is assigning a 1 to "male" respondents and a 0 to "female" respondents. Quantification of data by nominal numbering should be done only when an arbitrary number is needed to distinguish between groups, responses, etc. Characteristics of a nominal scale are listed in Figure 6-26.

Characteristics of a Nominal Scale

- ☑ Characterized by a lack of degree of magnitude. In other words, assigning a 1 to a variable does not mean that it is of a greater value than a variable assigned a 0. Using the example below, answering "yes" is not of greater value than answering "no." The numbers serve only to distinguish among different responses or different characteristics.
YES = 1
NO = 0

- ☑ Does not reflect equal intervals between assigned numbers. For example, the numbers distinguishing the military branches are just data labels.
Air Force = 1
Army = 2
Navy = 3
Marine Corps = 4

- ☑ Does not have a true zero; because a variable is assigned a 0 does not mean that it lacks the property being measured. Using the example below, assigning the number "0" to those who answered female on a student data sheet does not mean that the participant lacks gender.
MALE = 1
FEMALE = 0

Figure 6-26. Characteristics of a Nominal Scale.

Figure 6-27.
Characteristics of Ordinal Scale.

2. **Ordinal Scale.** The ordinal scale permits a "ranking" between values. Differences cannot be "quantified" between two ordinal values. A Likert scale is an example of an ordinal scale. For example, rating the effectiveness of instruction from 1 (Ineffective) to 5 (very effective) permits comparisons to be made regarding the level of effectiveness; a larger number indicates more of the property being measured. Characteristics of an ordinal scale are listed in Figure 6-27.

| Characteristics of an Ordinal Scale | | | | |
|---|----------|---------|-------|----------------|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| 1 | 2 | 3 | 4 | 5 |
| <input checked="" type="checkbox"/> Degree of magnitude exists in ordinal numbers because each higher rating indicates more of the property being measured. Above, the level of agreement is being measured. A 5 indicates a higher level of agreement than a 2. | | | | |
| <input checked="" type="checkbox"/> Equal intervals do not exist between ordinal numbers. For example, a rating of a 4 in the above example is not twice as effective as a rating of 2. Numbers used in an ordinal scale should not be added or multiplied because this can produce misleading results [i.e., two ratings of 2 (disagree) do not equal a single rating of 4 (agree)]. A 4 means something totally different than a 2. | | | | |
| <input checked="" type="checkbox"/> There is no true zero in an ordinal scale. In the above example, it is meaningless to assign a 0 to a variable to indicate a lack of effectiveness because a rating of 1 indicates "ineffective." | | | | |

3. **Interval Scale.** Interval numbering allows comparisons about the extent of differences between variables. For example, on test X, student A scored 20 points higher than student B. An example of an interval numbering system is a response to a question asking the respondent's age, the number of years in grade, etc. Characteristics of an interval scale are listed in Figure 6-28. This will help the evaluator determine when to quantify data using an interval scale.

Figure 6-30.
Characteristics of Interval Scale.

| Characteristics of an Interval Scale |
|--|
| <input checked="" type="checkbox"/> Degree of magnitude exists in interval numbers because each higher rating indicates more of the property being measured. For example, a score of 95 is better than a score of 90 on a test. |
| <input checked="" type="checkbox"/> Equal intervals exist between interval numbers. For example, 30 years in service is 10 more years than 20 years in service, which is 10 more years than 10 years in service. |
| <input checked="" type="checkbox"/> There is no true zero in an interval scale. Temperature is an example because temperatures can dip below 0 degrees and a temperature of 0 degrees does not indicate an absence of temperature. |

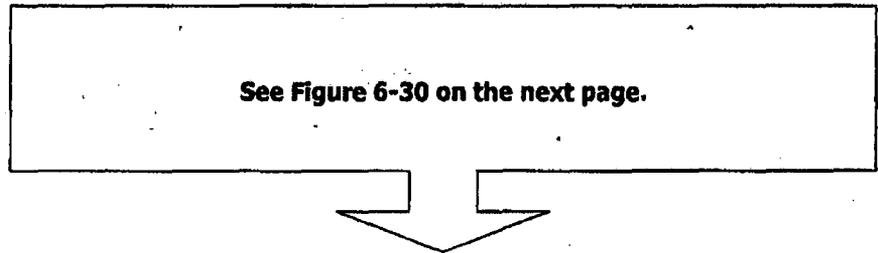
4. **Ratio Scale.** A ratio scale has equal intervals and a meaningful zero point. Point values assigned to responses to score a test is an example of a ratio scale. Ratio numbering permits precise relationships among variables to be made. For example, student A received a score of 40 on the test, which is twice as good as student B's score of 20. Characteristics of a ratio scale are listed in Figure 6-31. This will help the evaluator determine when to quantify data using a ratio scale.

| Characteristics of a Ratio Scale | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Degree of magnitude exists in a ratio numbering scale. Test scores are an example of a ratio scale illustrating degree of magnitude (e.g., a score of 80 is better than a score of 70). |
| <input checked="" type="checkbox"/> | Equal intervals exist on a ratio numbering scale (e.g., a score of 90 is twice as good as a score of 45). |
| <input checked="" type="checkbox"/> | A true zero exists in a ratio numbering scale (e.g., a score of 0 indicates no score). A ratio numbering system is typically used to quantify pass/fail data on a performance checklist, with "pass" quantified by a 1 and "fail" quantified by a 0. |

Figure 6-31. Characteristics of a Ratio Scale.

**GUIDE TO QUANTIFYING DATA TO PERMIT STATISTICAL
ANALYSIS**

The following is presented to aid the evaluator in quantifying data and selecting appropriate statistical analyses based on the evaluation instrument being used (see Figure 6-30).



| GUIDELINES FOR QUANTIFYING DATA TO PERMIT STATISTICAL ANALYSIS | | | | |
|---|-----------------------------|--|--|--|
| Evaluation Instrument | Scale of Measurement | Examples of Qualifying Data | Statistical Analyses That Can Be Performed | Statistical Analyses That Cannot Be Performed |
| Multiple-choice Test Item | Nominal | A = 1, B = 2, C = 3, D = 4, etc. | Frequency counts of responses per test item Mode (most frequently selected responses per test item) Item Analysis (when used in conjunction with a ratio scale) | Mean (average response per test item or per student) Median Overall test score per student Variability (range, variance, standard deviation) |
| | Ratio | Point system: 1 = correct answer 0 = incorrect answer | Frequency counts for correct/incorrect responses <input checked="" type="checkbox"/> Per test item <input checked="" type="checkbox"/> Per student Mean (calculated to produce item difficulty) Median (score for overall test which splits class in half) Item analysis (but cannot determine where problem lie) Overall test score per student Variability of overall test scores | Frequency counts for all incorrect responses (distracters) Mean (average response per test item or per student) Mode (most frequently selected response per test item) Variability of responses per test item |
| True/False Test Item | Ratio | Point system: 1 = correct answer 0 = incorrect answer | Frequency counts for correct/incorrect responses <input checked="" type="checkbox"/> Per test item <input checked="" type="checkbox"/> Per student Mean (calculated to produce item difficulty) Median (score for overall test which splits class in half) Item analysis Overall test score per student Variability of overall test scores | Mean (average response per test item or student) Mode (most frequently selected response per test item) |
| Fill-in-the-blank Short-Answer Test Item | Ratio | Point system: Points for correct response and partial credit | Frequency counts of responses <input checked="" type="checkbox"/> Per test item <input checked="" type="checkbox"/> Per student Mean score per test item and per student Mode (most frequently scored points per test item) Median (score for overall test which splits class in half) Preliminary item analysis Overall test score per student Variability of overall test scores and points scored per test item | |

Figure 6-30. Guidelines for Quantifying Data to Permit Statistical Analysis.

| GUIDELINES FOR QUANTIFYING DATA TO PERMIT STATISTICAL ANALYSIS (cont.) | | | | |
|--|----------------------|---|--|---|
| Evaluation Instrument | Scale of Measurement | Examples of Qualifying Data | Statistical Analyses That Can Be Performed | Statistical Analyses That Cannot Be Performed |
| Fill-in-the-blank/Short-Answer Test Item (cont.) | Ratio (cont.) | Point system: 1=correct answer 0=incorrect answer | Frequency counts of correct/incorrect responses <input checked="" type="checkbox"/> Per student <input checked="" type="checkbox"/> Per test item Mean (calculated to produce item difficulty) Median Preliminary item analysis Overall test score per student Variability of overall test scores | Frequency counts for all incorrect responses Mean (average response per test item or per student) Mode (most frequent response per test item) Variability of responses per test item |
| | Nominal | Categorize responses and assign a number to each response | Frequency counts of all responses per test item Mode (most frequently occurring response) Item analysis | Mean (average response per test item or per student) Median Overall test score per student Variability of responses per test item |
| Performance-Based Test Item | Ratio | Point system: 1=pass 0=fail | Frequency counts of pass/fail <input checked="" type="checkbox"/> Per student <input checked="" type="checkbox"/> Per test item Mean (calculated to produce item difficulty) Median Preliminary item analysis Overall test score per student Variability of overall test scores | Mean (average response per test item or per student) Mode (most frequent response per test item) Variability of outcomes per test item |

Figure 6-30. Guidelines for Quantifying Data to Permit Statistical Analysis (cont.).

| GUIDELINES FOR QUANTIFYING DATA TO PERMIT STATISTICAL ANALYSIS | | | | |
|---|-----------------------------|--|---|--|
| (cont.) | | | | |
| Evaluation Instrument | Scale of Measurement | Examples of Qualifying Data | Statistical Analyses That Can Be Performed | Statistical Analyses That Cannot Be Performed |
| Interview/ Survey Questionnaire | Nominal | Categorize responses and assign a number to each response | Frequency counts of responses per item Mode (most frequently occurring response) Variability of responses per item | Frequency counts per student Mean response per item and per student Median |
| | Ordinal | Likert scale | Frequency counts of responses per item Mean response per item Mean response per student (assuming scale is same throughout survey) Median (response per item which splits respondent group in half) Mode (most frequently occurring response per item) Variability of responses per item | |
| | Interval | Response serves as the code when response is numerical (e.g., age, years in service) | Frequency counts of responses per item Mean response per item Median (response per item which splits respondent group in half) Mode (most frequently occurring response) Variability of responses per item | Mean response per student |

Figure 6-30. Guidelines for Quantifying Data to Permit Statistical Analysis (cont.).

INTERPRETING QUANTIFIED DATA

1. **Multiple-Choice Test Item.** Both nominal and ratio scales can be used for multiple-choice test items. Using these scales to analyze multiple-choice test items is explained below.

a. **Nominal Scale.** Labels are assigned to different responses. For example, in a 4-choice item, answer "a" is coded as 1, answer "b" as 2, answer "c" as 3, and answer "d" as 4.

(1) A nominal scale permits frequency counts, mode, and item analysis of individual test items to be performed. Figure 6-34 presents data from three students who took the same 10-item test and their responses to each question. Next to each response is the number assigned to categorize the response (an asterisk indicates an incorrect response). Nominal numbers can be added across test items to calculate frequency counts (e.g., two out of three students selected response "a" on test item 1; all three students selected response "b" on test item 2). Mode can be determined for an item by looking for the most frequently occurring response an item (e.g., the mode for test item 1 is "a").

Figure 6-31. Student Test Data.

| Test Item | Student #1 | Student #2 | Student #3 |
|-----------|------------|------------|------------|
| 1. | a 1 | *d 4 | a 1 |
| 2. | b 2 | b 2 | b 2 |
| 3. | *a 1 | *d 4 | *b 2 |
| 4. | c 3 | c 3 | *a 1 |
| 5. | d 4 | d 4 | d 4 |
| 6. | a 1 | a 1 | a 1 |
| 7. | b 2 | *d 4 | b 2 |
| 8. | d 4 | *a 1 | d 4 |
| 9. | c 3 | c 3 | c 3 |
| 10. | d 4 | d 4 | d 4 |

(2) Nominal numbers cannot be summed to provide an overall score on the test for each student because a nominal scale only assigns labels to responses and does not reflect degree of magnitude (a higher score does not reflect a better score). In Figure 6-31, it would be incorrect to sum the coded responses to provide an overall score of 25 for student #1, 30 for student #2, and 24 for student #3. In actuality, student #1 performed the best with only 1 incorrect answer, student #3 performed second best with two incorrect answers, and student #2 had four incorrect answers.

- (3) A nominal scale cannot be used to calculate mean, median, or variability (range, variance, and standard deviation) because these data are meaningless in this context. For example, in Figure 6-34, a calculated mean or average response to test item #1 $[(1 + 4 + 1) \text{ divided by } 3 = 2]$ is meaningless because it would reflect that the average response to item #1 is "b." It would also be incorrect to calculate a mean by, for example, adding student #1's scores for each item and dividing by the number of items (25 divided by 10) to produce a mean response of 2.5. To interpret this would mean that the average response is halfway between a response of "b" and a response of "c," which is a meaningless calculation.
- b. **Ratio Scale.** A ratio scale can be used in conjunction with a nominal scale when quantifying responses to multiple-choice test items or it may be used as the only means of quantifying the data.
- (1) If an evaluator is solely interested in how many questions a student answers correctly, a simple scoring system is needed to count the number of correct and incorrect responses so a total score for the test can be calculated for each student. To do this, multiple-choice test items can be quantified using a ratio scale (e.g., 1 point is given to each correct answer and a 0 is given to each incorrect answer). This numbering system permits some frequency count data to be gathered (e.g., 22 of 50 students answered test item #1 correctly), but it does not permit frequency counts to be made across responses. This is because every incorrect response is assigned a 0, making it impossible to discern how many students selected any response other than the correct response. This numbering system permits preliminary item analysis to be performed (e.g., determining the percentage of students who got the answer right and those who did not), but it does not permit further item analysis to determine the item difficulty level of each response.
- (2) The evaluator can code the data using a ratio scale by assigning point values for correct responses and no points for an incorrect response. This allows the calculation of an overall test score per student by summing the point values for each question. A median (i.e., score for overall test which splits the class in half) can also be calculated, as can the variability of overall test scores.

