MINISTRY OF EDUCATION YOUTH & SPORT

STUDENT ASSESSMENT IN THE CLASSROOM:

Developing Tests of Achievement That Are Valid & Reliable

September, 2021

New Generation School Education Reforms

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New Generation School Central Office
Ministry of Education, Youth, and Sport

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Preface

The present manual was developed by the New Generation School Central Office to help teachers working in New Generation Schools to improve the quality of their student assessment. Most teacher preparation programs in Cambodia do not spend a great deal of time on Principles of Student Assessment. If such principles are covered at all, they are usually treated as a secondary part of some other course or subject. As a result, many teachers are often thrust into the classroom with a poor understanding of how to make the evaluation of their students as valid and reliable as possible. This manual provides a systematic approach to understanding the Principles of Student Assessment that starts with basic concepts such as testing validity and reliability and proceeds step by step to the basic nuts and bolts of proper test development. The manual ends with guidance on how teachers can conduct classroom-based item analysis so that they can determine how well the questions that they have developed actually work (i.e., are they too difficult, are they too easy, etc.). The developers of this manual hope that those teachers who complete the course contained within this document will be able to more effectively assess their students and be sure that the decisions they make based on their assessment data will be the correct ones.

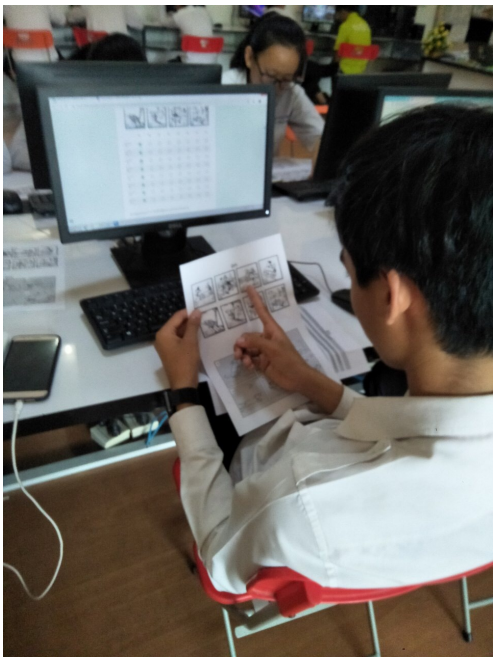
1. INTRODUCTION

1.1 Role of Evaluation in the Teaching-Learning Process

Traditionally, evaluation has tended to be a neglected area in the preparation of teachers not only in Cambodia but in many counties of the world, as well. Prospective teachers studying in training colleges often receive a very short summary of how to do student assessment as part of a broader course rather than as a distinct area of study in its own right. This neglect of educational assessment in the preparation of teachers has led to the perception of evaluation practices as invariable and monolithic, regardless of the context in which they are undertaken. In this respect, evaluation is most commonly thought of as the development and administration of tests for the purpose of assigning grades. While this is certainly one of the most common uses of evaluation, it overlooks its fundamental nature, which is essentially the *generation of information that is then used for a wide range of educational decision-making.* Whenever we make educational decisions, we need information. Such decisions may relate to lesson areas in need of review, promotion of individual students, curriculum