- (3) A ratio scale can also enable the calculation of mean to produce item difficulty rating. When responses are quantified with either of two numbers (e.g., 0 and 1), the evaluator can sum the responses to get a frequency count. The frequency counts relate to the number of correct and incorrect answers. The frequency count is then used to calculate item difficulty. Item difficulty is calculated by dividing the number of students who got the item correct by the total number of students taking the test. Therefore, if 20 students answered a test item correctly and five answered incorrectly, the item difficulty would be .80.

$$\frac{\text{\# of Students Who Answered Correctly} = 20}{\text{\# of Students Taking the Test} = 25} = .80$$

- (4) Quantifying data using a ratio scale does not, however, permit calculation of a mean response per student or per test item. Variability is not calculated for the same reason.
- (5) Mode (i.e., most frequently selected response per test item) is not calculated when using a ratio scale on a multiple-choice test item. This is because test data are coded as incorrect or correct rather than labeling all of the responses as is done with a nominal scale.
2. **True/False Test Items.** A true/false test item is typically quantified using a ratio scale (1 point for a correct response 0 points for an incorrect response). This allows frequency counts, mean (calculated to produce item difficulty), median (overall test score that splits the class in half), an overall test score per student, and variability of overall tests scores to be calculated. However, a mean response per test item or per student and a mode cannot be calculated because the actual response of "true" or "false" is not quantified; the correctness of the answer is.
3. **Fill-in-the-Blank and Short-Answer Test Items.** Fill-in-the-blank and short-answer test items can be quantified using a ratio scale and a nominal scale.
- a. One method for quantifying this type of data is to devise a scoring system so that answers are given points based on the "correctness" of the response. This is typically done by creating an answer key that details the levels of acceptable responses to each question. For instance, a test question may require the student to list, in order, the seven essential qualities of leadership. The answer key may be established so that the student receives 1 point for each correct quality listed and another 3 points if they are listed in correct order. This creates a scale of measurement that ranks performance on each item by the response's level of correctness. This is a good scale of measurement if there is some flexibility in the answers so that partial credit may be given to some information.

- (1) This type of scoring system permits frequency counts of responses per test item and per student, a mean score per test item, a mode (most frequently scored points) per test item, a median test score that splits the class in half, preliminary item analysis, an overall test score per student, the variability (range, variance, and standard deviation) of overall test scores, and the variability in the point spread among students per their overall test scores and per test item.
 - (2) Item difficulty and item discriminability may be calculated per test item to determine the percentage of students who answered correctly and the percentage who did not. However, an analysis of responses to determine if students responded incorrectly, but in similar ways, cannot be performed. For instance, it may be useful to know that students who missed a particular test question all responded with the same "wrong" answer. These data would help determine if the question was worded poorly so that it may be reworded in the future to remove any uncertainty or misinterpretation of its meaning. This can only be accomplished through use of a nominal scale.
- b. Another ratio scale involves establishing a scale of measurement with equal intervals and a true zero. Unlike the previous example where each response is keyed to a point system that may or may not be the same for each response, this method uses a point system that is the same for all responses. Such a system may be as simple as assigning a 1 to a correct response and a 0 to an incorrect response. This scale of measurement is only useful if there is a clearly defined correct and incorrect response for the item. This scoring system permits the same statistical analyses to be performed that a ratio scale for a multiple-choice test item permits.
 - c. Fill-in-the-blank and short-answer test items can also be quantified using a nominal scale, although this can be time consuming. To quantify data using a nominal scale, the responses must first be categorized into same or like responses. This can be difficult if the responses in the group vary greatly. If the responses can be categorized, the data are then quantified by assigning a number to each category through use of a nominal scale. Frequency counts, mode, and item analysis can be calculated. Mean (i.e., average response per test item or per student), median, an overall test score per student, and variability cannot be calculated.
4. **Performance-Based Test Items.** Performance-based test items are typically pass/fail items quantified as either a 1 (pass) or a 0 (fail). This scoring system permits the same statistical analyses to be performed that a ratio scale for a multiple-choice test item permits.

5. **Interview Data/Survey Questionnaires.** Interview data and survey questionnaires are structured to collect data through fill-in-the-blank/short-answer questions, multiple-choice items, and Likert rating scales.

a. **Nominal**

(1) **Fill-in-the-Blank/Short-Answer Response.** Survey and interview data of this nature can be difficult to quantify because they require a subjective judgment by the evaluator to categorize responses into meaningful groups of like responses. Unlike test data, survey and interview data are not quantified by "points" that can be added up for a total score but, rather, by using numbers to assign labels to responses (nominal scale). The difficulty lies in grouping the responses because an open-ended question can produce a multitude of different responses. For example, Figure 6-32 presents an open-ended question. Just below the question are the categories of responses identified during analysis of the test. The responses should be categorized into the smallest number of groups possible. In this example, all responses were easily categorized into one of five groups and quantified accordingly. Care should be taken when constructing a survey questionnaire to minimize fill-in-the-blank/short-answer items so the data can be easily quantified and analyzed (see Section 5604). In this example, the question was better suited to be a multiple-choice item that could have been quantified readily by allowing respondents to select their responses.

Figure 6-32. Categorizing Responses to an Open-Ended Question.

| CATEGORIZING RESPONSES TO AN OPEN-ENDED QUESTION | |
|--|-----|
| How often did you receive hands-on training with the equipment while attending the Radio Repairman Course? | |
| <hr/> | |
| Less than once a week | = 1 |
| Once a week | = 2 |
| Twice a week | = 3 |
| Three times a week | = 4 |
| More than three times a week | = 5 |

(2) **Multiple-Choice Response.** Survey and interview data that use a multiple-choice response format can be quantified like their counterpart knowledge-based test items using a nominal scale to assign labels to responses.

- b. **Ordinal.** An ordinal scale is used to measure responses gathered using a Likert rating scale. A Likert rating scale is the primary data collection tool that employs an ordinal scale. Typically, responses to a subject are rated across a continuum using a scale that varies from three to seven possible responses. The bottom of the scale typically represents a low amount of the property being measured while the top of the scale typically represents a high amount of the property being measured.
- (1) Unlike knowledge and performance-based test items and other types of survey/interview questions, a Likert rating scale is a measure where the mean (i.e., typical response per item) per respondent is calculated. When using a Likert scale, it is appropriate to add the responses and divide by the number of questions per student to produce a student's overall response or attitude to a subject. For example, a survey evaluating the improvements made to a training program uses a 3-point Likert scale. Respondents answer questions concerning the improvements made with 1 = "not improved," 2 = "improved," and 3 = "greatly improved." In this example, it would be appropriate to calculate a mean response to the survey per student. It would be possible for a student's mean response to be 2.5 which could be interpreted as the training program overall is considered to be improved.
 - (2) A mean is calculated using a Likert scale only if the same scale is used throughout the survey and the whole survey measures the same topic. For example, half of a survey measures the effectiveness of graduate job performance on a 5-point Likert scale from "ineffective" to "very effective." The other half of the survey measures graduate training in terms of effectiveness by using the same 5-point scale. It would be inappropriate to calculate an average response per respondent to the overall survey when the survey is measuring two different topics.
- c. **Interval.** Responses to a survey questionnaire or interview that are numerical in nature (e.g., respondent's age, years in service) are quantified using an interval scale. An interval scale quantifies the responses by the value of the response. If a respondent answers 23 to a question asking his age, his response is coded as 23. An interval scale permits the following statistics to be performed on a per item basis only: frequency counts, mean response, mode (most frequently occurring response), median (the response that splits the respondent pool in half), and variability (range, variance, and standard deviation). Unlike a Likert scale that may be the same scale used throughout a survey, an interval scale is not usually the same throughout a survey. A survey is usually designed with interval questions to gather primarily demographic data. Therefore, it is not appropriate to sum responses in an interval scale to calculate the above descriptive statistics for the overall survey.

TEST RELIABILITY AND VALIDITY

The reliability and validity of a test provide the foundation for effective evaluation of student performance. Both the reliability and validity of a test should be assessed to identify the appropriateness of the test as an accurate measure of instructional effectiveness.

1. **Reliability.** Reliability refers to the ability of an instrument to measure skills and knowledge consistently. The reliability of a test is determined based on the calculation of a reliability coefficient (r). It is recommended that this coefficient be computed using a computer statistical analysis software package. A reliability coefficient is the correlation, or degree of association, between two sets of scores. Correlation coefficients range from -1.0 to +1.0. The closer a coefficient gets to -1.0 or to +1.0, the stronger the relationship. The sign of the coefficient tells whether the relationship is positive or negative.

| Coefficient | Strength | Direction |
|-------------|-----------|-----------|
| $r = -.85$ | Strong | Negative |
| $r = +.82$ | Strong | Positive |
| $r = +.22$ | Weak | Positive |
| $r = +.03$ | Very Weak | Positive |
| $r = -.42$ | Moderate | Negative |

The different methods of estimating reliability fall within three categories: determining the internal consistency of a test, determining the stability of a test over time, and determining the equivalence of two forms of a test:

- a. **Test-Retest.** Test-retest is a method of estimating reliability by giving the test twice and comparing the first set of scores and the second set of scores. For example, suppose a test on Naval correspondence is given to six students on Monday and again on the following Monday without any teaching between these times. If the test scores do not fluctuate, then it is concluded that the test is reliable. The problem with test-retest reliability is that there is usually some memory or experience involved the second time the test is taken. Generally, the longer the interval between test administration, the lower the correlation.

| Student | First Administration Score | Second Administration Score |
|---------|----------------------------|-----------------------------|
| 1 | 85 | 87 |
| 2 | 93 | 93 |
| 3 | 78 | 75 |
| 4 | 80 | 85 |
| 5 | 65 | 61 |
| 6 | 83 | 80 |

- b. **Alternate Forms.** If there are two equivalent forms of a test, these forms can be used to obtain an estimate of the reliability of the test. Both forms of the test are administered to the same group of students and the correlation between the two sets of scores is determined. If there is a large difference in a student's score on the two forms of the test that are suppose to measures the same behavior, then it indicates that the test is unreliable. To use this method of estimating reliability, two equivalent forms of the test must be available and they must be administered under conditions as nearly equivalent as possible.
 - c. **Split-Half Method.** If the test in question is designed to measure a single basic concept, then the split-half method can be used to determine reliability. To find the split-half (or odd-even) reliability, each item is assigned to one half or the other. Then, the total score for each student on each half is determined and the correlation between the two total scores for both halves is computed. Essentially, one test is used to make two shorter alternate forms. This method has the advantage that only one test administration is required, so memory or practice effects are not issues. This method underestimates what the actual reliability of the full test would be.
2. **Interpreting Reliability**
- a. **Scoring reliability limits test reliability.** If tests are unreliably scored, then error is introduced that limits the reliability of the test.
 - b. **The more items included in a test, the higher the test's reliability.** When more items are added to a test, the test is better able to sample the student's knowledge or skill that is being measured.
 - c. **Reliability tends to decrease as tests are too easy or too difficult.** Score distributions become similar which makes it tough to know whether the instrument is measuring knowledge and skills consistently. When tests are too difficult, guessing is encouraged which creates a source of error in the test results.
3. **Validity.** The term validity refers to how well an instrument measures what it is suppose to measure. Validity can be assessed for tests, questionnaires, interviews, etc. However, validity is most often calculated for tests. Without establishing its validity, a test is of questionable usage since the evaluator does not know for sure whether the test is measuring the concepts it is intended to measure. There are several types of validity that can be determined.
- a. **Content Validity.** Content validity assesses the relevance of the test items to the subject matter being tested. Content validity is established by examining an instrument to determine whether it provides an adequate representation of the skills and knowledge it is designed to measure. No statistical test is used to establish content validity. To determine whether a test has content validity, SMEs review the test items and make a judgment regarding the validity of each item. For this approach to be effective, two major assumptions must be met. First, the SMEs must have the background and expertise to make a judgment regarding the content of the test. Second, the objectives to which the test is compared must be valid.

- b. **Criterion-Related Validity.** Criterion-related validity is established when test scores are compared to a criterion (such as graduate performance on the job) to determine how well a test predicts the criterion. For example, the validity of a test on map reading can be determined by comparing the scores students received on the test with their performance on a field exercise in land navigation. The test will have criterion-related validity if a student who received a high score on the map reading test receives a high score on the map reading portion of the land navigation exercise. Criterion-related validity is usually expressed as a correlation. There are two types of criterion-related validity: concurrent and predictive validity.
- (1) **Concurrent Validity.** To establish the criterion-related validity of a test, it is often faster to test people already considered successful on the criterion (e.g., individuals who were rated highly on their job performance). If successful individuals are used, valuable time is saved since they already have job performance scores ready for comparison with the test scores. If the test correlates highly with the job performance data, then the test has concurrent validity. In other words, if the successful job performers also score highly on the test, then the test is shown to be related to the criterion (successful job performance). The test is able to identify which individuals are doing well in their jobs. Once a test has been determined to possess concurrent validity, predictive validity is often tested or inferred.
 - (2) **Predictive Validity.** Predictive validity refers to how well the test predicts some future behavior of the student. This form of validity is particularly useful for aptitude tests, which attempt to predict how well the test taker will do in some future setting. The predictive validity of a test is determined by administering the test to a group of subjects, then measuring the subjects on whatever the test is supposed to predict after a period of time has elapsed. Often an instructor will want to design a test to try to predict how well students will perform on a criterion. If the test is able to predict the student's scores on the criterion with a good deal of accuracy, then the test has predictive validity. Predictive validity is very useful to instructors. If an instructor is able to predict future performance with a good deal of accuracy, he/she can identify students who need more attention in order to succeed.

USING A COMPUTER TO PERFORM STATISTICAL ANALYSIS

Use of computer statistical programs enables an evaluator to perform data analysis quickly and to generate a variety of statistics based on the specific requirements of the evaluation. Statistical analysis is currently not a discipline required of Marine Corps evaluators; however, it can greatly improve the evaluator's ability to analyze and interpret evaluation data by providing the tools to describe and define outcomes, compare relationships, and identify trends. Skill in statistical analysis is generally acquired through training or schooling. However, it can be learned and practiced, particularly if the evaluator has a computer statistical package. Along with learning the computer program, the key to performing statistical analysis on a computer is understanding the different statistical procedures, when to use them, how to use them, and how to interpret their results. Throughout this section, specific statistical analysis procedures have been discussed. Many of these statistics can be calculated by hand (e.g., frequency, mean, mode, median, range, item analysis). However, many of the more complex statistics are time consuming to calculate and leave greater room for human error in their calculation. An easier way to calculate these is through use of a computer statistical program.

1. **Use of Computer Programs.** There are many statistical programs that run on standard personal computers. Most of these programs are designed to allow the user to enter data from tests, questionnaires, etc., and select the type of statistics desired. The use of statistical software packages enables the user to perform data analysis quickly and efficiently and generate a variety of statistics based on the specific requirements of the evaluation. One of the most widely available computer programs is SPSS (Statistical Package for the Social Sciences). SPSS is a powerful tool that allows the calculation of all the statistics discussed in this Manual. Additionally, SPSS allows the calculation of several other higher-order statistics too complicated to discuss here.
2. **The Marine Corps Training Information Management System (MCTIMS).** The evaluation module of MCTIMS can produce reports and statistics. Individual reports can be tailored to include an array of information. For instance, MCTIMS can retrieve the class test results, an individual response report, an incorrect response report, an absentee report, and GPA/class standings reports for use by administrators. Within test statistics, MCTIMS automatically configures the mean, median, mode, and standard deviation. It also provides the number of perfect scores, number tested, number passed, and number failed. Refer to the MCTIMS User Manual for more information and guidance.

SUMMARIZE DATA

After data is assimilated, it should be summarized for ease of interpreting the results. Decisions must be made regarding how the data should be summarized. Data may be summarized in paragraph form and/or a table, graph, chart, or matrix. Strengths and problem areas are identified so that solutions can be formed and recorded.

IDENTIFY STRENGTHS

By identifying and documenting strengths, support is available to prevent changes being made to components of the program that work well.

IDENTIFY PROBLEM AREAS

The evaluator should identify any problem areas found during the interpretation of data. It is this step that identifies where changes may be necessary or what areas need to be reviewed for trends. Problem areas should be identified within the summarized data. Descriptive statistics, graphic summarization, and paragraph form are three ways that data can be summarized.

1. **Descriptive Statistics.** Descriptive Statistics are ideal for summarizing evaluation results. Descriptive statistics can be used to present evaluation results in paragraph form. Some examples:
 - 80 out of 100 students passed the written exam resulting in a pass rate of 80%.
 - Scores on the test ranged from a low of 65 to a high of 100, with a class mean of 92.5.
 - Students were asked to complete a comprehensive questionnaire rating the effectiveness of the instructional program. Students indicated responses on a scale of 1 to 5, 5 representing extremely effective. The mean value of class responses was 4.1, indicating an overall impression that the instructional program was very effective.
 - Of the 125 graduates surveyed, only 3 felt the instructional program did not prepare them for performance on their current job.

Graphic Summarization of Evaluation Results. Graphs, tables, and charts can be used to summarize evaluation results so that they are easily understood. Many types of data can be easily plotted on bar charts or line graphs to show relationships, indicate trends, or explain results. To provide comprehensive information, the results may need to be explained in paragraph form.

DETERMINE SOLUTIONS

Decisions must be made based upon the interpretation of the data. Any recommended solution should consider future goals and the feasibility of the change within the school. A plan of action should be formed. If revisions can be made to correct the identified problems, they should be made in a timely manner. A Course Content Review Board can be held at any time if major changes are necessary.

RECORD SOLUTIONS

Evaluation results must always be documented in some form. Evaluation results are used to inform personnel about the findings resulting from the collection, analysis, and interpretation of evaluation information. Once evaluation information is interpreted, there are **three courses of action** that can be taken:

1. All evaluation data are recorded and preserved for future use should no revisions to the course be determined.
2. Evaluation is continued through the collection of additional data by the FLC. The focus of this evaluation is targeted at the suspected deficiency in the instructional program.
3. Revisions to course materials are identified and presented at a CCRB.

SECTION 4

6004. MANAGE EVALUATION DATA

The next step in the evaluation process is to manage the documentation of evaluation results and recommendations for revising or refining an instructional program. These documents and reports are prepared to serve as a historical record of the evaluation, provide an audit trail for the continuing development and improvement of instruction, and direct the activities for implementing changes to the instructional program. Efficient data management therefore, requires that the information presented in these documents be clear, concise, and accurate. This chapter provides guidance concerning the documentation of evaluation results.

MARINE CORPS TRAINING INFORMATION MANAGEMENT SYSTEM

A POI is maintained by each FLC in MCTIMS for every formal course of instruction. MCTIMS can also track the drops, progress, and absenteeism of students through the use of the Student Management module. Once test items/questions for questionnaires are entered into MCTIMS, then the test data/questionnaire data can be scanned or manually entered. Using MCTIMS for Tests/Questionnaires is optional. MCTIMS has the capability to print reports that can be used for statistical analysis for the test/questionnaires entered into the data system. Refer to the MCTIMS User Manual for specific guidance.

DATABASES/SPREADSHEETS

To meet specific school needs in maintaining and managing data, some schools develop databases or spreadsheets to assist in conducting analysis and interpreting data. Specific reports can be generated from databases that compile entered data for easy interpretation. Prior to building such a database, the focus of the evaluation and the development of evaluation instruments should be complete. Formulas can be applied so that the database/spreadsheet will provide statistical data. Users skilled with both MCTIMS and standard spreadsheet or database applications can benefit from MCTIMS' ability to produce Student and Evaluation Data Export files for use in other applications.

COURSE HISTORY FOLDERS

Course history folders are the paper-based version of maintaining data. Schools must maintain course booklets for at least five years. The data placed in the course history folders can be paper-based, printed out of databases, MCTIMS, or other computer programs. However, by maintaining a folder for each iteration of a course, all data regarding a particular class can be easily assessed for reviews, inspections, or Course Content Review Boards. The following documentation, at a minimum, should be maintained in course history folders:

1. Enrollment rosters
2. Student data sheet information
3. Test results (i.e., reports, statistics, item analysis)
4. After Instruction Reports
5. End of Course Critique Summary
6. Graduation Roster

RECORD OF PROCEEDINGS

The Record of Proceedings (ROP) is generated from the Course Content Review Board (CCRB). CCRBs are discussed in detail in the next section. A ROP documents evaluation results and recommendations for revising a POI identified during the conduct of a CCRB. Within the FLC, the ROP not only documents an evaluation, it also functions as a record submitted to higher headquarters for implementing changes to a POI. If there are no recommended changes, then the ROP is simply maintained for documentation purposes at the school. The ROP also serves to initiate action at higher headquarters to address requirements outside the scope of the Formal School. To ensure that changes to instruction are implemented properly and that recommendations for changes outside the scope of the Formal School are addressed.

**CCRB- Course Content
Review Board.**

SECTION 5

6005. COURSE CONTENT REVIEW BOARD

MCO 1553.2¹ mandates that FLC convene a Course Content Review Board (CCRB) within 120 days of a signed T&R manual to ensure the efficiency and effectiveness of an instructional program. However, a CCRB can be more frequent if the need arises. Figure 6-36 provides a Conduct a CCRB Checklist to assist the host in the preparation and conduct of a CCRB.

Examples of When to Conduct CCRB

- As part of a battle rhythm within 120 days of a signed T&R manual.
- When doctrine is updated or new requirements surface.
- If evaluation results reveal a need to revise some facet of an instructional program, then a CCRB is held.

CCRB FUNCTIONS

A CCRB functions to record information and make recommendations to improve the effectiveness and efficiency of an instructional program. The Record of Proceedings (ROP) must provide justification and recommended courses of action for implementing any revisions to the POI/MLF/Lesson Plan. All recommended lesson and/or course revisions must be reflected in the ROP.

CCRBs include, but are not limited to:

-
- **Review of formative and summative evaluation data.**
 - **Review of higher headquarters policy change or direction, which affects a Program of Instruction.**
 - **Review of recommended lesson/course modifications to instructional materials.**
 - **Review of lesson additions/deletions to instructional materials.**
 -
-

CCRB USES

Changes pertaining to instructional time, resources, or inclusion of changes from the T&R conference that form the basis for the course may be identified by a CCRB. TECOM must approve any recommended changes that fall outside of content revisions. A CCRB's ROP can be used to communicate to higher changes made to the POI, and as a historical record of changes to the POI.

1. **Revising Instructional Resources.** A CCRB is the means to record and present recommended changes to resources. All recommended changes to training time, personnel, equipment, facilities, or budget must be submitted to TECOM with justification via an updated POI. TECOM will review and staff the changes, providing the school with guidance.
2. **Modifying Instruction to Include T&R Changes.** The changes resulting from a T&R conference need to be incorporated into current Lesson Plans. A CCRB reviews these T&R changes and identifies needed updates to current POI/MLF/Lesson Plan.
3. **Revise T&R Events and/or the Task List.** A CCRB is **not** the mechanism to record recommended changes to T&R events and task lists. The FLCER is the schools voluntary opportunity to present their findings at the appropriate T&R conference. FLC can also send representation to the T&R conferences.

CCRB PREPARATION

Initial planning for a CCRB should be conducted three months prior to the CCRB. Regardless of CCRB composition, all proceedings and findings are formally recorded by the CCRB Recorder (discussed later in this section). In addition, a CCRB can be videotaped. Figure 6-34 lists the FLC responsibilities and Figure 6-35 lists the CCRB member responsibilities.

Figure 6-34. FLC Responsibilities.

| FLC Responsibilities |
|--|
| <input checked="" type="checkbox"/> Scheduling the time, date, and location for the CCRB. |
| <input checked="" type="checkbox"/> Providing guidance to members in advance of the CCRB so they will be prepared to discuss agenda items. This guidance includes the agenda, evaluation data, and any directions from higher headquarters. The CCRB agenda is based on a review of evaluation data and focuses on identified or perceived instructional deficiencies. |
| <input checked="" type="checkbox"/> Assigning a Recorder to record the CCRB minutes. These minutes are used to develop the Record of Proceedings (ROP). |
| <input checked="" type="checkbox"/> Assigning a facilitator to manage and guide the CCRB. |
| <input checked="" type="checkbox"/> Funding for CCRB participants has to be worked out by the sponsoring school. |

Figure 6-35. Assigned CCRB Member Responsibilities.

| Assigned CCRB Member Responsibilities |
|---|
| <input checked="" type="checkbox"/> Study all collected evaluation data and directions from higher headquarters that are related to the agenda items. |
| <input checked="" type="checkbox"/> Be prepared to discuss recommended changes to instructional materials. If revisions are necessary, determine the specific changes and discuss how they should be made and how they will affect the instructional program. Recommendations must be specific and comprehensive and they must detail how changes should be implemented to best meet instructional needs. |

CCRB MEMBERS

A CCRB will consist of:

-
- * **Representation from instructors/curriculum developers from the Formal School.**
 - * **School supervisors.**
 - * **Occupational Field (OccFld) Specialist and Task Analyst representation (if possible).**
 - * **Operating Force Subject Matter Experts.**
-

APPOINTMENT

CCRB members are appointed by the Director of the school or as directed by Standing Operating Procedures (SOP). Potential members may be contacted either by phone or e-mail correspondence. A CCRB should have representatives from each phase of the instructional program such as SMEs, curriculum developers, and instructors. Should major changes to the instructional program (e.g., resources, T&R events) be foreseen, a Training and Education Command task-analyst should be invited to attend the CCRB. CCRB composition is critical to success of the CCRB. To maintain the integrity of the process and provide formal courses that meet the needs of the Operating Forces, the Operating Forces must have sufficient representation to carry the vote on all CCRB agenda items.

FACILITATE DISCUSSION OF AGENDA ITEMS

1. **CCRB Chairman**. This is the individual who controls the meeting, ensures that all agenda items are discussed, and that recommendations are recorded. The CCRB Chairman will establish guidelines or parameters for making decisions. This may include the number of sources and type of evaluation information that will be reviewed and analyzed. This may also include the order/priority of agenda items and any imposed time constraints of the proceedings. Additionally, the CCRB Chairman should encourage and promote participation by all CCRB members. Contributions from all CCRB members should be treated respectfully and discussed.
 - a. Specific recommendations to each agenda item must be made. It is not necessary for all CCRB members to agree on a decision or an approach, but all recommendations must be reached by consensus. This is accomplished by weighing all information from all sources, dismissing unnecessary information; further analyzing points for clarification, and assimilating information into a solid recommendation.

- b. Recommendations should be detailed. They must provide justification and they should include methods for implementing revisions to the instructional program. Recommendations for each agenda item should be reviewed and summarized by the facilitator.
 - c. All CCRB members must understand the recommendations and a consensus must be reached before the next agenda item is addressed.
2. **Recorder.** Under the guidance of the CCRB Chairman, the recorder should record all recommendations legibly. The ROP must clearly state CCRB findings and recommended courses of action in a detailed, concise format. The required format for the ROP can be found in MCO 1553.2_ Appendix G-3.

Record of Proceedings (ROP)

MCO 1553.2_ mandates that evaluation results and recommendations for revising instruction at FLCs be documented through the publication of an ROP. ROPs are generated based on CCRBs and are used to revise instructional materials, provide information and judgments about the effectiveness of an instructional program, and effect changes in a program beyond the scope of the school. The ROP provides a summary of evaluation results, recommendations, and justification for revising training.

1. **Format.** The required format for the ROP can be found in MCO 1553.2_ Appendix G-3. It must contain justification for any recommended revisions to instruction. The CCRB may make recommendations on revising instruction where appropriate. Changes to a POI per MCO 1553.2_ will be formalized by submission of a POI for approval.
2. **Members Review.** The ROP must be checked and approved by CCRB members to ensure that specific recommendations have been made for each issue encountered in the instructional program. This review also ensures that each recommendation is documented with solid justification and that the content is an accurate reflection of the conduct of the CCRB.
3. **Member Certification.** The members of the CCRB then sign the ROP certifying the accuracy of the content. Signature does **not** represent concurrence, and all in attendance should ensure dissenting opinions are captured within the ROP prior to signature.

Recommendations should be detailed.

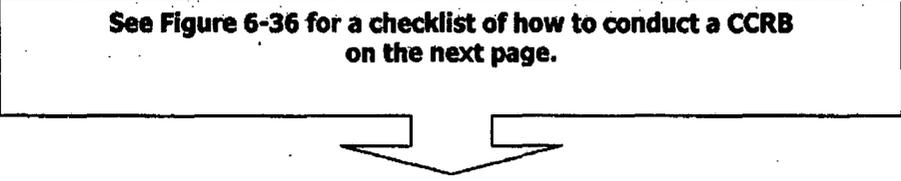
They must provide justification.

They should include methods for implementing revisions to the instructional program/POI.

SUBMITTING THE ROP

Submit the final ROP to the CO/Director of the FLC for as part of the POI submission process. A copy of the ROP will remain on file at the FLC.

See Figure 6-36 for a checklist of how to conduct a CCRB on the next page.



CONDUCT A CCRB CHECKLIST

| PREPARE FOR THE CCRB | YES | NO |
|---|------------|-----------|
| 1. Study evaluation data and directions from higher HQ | | |
| 2. Set a time and date | | |
| 3. Ensure members are appointed (travel (TAD) must be addressed here) | | |
| 4. Provide guidance to members (agenda, data, etc.) | | |
| 5. Assign a recorder | | |
| CONDUCT THE CCRB | YES | NO |
| 1. Open meeting on time | | |
| 2. Explain purpose of meeting | | |
| 3. Avoid stating preferences as to outcomes | | |
| 4. Explain ground rules: | | |
| a. Establish discussion method (s) | | |
| b. Establish decision making method (s) | | |
| c. Establish time limits | | |
| 5. Employ effective group communication techniques: | | |
| a. Promote systematic problem solving | | |
| b. Keep group focused on problem solving | | |
| c. Create/maintain suitable atmosphere | | |
| d. Show respect and interest in group members | | |
| e. Avoid making friction points personal | | |
| f. Maintain impartiality | | |
| g. Encourage balanced participation | | |
| h. Refrain from dominating the group (do not allow individuals) | | |
| i. Deal with conflict effectively | | |
| j. Consider several courses of action | | |
| k. Consider drawbacks of preferred course of action (wargame COAs) | | |
| l. Consider problems of implementation | | |
| m. Provide "second chance" to air remaining doubts | | |
| CLOSE THE CCRB | YES | NO |
| 1. Review minutes | | |
| 2. Seek approval from members concerning the minutes | | |
| 3. Close CCRB on time | | |
| COMPLETE THE CCRB | YES | NO |
| 1. Write the Record of Proceedings (ROP) based on the minutes | | |
| 2. ROP reviewed and certified by all CCRB members | | |
| 3. Submit Record of Proceedings to director for approval and to CG, TECOM | | |
| 4. Evaluate the conduct of the CCRB | | |

Figure 6-36. Conduct a CCRB Checklist.

6006. ADMINISTRATION

SECTION

6

This section provides the evaluation requirement as stated by various Marine Corps Orders and Publications. These documents provide guidance to FLCs regarding requirements in training. With the requirements being understood, personnel working in academics at the FLCs need to carefully consider the approach to evaluation. This is done through an evaluation plan for the school. The evaluation plan discusses how, where, and when to conduct evaluation, the types of data retrieved, and what to do with the data. Details on types of sampling are referred to in detail so that this can be addressed in the plan. In addition, specific information on how to design questionnaires, interview questions, and evaluation checklists is covered so that schools are able to ensure that the instruments used are meeting the needs of the school. Instruments should be designed with ease of data compilation and interpretation in mind.

EVALUATION REQUIREMENTS

FLC leaders need to be familiar with the requirement for evaluation. The first step in evaluation planning involves the identification of an evaluation requirement. The source and scope of this requirement will drive subsequent evaluation activities. Establishing this requirement ensures that personnel and resources are allocated appropriately and effectively in support of an instructional program. This section provides direction and guidance in identifying an evaluation requirement and focusing on the source of this requirement—Marine Corps doctrinal publications.

MARINE CORPS REQUIREMENT FOR EVALUATION

Marine Corps doctrine or local SOPs mandate the conduct of certain evaluations including their frequency, the type of evaluation to be conducted, and the specific issues to be evaluated. The following subparagraphs briefly describe the 1553 series of Marine Corps Orders (MCO) and Marine Corps Reference Publications (MCRP) as they pertain to instructional evaluation. The evaluator should be familiar with the effect of these orders on the organization's evaluation activities. In addition to these documents, Marine Corps Training and Education Command (TECOM) may be contacted for guidance concerning the conduct of evaluation.

MCO 1553.1. MCO 1553.1, Marine Corps Training and Education System, establishes CG, Training and Education Command as the organization that evaluates Marine Corps training and education policy, plans, concepts, and programs; conducts and reviews evaluations of training and education performed in units and institutions; and resolves emergent issues.

MCO 1553.2. MCO 1553.2, Management for Marine Corps Formal Schools and Training Detachments, addresses Course Content Review Board (CCRB) requirements, curriculum assistance visits conducted by Training and Education Command, and the conduct of a Training Situation Analysis (TSA) to assess a formal school's philosophy, management, facilities, staffing, curriculum, and instructional support.

MCO 1553.3. MCO 1553.3, Marine Corps Unit Training Management (UTM), establishes a Marine Corps-wide Training Management (TM) process wherein all individual and collective training conducted by units within the operating forces and supporting establishment shall be requirements driven, standards based, and performance-oriented and prioritized by the commander relative to assigned missions. Additionally, the Marine Corps Training and Readiness (T&R) Evaluation process is identified as the training management and diagnostic tool to improve training.

MCO 1553.6. MCO 1553.6, Development, Management, and Acquisition of Interactive Courseware (ICW) for Marine Corps Instruction, establishes policy, prescribes requirements, and assigns responsibilities for the development, management, and acquisition of ICW for Marine Corps Instructional programs.

MCO 1553.7. MCO 1553.7 provides information, guidance, and the responsibilities concerning the use of By-Name Assignment which is now found within the Student Registrar Module of MCTIMS.

MCO 3500.14. MCO 3500.14, Aviation Training and Readiness (T&R) Program, establishes training standards, regulations, and policies regarding establish policies regarding the training of Marine Corps aircrews, Marine Command and Control System (MACCS) operators, Airfield Emergency Services and Meteorological and Oceanographic (METOC) personnel.

MCO P3500.72. MCO P3500.72, Marine Corps Ground Training and Readiness (T&R) program, establishes training standards, regulations and policies regarding the training of Marines and assigned Navy personnel in ground combat, combat support, and combat service support occupational fields.

MCRP 3-0A, Unit Training Management/MCRP 3-0B, How to Conduct Training. MCRP 3-0A and MCRP 3-0B set forth evaluation requirements for unit training. These manuals provide guidance to plan, prepare, and evaluate training conducted at battalion or squadron level units. These manuals help evaluators determine if unit training produces technically and tactically proficient Marines capable of accomplishing their assigned missions.

Formal Learning Center Evaluation Requirement. Evaluation is a continuous process whereby information is gathered to assess the value, worth, or merit of a program. A school may conduct an evaluation any time it is deemed necessary to verify the effectiveness of an instructional program, identify instructional deficiencies, or determine the most efficient allocation of instructional resources.

PREPARE AN EVALUATION PLAN

After an evaluation requirement has been identified, a plan for conducting the evaluation is developed to ensure that no important steps in the process are overlooked. This section presents the critical elements of an evaluation plan, including supporting data, sources of data, sampling, an evaluation schedule, and data collection, analysis, and interpretation.

ELEMENTS OF AN EVALUATION PLAN

Whether the evaluation will be formative or summative, the planning topics discussed below will help ensure effectiveness. The evaluator must be prepared to modify the plan as required during the conduct of the evaluation if new issues are identified or events mandate revision of the plan. Any changes to the plan should be carefully documented. A sample evaluation plan is provided in MCO 1553.2, Appendix O-60.

1. **Data Required to Support the Evaluation.** This element of the evaluation plan is a clear and detailed statement of the data required to support the evaluation. For example, if the evaluation focuses on student mastery of learning objectives, student performance (test) data must be collected. If the focus concerns whether course graduates meet the needs of using commands, graduate on-the-job performance data are required. Throughout the planning process and during data collection, the evaluator should review this portion of the plan to ensure the appropriate data are collected to support conclusions and recommendations concerning the revision, maintenance, or termination of an instructional program.
2. **Sources of Data.** As part of the evaluation plan, the evaluator must determine who will provide the data and what sources of information will be used. Sources include existing data, instructors and other school personnel, students, graduates, SMEs, and/or using commands.
 - a. Existing data include all task and course materials (e.g., T&R Manual, POI, lesson plans), documentation from higher headquarters that may change the course requirements, and previous evaluation data (e.g., CCRB or SME Conference reports, test data).
 - b. Data from individuals include student performance data (test results), instructor performance data, and graduate performance data.
3. **Sampling.** This element of the evaluation plan should identify, when applicable, the sampling procedure including sample size and sampling technique to be used. Sampling is discussed later in this section.
4. **Evaluation Schedule.** The evaluation plan should indicate when the evaluation would take place. In addition, the evaluation plan should include a schedule for each evaluation task or event. The schedule should be developed to ensure the evaluation is conducted when the most reliable data can be collected.
 - a. **Timely Evaluation.** An evaluation should be planned to ensure timely collection of data. For example, if the evaluation focuses on graduate job performance, the graduates should have been on the job for at least 30 days, but less than three months to ensure valid data can be collected. Graduates new on the job may not have had the opportunity to perform certain tasks; and if they have been on the job longer than three months, they may have trouble separating what they learned in school from what they learned on the job. As an additional example, if the evaluation is being conducted to determine the consistency of instructional results, the instructional program must have been in place through several iterations. This will ensure the data collected will provide a comprehensive basis for decision making about an instructional program.

- (2) **External Evaluator.** An external evaluator is more likely to be impartial because he/she has no vested interest in the program's success or failure. His/her findings may be viewed as more credible, especially if the program is controversial and evaluation findings are to be used in settling a dispute. In addition, personnel associated with an instructional program are often more willing to reveal sensitive information to an external evaluator (since an internal evaluator may inadvertently breach their confidentiality). On the other hand, an external evaluator may be unfamiliar with the instructional program, requiring him/her to devote time to learn about it, and he/she may not have the ability to identify subtle issues or concerns related to the instructional program. If possible, an organization should use an external evaluator when the answer to any of the following questions is no.

Figure 6-37. Internal and External Evaluators

| Internal vs. External | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Are technically qualified internal evaluators available to effectively and competently evaluate the program? |
| <input checked="" type="checkbox"/> | Can internal evaluators be fully committed to the evaluation? That is, are they without additional duty responsibilities that would hinder the evaluation effort? |
| <input checked="" type="checkbox"/> | Will there be sufficient internal evaluators to sustain an evaluation? |
| <input checked="" type="checkbox"/> | Will the internal evaluator have the credibility to perform the evaluation objectively? |

- b. **Plan for Briefing/Training Data Collectors.** Once personnel requirements have been identified, a plan for briefing and training data collectors should be developed.
- (1) **Personnel Brief.** The brief should include the intent of the evaluation, the role of the data collectors, when and how they will collect the data, how to monitor the process, and how to ensure that data collected are complete.
- (2) **Personnel Training.** A relatively simple orientation for data collection personnel is all that will be needed for most evaluation instruments. However, if interview or observation instruments are to be used, personnel may need training sessions on their use, including written instructions, job aids, and/or practice. Procedures (including time tables) for this training should be included in the evaluation plan.

- c. **Conditions Under Which Data Will be Collected.** The plan should also specify the appropriate conditions for data collection. For example, will students be observed during a class? Will they be tested in groups or individually? Will graduate performance on the job be assessed? Will evaluation instruments be mailed, emailed, or administered in person? Planning the data collection effort will ensure that valid data can be collected under the conditions specified.
 - d. **Data Collection Arrangements.** The evaluation plan should also specify the administrative requirements to support data collection. Depending on the evaluation to be conducted, these requirements may include contacting school or command personnel to schedule visits, making travel reservations, ensuring that evaluation instruments are duplicated and mailed on schedule (if not carried by the evaluator), etc.
6. **Method for Data Analysis and Interpretation.** The evaluation plan should specify the method for data analysis and interpretation. This includes formatting, coding, organizing, storing, and retrieving the data along with the statistical techniques used to analyze the raw data and methods for interpreting results. Refer to Section 5302 for information on the analysis and interpretation of evaluation data.
 7. **Method for Reporting.** The evaluation plan should specify the method for making recommendations and reporting evaluation results.

SAMPLING

It is not always feasible to survey or test every member of a specific population (e.g., every Marine in the Marine Corps). Therefore, a sample representative of the population is selected for evaluation. When selecting a sample, the larger the sample, the more precise the estimate of the characteristic in the population. Sampling techniques are particularly common when conducting surveys or interviews rather than testing individual performance in school or on the job where it is important to test everyone. Often the target population (the people or events that are of interest) is too large to survey practically, so an evaluator focuses instead on a subset of the population known as a sample.

SAMPLING TECHNIQUES

When a sample is selected, it is important that the sample be unbiased or truly representative of the whole population to provide the highest degree of reliability and validity with respect to making conclusions and recommendations regarding an instructional program. There are two basic ways to achieve a representative sample: simple random sampling and stratified random sampling.

1. **Simple Random Sample.** A simple random sample is one in which every member of the population has an equal chance of being selected for the sample and the selection of any one member of the population does not influence the chances of any other member being selected.

2. **Stratified Random Sample.** A stratified random sample involves dividing the population into two, three, or more strata (e.g., rank, military occupational specialty [MOS]) and then randomly sampling from each stratum. "Strata" refers to subpopulations. This method of sampling allows the evaluator to generalize results to the population as a whole, particularly if the population is not homogenous. A stratified random sampling procedure ensures that segments of the population having a low frequency of occurrence (e.g., female Marines) are represented in the sample.

PROCESS FOR SELECTING A SAMPLE SIZE

The selection of a sample size is not a subjective process. In lieu of any other method, evaluators can rely on their past experiences to select a sample size. However, there is a standardized method that can be used to determine an appropriate sample size. To calculate sample size, an expected response rate and confidence level must be identified. The expected response rate is the proportion of responses expected from the population being sampled. For example, if a survey is sent to 100 Marines and it is expected that 30 Marines will return the survey, the expected response rate is 30%. The confidence level corresponds to the degree of assurance or confidence that a given value will occur other than by chance. The most commonly used confidence levels are 95% and 99% such that a 95% confidence level means that the likelihood of a value occurring by chance is 5 in 100 and a 99% confidence level corresponds to the likelihood of a chance occurrence of 1 in 100.

1. **Determining Sample Size for a Random Sample.** MCO 1553.2
Appendix O-62 provides a sampling table and formula for determining sample size. For example, for a population of 4,200 course graduates, an estimated (desired) return rate of 85%, and a confidence level of 95%, sample size would be determined using the following procedure:
 - a. **Using Appendix O-62, locate the number corresponding to the population size. Since 4,200 is not provided in the table, round the number up or down to the nearest value. For example, the population value of 4,200 would be rounded down to 4,000.**
 - b. **Locate the value corresponding to the 95% confidence level with a population size of 4,000. Using Appeneix O-62, this value is 364 (meaning that 364 questionnaires are required). This figure should be 85% of the questionnaires mailed out.**
 - c. **To determine the number of questionnaires that need to be mailed out to obtain 364 usable questionnaires, substitute the values in the formula provided in Appeneix O-62. Using our example, for a population of 4,200 and an expected return rate of 85%, the desired sample size would be 364. Therefore, to obtain an 85% response rate (364 responses), 428 questionnaires need to be gathered.**

2. **Determining Sample Size for a Stratified Sample.** If an evaluator wishes to divide a population into several strata (such as rank or MOS) and select sample sizes based on these strata, sample size is determined in the same way described above. In a stratified sample, population size corresponds to the number of individuals within each stratum. For example, given a graduating class of 200 students in which 160 are male and 40 are female, two sample sizes would be calculated, one for a population size of 160 and another for a population size of 40.

DESIGN EVALUATION INSTRUMENTS

The evaluation instrument is the tool that elicits information to accurately assess the effectiveness and efficiency of an instructional program. An evaluation instrument controls the nature and type of information collected and the reliability and validity of that information. This section provides additional guidance on the design of evaluation instruments such as survey questionnaires and interviews, and the use of evaluation checklists. Particular emphasis is placed on guidelines and considerations for developing and using standardized evaluation instruments, stressing the importance of clarity, consistency, and brevity in their design.

SURVEY QUESTIONNAIRES

A survey questionnaire must be well-organized and easy to read to be an effective data collection tool. When selecting or designing survey questionnaires, the following guidelines should be followed:

Format. Format is important in gaining the cooperation of respondents, analyzing the data, and interpreting the results. Design the layout or structure of a questionnaire so that it is attractive and uncluttered, permitting the respondent to readily determine what types of questions are being asked and how to record responses. A respondent should be able to complete the questionnaire within a short period; respondents will often put aside and fail to complete a questionnaire that requires more than 20 minutes of their time.

Instructions. To ensure that the questionnaire is completed properly, clear, concise instructions should be included at the beginning of the questionnaire. These should include a brief explanation of the purpose of the questionnaire, how it is organized, and how responses should be recorded. If the questionnaire is mailed or distributed for later return by respondents, instructions for its return should be provided and a metered return envelope should be included.

Questionnaire Items. Questions should be grouped by topic or subject and presented in a logical format. For example, in a questionnaire administered to graduates of Basic Rifleman covering both M16 Service Rifle and M203 Grenade Launcher, all questions pertaining to the Service Rifle should be grouped together and all questions pertaining to the Grenade Launcher should be grouped together.

Response Format. When possible, the method for responding to questionnaire items should be consistent to avoid confusion and facilitate the recording of accurate responses. If a variety of answer formats must be used, group items with the same answer format together. Survey questionnaires involve self-reporting by respondents and, therefore, provide qualitative data. For those data to be scored for later analysis and interpretation, they must be quantified. The response format of the questionnaire controls the way the data are gathered, how they can be quantified, and the ease or difficulty of their quantification. Response formats include open-ended and fixed alternative (or closed) questions. The fixed alternative format, which includes nominal, ordinal, and interval scale responses, provides data that are more easily quantified for later scoring and analysis. Open-ended responses may also be quantified for data analysis, although it is a much more time-consuming process. Figure 6-39 provides examples of questionnaire response formats.

1. **Open-ended.** An open-ended question has no pre-determined response category. It allows the respondent to answer the question in his/her own words without restricting the kind of answer he/she can give. Data collected using open-ended questions can be quantified by categorizing the responses and assigning a number to each category. Open-ended questions in survey questionnaires or interviews allow respondents to provide additional comments, descriptions, and rationale or explanation for their answers. They are useful for collecting information pertaining to perceived effectiveness of a particular course of instruction. Unlike rating scales and checklists, information gathered from open-ended questions can be difficult to collate, analyze, and quantify because scores or ratings are not assigned to responses. However, an answer key can be made to allow open-ended (e.g., essay) questions to be scored for partial and full credit through the assignment of point values. Refer to Section 5302 for information on quantifying data.
2. **Nominal Scale.** A nominal scale response format is used primarily to elicit information that falls within a single measurement dimension in which responses can be easily categorized such as sex (e.g., male, female) or rank (e.g., corporal, sergeant, captain). This type of scale is particularly appropriate for gathering demographic information.
3. **Ordinal Scale.** A Likert rating scale is an example of an ordinal scale response format and is most commonly used to measure respondents' attitudes, preferences, or feelings about a topic. A Likert rating may involve a 1-3, 1-4, 1-5, 1-6, or 1-7 scale. Level of agreement, level of preparedness, and level of ability are a few examples of what the scale can measure. Each statement requires only one judgment and carefully avoids ambiguity in expression or interpretation. Figure 6-38 provides more information on the Likert rating scale.

| Likert Rating Scale | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Method of recording responses to a question. |
| <input checked="" type="checkbox"/> | Scale that responds to a spectrum of responses (e.g., behavioral ratings, frequency ratings, attitudinal ratings) concerning a certain topic. |
| <input checked="" type="checkbox"/> | Respondents check the response that corresponds to the intensity of their judgment of the topic. |
| <input checked="" type="checkbox"/> | Ideal for obtaining varying judgments or scores on a topic by using a number of statements on the same subject and giving an intensity value for each. |

Figure 6-38. Likert Rating Scale.

| <u>QUESTIONNAIRE RESPONSE FORMATS</u> | |
|--|--|
| <u>Open-Ended</u> | |
| 1. What do you feel is the most important information you received while attending the Supply Officer Course? | |
| <hr/> <hr/> <hr/> | |
| <u>Nominal Scale</u> | |
| 2. Which of these qualities do you feel is the most important for an instructor to possess? (Circle the appropriate number below.) | |
| 1. In-depth knowledge of subject matter | |
| 2. Professionalism | |
| 3. Sincerity | |
| <u>Ordinal Scale</u> | |
| 3. The Supply Officer School's minimum rank requirement for attendance is Major. Which of the following expresses your opinion concerning this statement? (Circle the appropriate number below.) | |
| 1. Strongly disagree | |
| 2. Disagree | |
| 3. Agree | |
| 4. Strongly agree | |
| <u>Interval Scale</u> | |
| 4. How many personnel are assigned to your unit? (Circle the appropriate number below.) | |
| 1. Under 25 | |
| 2. 26-50 | |
| 3. 51-75 | |
| 4. 76-100 | |
| 5. Over 100 | |

Figure 6-39. Questionnaire Response Formats.

4. **Interval Scale.** An interval scale response format elicits information that is quantifiable in terms of absolute or continuous values such as age, years of service, time in billet, etc. This type of question can be designed to require the respondent to either write in his response or select a particular interval in which a value falls.
5. **Development of Questionnaire Items.** Questionnaire items should be short, direct, and written at a reading level appropriate to the respondent population. The evaluator should adhere to the following guidelines when developing questionnaire items. Figure 6-40 provides examples of good and poor questions.

Figure 6-40. Guidelines for Writing Questionnaire Items.

| <u>GUIDELINES FOR WRITING QUESTIONNAIRE ITEMS</u> | |
|--|---|
| 1. Avoid the use of negatives. | POOR: The instructor was not available to answer my questions. (Yes/No) GOOD: The instructor was available to answer my questions. (Yes/No) |
| 2. Use short, common words; avoid jargon. | POOR: Does the AIR include IRFs? GOOD: Does the After Instruction Report (AIR) include Instructional Rating Forms (IRF)? |
| 3. Do not combine two issues in one questionnaire item. | POOR: Was the instructor knowledgeable and effective? GOOD: Was the instructor knowledgeable? Was the instructor effective? |
| 4. Avoid leading questions. | POOR: Do you feel the school needs to lengthen the course to better equip the graduates? GOOD: Are there changes the school can make to the course to better equip the graduates? |
| 5. Ensure the question can be answered by the respondent. | POOR: Was your knowledge comparable to the previous students' knowledge when you entered the class? GOOD: Do you feel you had the prerequisite knowledge and skills to succeed in this course? |
| 6. Avoid the use of emotionally-tinged words and embarrassing questions. | POOR: Did you have difficulty understanding the materials? GOOD: Were the materials presented in a manner easy to understand? |

6. **Distribution.** In addition to well-written questions, valid results from survey questionnaires depend on the selection of respondents. A representative sampling is essential. Variations in job requirements occur because of command, geographic locations, organization level, etc. Therefore, the sample should include respondents assigned to each using location in the population. Section 5603 provides detailed information on sampling.
 - (a) **When to Send Questionnaires.** Proper timing is important when sending questionnaires. For example, questionnaires should be in graduates' hands one to three months after graduation and assignment to the using command. Beyond three months, it may be difficult to determine whether the graduate learned a skill from the instructional program or on the job. If the questionnaire is distributed too soon after course completion, the graduate may not have had time or occasion to perform all of the tasks taught. However, the optimum time for questionnaire distribution is also dependent on the complexity of the job/tasks the instruction covered.
 - (b) **Follow-up.** Follow-up can ensure the return of a sufficient number of completed questionnaires to support valid and reliable data analysis. Procedures for appropriate follow-up should be included in the evaluation plan. These would include the timing of the follow-up, a method for identifying non-respondents, and the method of follow-up (e.g., phone, mail). When the date for follow-up arrives, reminder calls or notices to non-respondents should be made to encourage their completion of the questionnaire. It is also a good practice to thank respondents for their participation. Sending a simple thank-you form requires little time but can be very worthwhile in motivating respondents to cooperate in future surveys.

INTERVIEWS

Although interviews may be structured or unstructured, the collection of reliable data for evaluation purposes is best obtained from structured interviews. The following are guidelines that can be used when conducting interviews. The advantages and disadvantages of interviews are listed in Figures 5-42 and 5-43.

1. **Introductory Statement.** The interview should always begin with an introductory statement that outlines the purpose and structure of the interview. The purpose should be explained in terms the respondent can understand and should identify what types of questions will be asked. The introductory statement should also provide a clear transition to the interview itself.
2. **Conducting the Interview.** The goal of the interviewer is to maximize the flow of information from the respondent.

Figure 6-41. Conducting the Interview.

| Conducting the Interview | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Keep the language pitched to the level of the respondent. Do not use technical terms or acronyms unless the respondent is familiar with them. |
| <input checked="" type="checkbox"/> | Choose words that have the same meaning for everyone. |
| <input checked="" type="checkbox"/> | Do not assume the respondent has factual or firsthand information. |
| <input checked="" type="checkbox"/> | Establish the frame of reference for the questions being asked. For example, to narrow a respondent's comment on the effectiveness of testing, the interviewer may ask the respondent to focus on performance testing during the last three weeks of a course. |
| <input checked="" type="checkbox"/> | If asked, either suggest all possible responses to a question or do not suggest any. |
| <input checked="" type="checkbox"/> | If unpleasant questions must be asked, give the respondent a chance to express his positive feelings first by structuring the interview so those questions are asked first. |
| <input checked="" type="checkbox"/> | Speak clearly and slowly and listen to the respondent's answer before recording the response. |
| <input checked="" type="checkbox"/> | Include a closing statement to let the respondent know the interview is concluded. |

3. **Types of Interview Questions.** The type of interview questions developed should be based on the objective of the interview.
 - (a) **Open-ended Questions.** A question that asks for narrative responses and allows respondents to respond in their own words is an open-ended question. Open-ended questions are used when a discrete answer is not desired or possible (i.e., there is no yes/no or categorical response possible). These questions often rely on the respondent's opinion and judgment rather than the respondent's knowledge of information or facts.
 - (b) **Probing or Clarifying Questions.** Ask probing or follow-up questions to confirm a respondent's answer or to clarify what the respondent has said. The respondent's statements should be included in the probe to provide a point of reference and elicit elaboration or clarification of a topic.
 - (c) **Closed Questions.** A question that limits respondents' answers to predetermined response categories is a closed-ended question. Multiple choice and yes/no questions are examples of closed-ended questions. Closed questions employ a nominal, ordinal, or interval scale response format. Closed questions are used to elicit information that is easily categorized or to elicit specific factual information such as rank, age, etc. Closed questions restrict the range of responses received.

4. **Recording Responses.** For open-ended questions or questions in which probing or clarifying responses have been provided, the interviewer should:

- * Record responses using the **exact words and phrases** used by the respondent.
- * Use key words or phrases to further clarify a response or as a reminder of what was said.

Advantages of Interview

- If the questions are few and easy to answer, the interview method results in a higher percentage of responses and, therefore, better sample results than a survey questionnaire.
- The interview method ensures that the targeted audience answers the questions. The individuals required to answer the questions can be pre-selected, ensuring the evaluation information is obtained.
- An interviewer can judge the sincerity of the respondent as he gives his answers.
- An interview can be conducted simultaneously with observation of performance. Observation of performance adds merit to the interview information obtained.

Figure 6-42. Advantages of Interview.

Disadvantages of Interview

- Face-to-face interviews can be expensive and time consuming based on the time required to conduct the interview and location of the interview.
- Interviews do not allow respondents to remain anonymous which can affect their responses.
- Interviews preclude the respondent from returning to a question at a later date.
- If a respondent cannot be present during the scheduled time, it can be difficult to reschedule the interview.
- An interviewer can introduce bias into the study by suggesting a possible answer to a question when the respondent has difficulty giving one. This produces questionable evaluation results.

Figure 6-43. Disadvantages of Interview.

EVALUATION CHECKLISTS

Checklists are typically used when the evaluation consists of a review of documentation, course materials, etc., or an observation of performance. Checklists that are used as evaluation instruments are not simply lists of items that can be "checked off" as they are identified or located. These checklists consist of carefully worded questions that the evaluator answers by his review of course materials or observation of course components (e.g., graduate or instructor performance, conduct of a class). If existing materials will be reviewed as part of the evaluation, data are collected via checklists as the evaluator reviews the applicable documents. To perform an evaluation of an instructional program, two or more of these checklists may be used, as required. Checklists can be used to conduct both formative and summative evaluations of an instructional program.

Use of Checklists During Formative Evaluation. During instructional program development, checklists can be used to ensure instructional development is proceeding according to plan. Checklists are also used to assess and validate instructional materials. The use of checklists helps the evaluator ensure that the materials being developed (e.g., learning objectives, test items, lesson plans, student materials, instructional setting, media) will result in an effective and efficient course of instruction. Using evaluation checklists as a systematic method for validating instruction ensures:

1. The instruction does not contain unnecessary information, maximizes the use of instructional time and media, follows the SAT process, and prepares graduates to perform their job tasks to the specified standard.
2. An audit trail is created that enables evaluators to track each component of the instructional program to the T&R event it supports and to document the SAT methodology followed. To create an audit trail, a progress or process method can be used.
 - (a) **Progress Method.** This method is used to keep management informed of the progress of the course development effort. In consultation with the course manager(s), the evaluator should identify what information the manager needs to make effective decisions concerning the course and how frequently it is needed. A recommended approach is to report on the completion of key checkpoints in the course development (See Figure 6-44 for a portion of a sample project schedule). Often, managers need only to know that an activity was completed on time. If deviations occur, they should be explained and discussions held to produce an acceptable solution. When the development effort is complete, the project schedule will provide one form of an audit trail that can later be reviewed when evaluating an instructional program.

| <u>Activity</u> | <u>Estimated Completion</u> | <u>Actual Completion</u> | <u>Note</u> |
|-------------------------|-----------------------------|--------------------------|-------------|
| Develop Course Schedule | 20 Sep | 20 Sep | |
| Develop Lesson Plan | 20 Dec | 20 Jan | (1) |
| Develop Student Guide | 20 Jan | 20 Feb | (2) |
| Develop Media | 30 Jun | 30 Jun | |

Notes:
 (1) Delay of travel funds caused site visit to be postponed.
 (2) Development was dependent on completed lesson plan.

Figure 6-44. Sample Project Schedule.

(b) **Process Method.** This method uses a checklist to describe and document the actual development process of a specific course. A recommended approach is to list every major activity of the course development process. Changes to the SAT procedures as well as steps or processes not completed should be documented. Figure 6-45 illustrates a sample process checklist, although any suitable form can be used. The important information to be captured is the explanation of any deviations so that future managers will know what was done during course development.

| <u>Development Activity</u> | <u>Completed</u> | | <u>Explanation</u> |
|------------------------------|------------------|-----------|----------------------|
| | <u>YES</u> | <u>NO</u> | |
| Develop Course Schedule | [| | |
| Review Source Documents | [| | |
| Determine Course Structure | [| | |
| Organize TLO's and ELO's | [| | |
| Assign Lesson Titles | [| | Used existing titles |
| Assign Lesson Designators | [| | |
| Estimate Instructional Hours | [| | |
| Organize Information | [| | |

Figure 6-45. Sample Process Checklist.

Use of Checklists During Summative Evaluation. During a summative evaluation, checklists provide the evaluator with a systematic method for examining an instructional program to ensure it prepares graduates to perform their job tasks to the specified standard. Checklists can be used to evaluate the following:

1. **Student Performance.** A pass-fail checklist is commonly used in performance tests where students are rated on mastery of learning objectives. A typical approach to this type of checklist is to list the learning objective behaviors (although it can also be detailed enough to list performance steps) on one half of the page. On the other half, present the checklist in two columns, one to be checked if the student successfully accomplishes the learning objective (Pass) and one column to be checked if the student does not accomplish the learning objective (Fail). This checklist is easy for an instructor to complete while observing student performance during a performance test. If an evaluation includes visits to using commands to evaluate graduate on-the-job performance, a very similar checklist may be used. Changes to the checklist may be required to account for differences between the instructional environment and that of the "real world."
2. **Instructor Performance.** Instructors are commonly evaluated and rated by students through Instructional Rating Forms (IRF) and Course Critique questionnaires. An evaluator can use a checklist during observation of a class to record data on the instructor's ability to effectively present the materials in the lesson plan (See MCO 1553.2_ Appendix O-44 for a sample checklist). The checklist can also be used to assess the instructor's qualifications.
3. **Course Materials.** Course materials (e.g., lesson plans, student materials, media, test items) should be reviewed and updated regularly. The evaluator should ensure that current materials are being used as planned and in accordance with an approved POI (see MCO 1553.2_ O-28 for the Master Lesson File checklists). In addition, a review of course materials should include course control documents including the POI, record of proceedings (ROP), etc. Course control documents provide an administrative check of how the course is being implemented in support of the SAT process.
4. **Instructional Environment and Instructional Equipment.** An evaluator can use checklists in determining whether existing instructional facilities are meeting the requirements of the instructional program. The evaluator should first review the course requirements for instructional equipment and facilities. Evaluation of the instructional environment should include appearance and cleanliness, condition, adequacy of space, and environmental factors (e.g., noise, lighting, distractions). The condition, operation, and appropriateness of instructional equipment should also be evaluated. A preventive maintenance plan should be followed to ensure training devices, simulators and computer equipment remain operable.

SAT USERS GUIDE

APPENDIX A

STANDARD VERB USAGE

The verbs in Sections I-III are the approved verbs for **task titles**. They also provide a partial source of verbs for **learning objectives** and **task performance steps**. The use of standard, well-defined verbs provides clarity, prevents duplicate work, and aids in providing quality training.

Standardized verbs:

Promote clarity

- Allows T&R task/review boards, task analysts, trainers, and Marines to understand what the task statement means. This is particularly important since:
 - The person who analyzes the task may not be the person who developed the task statement.
 - Task selection boards usually make their decisions based on the task statement, before the conditions and standards are fully developed.

Prevent duplication

- It is possible to write the same task many different ways, some so differently that it is almost impossible to tell if it is the same task. If you use standard verbs, it is easier to group tasks by verb and see if you have duplicated behaviors.

Promote application of sound training principles

- There are many words which may appear to be action verbs, but which don't actually refer to an observable action (such as 'know', 'understand,' 'appreciate,' and so on.) By using standard verbs, you will avoid these words and produce sound, observable tasks.

SAT USERS GUIDE

APPENDIX B

SECTION I

SAT STANDARD VERBS

Note: Tactical tasks from MCRP 5-12A Operational Terms and Graphics are Italicized and Underlined. Those verbs marked with an asterisk (*) in Section I, should be used with caution. For a fuller explanation, see Section II, VERBS TO BE USED WITH CAUTION.

| | |
|--------------------|--|
| *Achieve | To attain a desired end. |
| Adjust | <ol style="list-style-type: none">1. To correct the actions of a distant unit. <i>Example:</i> Adjust indirect fire.2. To bring parts of instruments into a truer or more effective relative position or setting. |
| *Administer | To manage or supervise the execution, use, or conduct of a relatively structured activity. |
| Advise | To counsel or recommend. |
| Alert | To make aware of. |
| Align | To place parts in the proper position to one another. |
| Allocate | To apportion for a specific purpose or to particular persons or things. |
| Ambush | <ol style="list-style-type: none">1. To attack (by surprise) a moving force with a stationary force. See: MCRP 5-12A Operational Terms and Graphics2. To conduct a surprise attack on another aircraft. <i>Example:</i> Ambush hostile aircraft. See: MCRP 5-12A Operational Terms and Graphics |
| *Analyze | To separate a whole into its constituents with a view to its examination and interpretation. |
| Annotate | To make or furnish critical or explanatory notes or comments. |
| *Apply | <ol style="list-style-type: none">1. To put on. <i>Example:</i> Apply a base coat of paint.2. To use practically.3. To concentrate. |
| Approve | To give formal or official sanction. |
| Assault | To carry out the close combat phase of an attack. See: MCRP 5-12A Operational Terms and Graphics |
| Assemble | <ol style="list-style-type: none">1. To fit the parts of an item together. <i>Note:</i> Usually said of a machine.2. To bring together. <i>Note:</i> Usually said of an organization or group. |
| *Assess | <ol style="list-style-type: none">1. To determine the importance, size, or value of.2. To fix the amount of. |
| Assign | <ol style="list-style-type: none">1. To give responsibility. <i>Note:</i> For the execution of a task. |

2. To place under the control of.
Example: Assign Marines to EMI.
- Assist** To give aid by participating in a task.
- Attack** An offensive action characterized by movement supported by fire with the objective of defeating or destroying the enemy.
Example: Attack under conditions of limited visibility.
See: Attack by fire, MCRP 5-12A Operational Terms and Graphics
- Authenticate**
1. To verify identity in response to a challenge.
Note: See Challenge.
 2. To verify the authenticity of.
- Block**
1. A tactical mission task that denies the enemy access to an area or prevents his advance in a direction or along an avenue of approach.
 2. An obstacle effect that integrates fire planning and obstacle effort to stop an attacker along a specific avenue of approach or to prevent him from passing through an engagement area
See: MCRP 5-12A Operational Terms and Graphics
- Breach**
1. The employment of any means available to break through or secure a passage through an obstacle.
Note: As an enemy position.
See: MCRP 5-12A Operational Terms and Graphics
 2. To secure passage through.
Note: Usually said of an obstacle.
- Brief** To give information or final precise instructions.
- Bypass** A tactical mission task in which the commander directs his unit to maneuver around an obstacle, avoiding combat with an enemy force.
See: MCRP 5-12A Operational Terms and Graphics
- Calculate** To ascertain by computation.
- Camouflage** Concealing of personnel, equipment, and facilities.
See: MCRP 5-12A Operational Terms and Graphics
- Canalize** To restrict operations to a narrow zone by use of existing or reinforcing obstacles or by fire or bombing.
See: MCRP 5-12A Operational Terms and Graphics
- Challenge** To order to prove identity.
- Change** To make different in some particular.
- *Check** To inspect for satisfactory condition, accuracy, safety, or performance.
- Clear**
1. The total elimination or neutralization of an obstacle that is usually performed by follow-on engineers and is not done under fire.
Examples: Clear a trenchline. Clear a building.
 2. To approve or authorize, or obtain approval or authorization for:
 - a. a person or persons with regard to their actions, movements, duties, etc.;
 - b. an object or group of objects, as equipment or supplies, with regard to quality, quantity, purpose, movement, disposition, etc.
 - c. a request, with regard to correctness of form, validity, etc.
 3. To give a person a security clearance.
 4. To give one or more aircraft a clearance.
 5. To fly over an obstacle without touching it.
 6. To clear the air to gain either temporary or permanent air superiority or control in a

- given sector.
7. To operate a weapon / gun so as to unload it or make certain no ammunition remains.
Example: Clear a M16 rifle.
 8. To free a gun of stoppages.
Example: Clear a stoppage in a M240 machinegun.
 9. To clear an engine; to open the throttle of an idling engine to free it from carbon.
 10. A tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance in an assigned area.
 11. To pass a designated point, line, or object.
Example: The end of a column must pass the designated feature before the latter is cleared.
- Close**
1. To move into combat range of an enemy force.
Example: Close with, locate and destroy the enemy.
 2. To arrive at a designated position.
 3. To move in such a manner as to present passage through.
- Collate** To bring parts together to form a whole.
Note: Usually said of information or intelligence.
- Collect**
1. To gather or exact from a number of persons or sources.
Note: Usually said of information.
 2. To bring together in a group.
- Combine** To join two or more things such as units, or chemical substances into one.
- Communicate** To convey knowledge of or information about; to make known.
- *Compare** To examine the character or qualities of, especially in order to discover resemblances or differences.
Example: Compare courses of action.
- Complete** To bring to an end and especially into a perfected state.
- Comply** To act in accordance with orders, regulations, policy, etc.
- Compute** To determine, especially by mathematical means.
- *Conduct** To direct or control, lead, or guide.
See: MCRP 5-12A Operational Terms and Graphics
- Confirm** To validate.
- Connect**
1. To join.
 2. To fasten together.
- Consolidate**
1. To organize or reorganize, bringing separate parts together into one whole.
 2. To secure or complete an action.
Example: Consolidate on the objective.
- Construct** To build.
- Contain** To stop, hold, or surround the forces of the enemy or to cause the enemy to center activity on a given front and to prevent the withdrawal of any part of the enemy's force for use elsewhere.
See: MCRP 5-12A Operational Terms and Graphics
- Control**
1. Authority that may be less than full command exercised by a commander over part of the activities of subordinate or other organizations.
 2. Physical or psychological pressures exerted with the intent to assure that an agent

or group will respond as directed.

3. A tactical mission task that requires the commander to maintain physical influence over a specified area to prevent its use by an enemy.
4. Action taken that eliminates a hazard or reduces the risk from that hazard. Part of the third step in risk management.
5. Within command and control, the regulation of forces and other battlefield operating systems to accomplish the mission in accordance with the commander's intent.

See: MCRP 5-12A Operational Terms and Graphics

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| Coordinate | To bring into a common action, movement, or condition. |
| Correct | To alter or adjust so as to bring to some standard or required condition. |
| Correlate | To present or set forth so as to show relationship. |
| *Counsel | Advise or provide guidance. |
| <u>Counter</u> | To act in opposition to; nullify. MCRP 5-12A Operational Terms and Graphics |
| Cover | To afford protection or security to. |
| Cross | To pass over or through. |
| Cross-check | To check from various angles or sources to determine validity or accuracy. |
| Debrief | To obtain an oral report on an action or mission immediately afterwards. Example: Debrief a reconnaissance patrol. |
| Decontaminate | To cleanse or remove chemical or radiological contamination. |
| <u>Defeat</u> | <ol style="list-style-type: none">1. A tactical mission task that occurs when an enemy force has temporarily or permanently lost the physical means or the will to fight. The defeated force's commander is unwilling or unable to pursue his adopted course of action, thereby yielding to the friendly commander's will, and can no longer interfere to a significant degree with the actions of friendly.2. Defeat can result from the use of force or the threat of its use See: MCRP 5-12A Operational Terms and Graphics. |
| Defend | To ward off an actual or threatened action. See: Defensive operations, MCRP 5-12A Operational Terms and Graphics |
| *Define | <ol style="list-style-type: none">1. To determine the limits and nature.2. To state the meaning of. |
| Delay | To slow the advance of an enemy force without becoming decisively engaged. See: MCRP 5-12A Operational Terms and Graphics |
| Deliver | To send to an intended target or destination. |
| *Demonstrate | <ol style="list-style-type: none">1. To feign an action for the purposes of deceiving an enemy.2. To show by reasoning.3. To show the operation or working of.4. To explain by using examples, experiments, or action. |
| Deploy | <ol style="list-style-type: none">1. To spread out, utilize, or arrange, especially tactically. See: Deployment, MCRP 5-12A Operational Terms and Graphics2. To position for use. |
| Designate | <ol style="list-style-type: none">1. To indicate and set apart for a specific purpose, office, or duty.2. To select. Note: Usually said of a target. |

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| <u>Destroy</u> | <ol style="list-style-type: none">1. A tactical mission task that physically renders an enemy force combat-ineffective until it is reconstituted. Example: Destroy attacking force.2. To damage a combat system so badly that it cannot perform any function or be restored to a usable condition without being entirely rebuilt. Example: Destroy enemy vehicles. See: MCRP 5-12A Operational Terms and Graphics |
| Detect | To discover. |
| Determine | <ol style="list-style-type: none">1. To settle or decide by choice of alternatives or possibilities.2. To fix precisely. |
| Develop | To set forth or make clear by degrees or in detail. |
| Direct | <ol style="list-style-type: none">1. To regulate the activities or course by acting through subordinate leaders.2. To control through suggestions and guidelines. |
| Disassemble | To take apart, usually for the purposes of cleaning or repair. |
| Disconnect | To sever the connection between. |
| <u>Disengage</u> | <ol style="list-style-type: none">1. To release or break contact with. Example: Disengage the drive shaft.2. A tactical mission task where a commander has his unit break contact with the enemy to allow the conduct of another mission or to avoid decisive engagement. Example: Disengage from enemy force. See: MCRP 5-12A Operational Terms and Graphics |
| Dismantle | To render inoperable by taking apart. Note: See Disassemble. |
| Dispatch | To send away with promptness or speed, especially on official business. |
| Displace | To leave one position and occupy another. See: MCRP 5-12A Operational Terms and Graphics |
| <u>Disrupt</u> | <ol style="list-style-type: none">1. A tactical mission task in which a commander integrates direct and indirect fires, terrain, and obstacles to upset an enemy's formation or tempo, interrupt his timetable, or cause his forces to commit prematurely or attack in piecemeal fashion.2. An engineer obstacle effect that focuses fire planning and obstacle effort to cause the enemy to break up his formation and tempo, interrupt his timetable, commit breaching assets prematurely, and attack in a piecemeal effort.3. In information operations, breaking and interrupting the flow of information between selected command and control nodes. See: MCRP 5-12A Operational Terms and Graphics |
| Disseminate | To disperse throughout. Note: Usually refers to orders, information, and similar matters. |
| Distribute | To give out or deliver, especially to members of a group. |
| Draft | To draw the preliminary sketch, version, or plan of. |
| *Effect | To cause the desired result or outcome. Note: See Achieve. |
| Emplace | To put in a prepared position. Example: Emplace the howitzer. See: Emplacement, MCRP 5-12A Operational Terms and Graphics |
| Employ | To make use of, usually in the role of a leader or commander. |

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| Encrypt | Encipher, encode. |
| Enforce | To see that the provisions (of an order or regulation) are carried out effectively. |
| Engage | <ol style="list-style-type: none">1. To intermesh or interlock. Note: Usually refers to machinery.2. To fight. See: MCRP 5-12A Operational Terms and Graphics |
| *Ensure | <ol style="list-style-type: none">1. To make certain. To guarantee. |
| Enter | To come in. |
| Erect | To build or set up. Example: Erect OE-254 Antenna. |
| Establish | <ol style="list-style-type: none">1. To bring into existence.2. To introduce as a permanent entity or procedure. |
| Evacuate | To move from an area, usually for the purpose of treatment, repair, or prevention of capture. See: MCRP 5-12A Operational Terms and Graphics |
| Evade | To avoid. See: Evasion and Escape, MCRP 5-12A Operational Terms and Graphics |
| *Evaluate | To determine the significance or worth of, usually by careful appraisal and study. |
| Exchange | To part with for a substitute. |
| <u>Exfiltrate</u> | The removal of personnel or units from areas under enemy control by stealth, deception, surprise, or clandestine means. See: MCRP 5-12A Operational Terms and Graphics |
| Extend | <ol style="list-style-type: none">1. To increase the scope, meaning, or application of.2. To elongate or to increase the size. Example: Extend the legs of the tripod. |
| Extract | <ol style="list-style-type: none">1. To remove from an area, usually for combat purposes. Example: Extract a fire team under fire.2. To select and copy out or cite. |
| Finalize | To put in final or finished form: to give final approval to. Example: Finalize operations order. |
| Fire | To discharge a weapon. |
| <u>Fix</u> | To prevent the enemy from moving away from a specific location for a specific time. See: MCRP 5-12A Operational Terms and Graphics |
| <u>Follow and assume</u> | To follow a lead force and assume the mission if the lead force is fixed or attrited. See: MCRP 5-12A Operational Terms and Graphics |
| <u>Follow and support</u> | To follow the lead force and support its offensive operations. See: MCRP 5-12A Operational Terms and Graphics |
| Format | To produce a document or electronic report in a specified form or style. |
| Formulate | To put into a systematized statement or expression. |
| Forward | To send onward. |
| Fuel | To provide with fuel. |
| Ground | To connect electrically with a ground. |
| Guard | <ol style="list-style-type: none">1. To protect by physical security means.2. To prevent from escaping by physical security means. |

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| | 3. To protect by accepting combat. Example: Guard a flank. See: MCRP 5-12A Operational Terms and Graphics |
| Harden | To protect passively by providing or increasing resistance to projectiles and similar threats. |
| Hover | To hold a flying aircraft relatively motionless. |
| *Identify | <ol style="list-style-type: none">1. To determine critical or necessary conditions or other factors. Example: Identify all specified and implied missions.2. To determine the specific model of an item. Example: Identify threat armored vehicles.3. To ascertain the origin, nature, or definitive characteristics of. |
| Implement | To give practical effect to and ensure of actual fulfillment by concrete measures. |
| <u>Interdict</u> | A tactical mission task where the commander prevents, disrupts, or delays the enemy's use of an area or route. See: MCRP 5-12A Operational Terms and Graphics |
| Infiltrate | To move by small groups, usually clandestinely. See: Infiltration, MCRP 5-12A Operational Terms and Graphics |
| Inform | To make known. |
| Input | To provide information to or to enter information into a system. |
| *Inspect | To examine officially. |
| Install | To put in an indicated place, condition, or status. |
| Integrate | To form, coordinate, or blend into a functioning or unified whole. |
| Interpret | To present or delineate the meaning of. Example: Interpreting for Afghan and English speakers. |
| Issue | To give out. Example: Issue the operations order. |
| <u>Isolate</u> | A tactical mission task that requires a unit to seal off - both physically and psychologically - an enemy from his sources of support, deny an enemy freedom of movement, and prevent an enemy unit from having contact with other enemy forces. See: MCRP 5-12A Operational Terms and Graphics |
| Land | To bring an aircraft to earth. |
| Launch | <ol style="list-style-type: none">1. To send an aircraft or missile into the air. Note: See take off. Note: Launch usually refers to unmanned vehicles; however, launch may also mean a collective act of sending a manned aircraft aloft. Example: Launch an aircraft from the flight deck.2. To send boats and landing craft from a larger Naval vessel Example: Launch small boats from the well deck. |
| Lay | To point a weapon in a precise direction. Example: Lay the 60mm Mortar. |
| Lead | <ol style="list-style-type: none">1. To go at the head. Example: Lead a convoy.2. To exercise direct, low-level control. Example: Lead a fire team to the assault position. |
| Level | <ol style="list-style-type: none">1. To make even or uniform.2. To apportion equally. |

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| Load | <ol style="list-style-type: none">1. To insert ammunition into a weapon or launcher.2. To place in or on a means of conveyance. |
| Locate | To determine or set the position of. |
| Log | To enter details of or about an event in a log. |
| Maintain | To preserve, fix, or keep in good repair. |
| Make | To create or cause to happen. |
| *Manage | <ol style="list-style-type: none">1. To handle or direct with a degree of skill or specialized knowledge.2. To exercise executive, administrative, and supervisory direction. |
| Modify | To make minor changes in/to. |
| *Monitor | To watch, observe, or check, especially for a special purpose. Example: Monitor enemy radio traffic. |
| Motivate | To provide with an incentive. |
| Move | To proceed from one point to another. |
| *Name | <ol style="list-style-type: none">1. To designate or mention by name.2. To appoint.3. To identify by giving the right name.4. To give a name. |
| Navigate | Determine and follow a course. |
| <u>Neutralize</u> | <ol style="list-style-type: none">1. To render ineffective or unusable2. To render enemy personnel or material incapable of interfering with operations3. To render safe mines, bombs, missiles or IEDs.4. To make harmless anything contaminated with a chemical agent. See: MCRP 5-12A Operational Terms and Graphics |
| Notify | To inform, to warn, to make known, or to make notice of. |
| Observe | To watch carefully. |
| Obtain | To gain or attain. Note: Usually by planned action or effort. |
| <u>Occupy</u> | A tactical mission task that involves a force moving into an area so that it can control the entire area. Both the force's movement to and occupation of the area occur without enemy opposition. Example: Occupy a Forward Operating Base (FOB). See: MCRP 5-12A Operational Terms and Graphics |
| Open | <ol style="list-style-type: none">1. To make ready for use. Example: Open a Forward Area Rearming and Refueling Point (FARP).2. To make available for entry or passage. |
| Operate | <ol style="list-style-type: none">1. To cause a piece of equipment to function.2. To perform a function. |
| *Orchestrate | <ol style="list-style-type: none">1. To compose/arrange music.2. To organize, manage, or arrange. |
| Order | To command a specific action to be executed. See: MCRP 5-12A Operational Terms and Graphics |
| Organize | To arrange by systematic planning and united support. |
| Orient | To point or look in a specific direction. |

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| | Example: Orient weapons on assigned sector. |
| *Oversee | To watch over and direct. |
| Pack | To place in a container for transportation or storage. |
| Patrol | To conduct security or offensive operations with small, specially tailored groups. Example: Patrol the gaps between units. See: MCRP 5-12A Operational Terms and Graphics |
| *Perform | To carry out an action or pattern of behavior. |
| Place | Put in proper position or location. Note: "Position" or "locate" are usually better choices. |
| Plan | 1. To devise or project. See: MCRP 5-12A Operational Terms and Graphics 2. To formulate a systematic scheme or program of action. |
| Plot | To mark or note on a map, chart, or graph. |
| Police | 1. To provide protective or police services. 2. To make clean and put in order. |
| Position | To put in place; to set. |
| Post | 1. To make transfer entries. 2. To position at a certain site. Example: Post the guard. |
| Predict | Foretell on the basis of observation, experience, or scientific reason. |
| Prepare | 1. To put together. Example: Prepare launcher for firing. 2. To combine elements and produce a product. Example: Prepare a meal. 3. To make ready. Example: Prepare to continue the attack. 4. To make other persons or things ready. Example: Prepare a fighting position. |
| Prevent | To keep from occurring or recurring. Example: Prevent cold weather injuries. |
| *Prioritize | To put in order or rank. Note: Especially for the purpose of allocating resources. |
| Process | To initiate a series of actions or operations leading to a particular end. Example: Process a leave request. |
| Produce | To develop or create. |
| Project | To plan, calculate, or estimate for the future. Example: Project ammunition expenditures. |
| Protect | To shield from destruction; safeguard. |
| Provide | To supply or make available. |
| Publish | To produce for distribution. Example: Publish the duty roster. |
| Range | To determine the distance. Note: Usually to a target. See: MCRP 5-12A Operational Terms and Graphics |
| Reach | To arrive at a location. |

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| React | To respond, usually to an emergency situation with a limited choice of actions. Example: React to Engine Failure in Flight. |
| Read | To examine carefully so as to understand. |
| Realign | To reorganize or make new groupings. |
| Reassess | To re-determine the extent or value. |
| Recall | To bring back (forces) to another location. |
| Receive | To acquire from someone else. Example: Receive Patients. |
| *Recognize | To determine the category of an item. Learning Objective Example: Recognize Threat Armor Vehicles. |
| Recommend | To endorse as worthy, fit, competent, exceptional, etc. |
| Reconnoiter | To obtain information by visual observation or other methods. Note: Reconnoiter usually implies a physical movement to the area to be observed. See: Reconnaissance, MCRP 5-12A Operational Terms and Graphics |
| Record | <ol style="list-style-type: none">1. To set down as a means of preserving information.2. To document.3. To mechanically or electronically save information. |
| Recover | To extract damaged or disabled equipment and move to a location for repair. |
| Redistribute | To reallocate, usually in response to uneven consumption or usage. Example: Redistribute ammunition. |
| <u>Reduce</u> | <ol style="list-style-type: none">1. To diminish in size, amount, extent, or number.2. A tactical mission task that involves the destruction of an encircled or bypassed enemy force.3. One of the five breaching fundamentals. The creation of a lane through, over, or around an obstacle. To render ineffective by partially dismantling. Example: Reduce an obstacle.4. To render operable by following a prescribed procedure to eliminate a malfunction. Example: Reduce a stoppage in a M249 Squad Automatic Weapon. See: MCRP 5-12A Operational Terms and Graphics |
| Reestablish | To establish again, usually in response to a combat loss or damage. Example: Reestablish communications. |
| Reexamine | To examine again. |
| Release | <ol style="list-style-type: none">1. To let go.2. To set free from configuration or condition. |
| Relieve | <ol style="list-style-type: none">1. To replace. Example: Relieve a Company in place.2. To reduce or eliminate pressure on. Example: Relieve an encircled unit. See: Relief in place, MCRP 5-12A Operational Terms and Graphics |
| Relocate | Establish or lay out in a new place. |
| Remove | <ol style="list-style-type: none">1. To take away or displace.2. To dismiss.3. To eliminate, kill, or destroy. |
| Reorganize | To organize again, usually as a result of combat damage or loss. See: Reorganization, MCRP 5-12A Operational Terms and Graphics |

| | |
|----------------------|---|
| Repair | To restore to serviceable condition. |
| Replace | To substitute a new or workable item or person. |
| Replenish | To fill again. |
| Report | <ol style="list-style-type: none">1. To present an account officially.2. To formally or regularly carry back and repeat to another.3. To provide information on ongoing activities. <i>Example:</i> Report initial enemy contact. |
| Request | <ol style="list-style-type: none">1. To ask for.2. To ask someone to do something. |
| Resolve | To reduce by analysis. |
| Restate | To state again or in another way. |
| Resume | To begin again. |
| <u>Retain</u> | <ol style="list-style-type: none">1. A tactical task to occupy and hold a terrain feature to ensure that it is free of enemy occupation or use.2. A tactical mission task in which the commander ensures that a terrain feature already controlled by a friendly force remains free of enemy occupation or use. See: MCRP 5-12A Operational Terms and Graphics |
| Return | To restore to a former or proper place. |
| *Review | To go over for the purpose of determining correctness or currency. |
| Revise | To correct or improve. <i>Note:</i> Usually applied to a plan or document. |
| Rotate | To cause to turn about an axis or center. |
| Schedule | To appoint, assign, or designate for a fixed time. |
| <u>Secure</u> | <ol style="list-style-type: none">1. In an operational context, to gain possession of a position or terrain feature with or without force, and to make such disposition as will prevent, as far as possible, its destruction or loss by enemy action.2. A tactical mission task that involves preventing a unit, facility, or geographical location from being damaged or destroyed as a result of enemy action.3. One of the five breaching fundamentals. Those actions which eliminate the enemy's ability to interfere with the reduction and passage of combat power through a lane. Secure may be accomplished by maneuver or by fires.4. To make immobile, make safe or to fix tightly. See: MCRP 5-12A Operational Terms and Graphics |
| <u>Seize</u> | <ol style="list-style-type: none">1. To clear a designated area and obtain control of it.2. To employ combat forces to occupy physically and control a designated area.3. A tactical mission task that involves taking possession of a designated area using overwhelming force. See: MCRP 5-12A Operational Terms and Graphics |
| Select | To choose from among others to meet specific standards or criteria. |
| Send | To dispatch. |
| Set | To adjust a device to a desired position, to make ready for future action. |
| Set up | To erect or position components. |
| Sort | To examine and place into categories. |
| Splint | To support or restrict. |

| | |
|------------------------|--|
| Stand to | To increase security by coming to full alertness, with all weapons manned and ready. Note: Derived from the phrase "Stand to Arms." |
| State | To declare or set forth; a condition. Example: Suppress Enemy Air Defenses (SEAD). |
| Stockpile | To accumulate supplies for use. Example: Stockpile ammunition on a battle position. |
| Store | To stock or deposit. Note: Store implies protecting from deterioration or pilferage. |
| Strike | <ol style="list-style-type: none">1. To attack.2. To disassemble. Example: Strike a tent. |
| Submit | To send forward for approval. |
| Supervise | <ol style="list-style-type: none">1. To oversee.2. To critically watch, motivate and direct the activities of subordinates. |
| <u>Support</u> | <ol style="list-style-type: none">1. The action of a force that aids, protects, complements, or sustains another force in accordance with a directive requiring such action.2. A unit which helps another unit in battle.3. An element of a command which assists, protects, or supplies other forces in combat4. To aid or help. Note: Usually refers to collective tasks. Example: Support by fire. See: MCRP 5-12A Operational Terms and Graphics |
| <u>Suppress</u> | <ol style="list-style-type: none">1. A tactical mission task that results in temporary degradation of the performance of a force or weapons system below the level needed to accomplish the mission.2. To actively prevent, usually by firing on.3. One of the five breaching fundamentals. The focus of all fires on enemy personnel, weapons, or equipment to prevent effective fires on friendly forces. The purpose of suppression is to protect forces reducing and maneuvering through the obstacle and to soften the initial foothold. See: MCRP 5-12A Operational Terms and Graphics |
| Sweep | To move through and search an area. |
| Take charge | To assume control or command. |
| Take off | To send an aircraft into the air. Note: Usually said of a manned aircraft. Note: See Launch. |
| Task | To assign responsibility. |
| Template | To estimate or predict enemy dispositions or actions by applying known enemy doctrine. |
| Test | To examine to prove the value or ascertain the nature of something. |
| Track | <ol style="list-style-type: none">1. To keep a moving target within the sight reticule. Example: Track a target with an Anti-armor Weapon.2. To follow by means of marks or scent. |
| Train | To make proficient by instruction and practice. See: MCRP 5-12A Operational Terms and Graphics |
| Translate | To express in more comprehensible term, or in a different language. |

| | |
|---------------------|---|
| Transmit | To send over a communications net. |
| Transport | To carry from one place to another, convey. |
| Treat | To care for medically. |
| Triage | To assess patients' physical condition to determine treatment priority. |
| Troubleshoot | To locate the source of trouble in equipment, systems, or operations. |
| Tune | To put on the proper setting or frequency. Note: As a radio. |
| <u>Turn</u> | <ol style="list-style-type: none">1. A tactical mission task that involves forcing an enemy force from one avenue of approach or movement corridor to another.2. A tactical obstacle effect that integrates fire planning and obstacle effort to drive an enemy formation from one avenue of approach to an adjacent avenue of approach or into an engagement area.3. To change the direction or orientation of something. See: MCRP 5-12A Operational Terms and Graphics |
| Update | To bring up to date or make current. |
| Validate | To substantiate accuracy by comparison or investigation. |
| Verify | To confirm or establish the accuracy or truth of something. |
| Wargame | To conduct comparisons of options using rules, data and procedures. Example: Wargame Courses of Action. See: MCRP 5-12A Operational Terms and Graphics |
| Wear | To bear or have on the person; to carry on the person. |
| Zero | To set a sight to enable a firearm to shoot a target. |

SAT USERS GUIDE

APPENDIX C

SECTION II

VERBS TO BE USED WITH CAUTION FOR T&R TASK LISTS AND TLOS

These verbs should be used with care. Some are only variants of the verb 'Do,' and don't convey any special meaning. Their overuse defeats the purpose of standardized verbs and results in vague, "fuzzy" task statements.

Other verbs in this list are often used for procedural steps in the performance of the task. When selecting a verb for a task title:

1. Choose a verb you think is appropriate.
2. Give yourself the "why" test, i.e., ask "Why would a Marine perform this task?"
3. Determine if the answer to the "why" test is truly "to perform the entire task as written" or "to perform a task step." Your answer will indicate ---
 - a. You selected the correct verb for the task title;
 - b. You need to change the task verb;
 - c. You really have a task step.

Other verbs are most often used to define enabling objectives. For example, when teaching a student to repair an item of equipment, the instructor might require the student to LIST, NAME, or IDENTIFY the component parts of the item.

- Achieve** This verb implies you are going to measure the product (or quality), not the process. A common mistake is to use the verb "achieve" and then to use standards that represent steps in the task rather than the quality of the outcome.
- Administer** The use of this verb should be restricted to fairly mechanical or structured activities or to medical activities. It is not a synonym for 'Manage.'
- Analyze** One usually analyzes something in order to accomplish a real task.
- Apply** The use of "Apply" often leads to unobservable or unmeasurable task statements. **Improper Use Example:** Apply the Principles of War.
- Assess** Difficult to observe or measure. Usually the analyst will state what the individual has to do in order to assess something.
- Check** Checking is usually done as part of supervision or verification.
- Compare** The answer to the "why" test may indicate the "compare" statement is really a task step and not a task.

Conduct The verb 'Conduct' should be used ONLY when a more precise verb does not exist or when the use of a more precise verb would result in an unusually clumsy construction.
Example 1 of Proper Use: Conduct a Deliberate Attack.
Example 1 of Improper Use: Attack Deliberately.
Note: "Attack" is the proper verb in the above task statement -- - that's what you're going to do --- but the construction is so clumsy that in this case it is preferable to use "Conduct."
Example 2 of Proper Use: Suppress Enemy Fires.
Example 2 of Improper Use: Conduct Suppression Operations.
CAUTION: The verb "Conduct" (as well as "Perform" and other verbs that simply mean 'Do') is often used to mask a serious error ---using more than one verb in a task statement.

Counsel This has the connotation of simply providing general information. The verbs "advise" and "recommend" are usually what is really meant and indicate "action."

Define Use of this verb often indicates an enabling objective that would be used in a classroom setting, not the task itself. *Example Of Improper Use:* Define the Purpose of a Front End Analysis.

Demonstrate Like "define", "demonstrate" is usually indicative of an enabling objective. *Example Of Improper Use:* Demonstrate an understanding of Front End Analysis by defining the Purpose of a Front End Analysis.

Effect Similar in meaning to "achieve" but more vague.

Ensure Difficult to observe or measure. Usually the analyst would be better off stating what the individual or unit has to do in order to ensure something happens or doesn't happen.

Evaluate Usually indicates a step or enabling objective.

Identify May indicate a step or enabling objective.
Example Of Improper Task Title: Identify the Parts of the M16 Rifle.

Inspect Usually indicates a step or enabling objective.

Manage Difficult to observe or measure. Usually the analyst would be better off stating what the individual has to do in order to manage something. Since management is a complex set of skills, a task that uses the verb "manage" should be closely examined. It will often be found to be so broad that it must be split into several more well-defined tasks.

Monitor Usually indicates a step or enabling objective.

Name Nearly always indicates an enabling objective.

Orchestrate 1. To compose/arrange music.
2. To organize, manage, or arrange.

- Oversee** To watch over and direct.
- Perform** "Perform", like "conduct", is simply another way of saying "do."
- Prioritize** Usually indicates a step or enabling objective.
- Recognize** "Recognize" may be very appropriate for a learning objective, but caution must be used if it is used in a task title as the resulting statement may really be a task step.
Example: Recognize friendly aircraft" may be a step in the task "Report enemy aircraft."
- Review** Usually indicates a step or enabling objective.

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APPENDIX D

SECTION III

VERBS TO USE WITH CAUTION FOR
ENABLING LEARNING OBJECTIVES OR LEARNING ACTIVITIES

| | |
|------------------|--|
| Describe | Usually indicates an enabling objective. Not an action verb. |
| Discuss | Usually indicates an enabling objective or a learning activity. Not an action verb. |
| Elucidate | Not measurable or observable. Not an action verb. |
| Explain | Usually indicates an enabling objective. Not an action verb. |
| List | Usually indicates an enabling objective. Not an action verb. |

SECTION IV

VERBS WITH SIMILAR DEFINITIONS

Administer, Manage

"Administer" refers to relatively structured activities, while "manage" refers to broader activities requiring great depth of knowledge and experience. A clerk may administer the unit's publications. An executive or senior officer manages weapons procurement.

Assist, Support

"Support" usually indicates a collective task, while "assist" usually indicates an individual task.

Assist: An assistant participates in the action with the principal actor.

Illustration: The loader assists the gunner.

Support: Implies a different kind of activity than the primary activity.

Illustration: The ACE supports the MEF.

Decide, Determine

Decide: Refers to arriving at a conclusion and to pronounce that decision.

Determine: To settle or decide by choice of alternatives or possibilities and to fix precisely.

Disassemble, Dismantle

Disassemble implies taking apart for the purpose of repairing or cleaning. Dismantling implies taking apart on a relatively long term basis to render inoperable.

Lead, Command

"Lead" implies to go ahead, or to control the activities of a small group.

"Command" is a legal status, which includes not only direction, but also disciplinary authority.

Operate, Employ

"Operate" is to turn on, control, and turn off a piece of equipment.

"Employ" is to ensure that the equipment is used to further the mission of the organization.

Illustration: Sgt Aschinger operates the radio. Capt Garcia employs the communications system.

Recognize, Identify

"Recognize" implies a less stringent standard than "identify". A Marine may recognize a threat vehicle by a characteristic that is common to many different threat vehicles (for example, the boat-shaped nose on most Soviet-designed personnel carriers). In order to identify the vehicle, he would have to determine the model (for example, a BMP-80).

SECTION V

VERBS NOT TO BE USED

| | |
|-------------------------|--|
| Appreciate | Not measurable or observable. Not an action verb. |
| Become aware of | Not measurable or observable. Not an action verb. |
| Be familiar with | Not measurable or observable. Not an action verb. |
| Believe | Not measurable or observable. Not an action verb. |
| Clarify | Usually indicates an enabling objective. |
| Consider | Rarely observable. Not an action verb. |
| Enjoy | Not measurable or observable. Not an action verb. |
| Execute | Vague. Another version of 'Do.' |
| Know | Not measurable or observable. Not an action verb. |
| Relate | Usually indicates an enabling objective. Not an action verb. |
| Summarize | Not an action verb. |
| Synthesize | Not measurable or observable. Not an action verb. |
| Understand | Not measurable or observable. Not an action verb. |
| Use | Vague. Another version of 'Do.' |
| Utilize | Vague. Another version of 'Do.' |

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APPENDIX E

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| Synthesize | Not measurable or observable. Not an action verb. |
| Understand | Not measurable or observable. Not an action verb. |
| Use | Vague. Another version of 'Do.' |
| Utilize | Vague. Another version of 'Do.' |

SAT USERS GUIDE

APPENDIX F

SECTION V

VERBS NOT TO BE USED

| | |
|-------------------------|--|
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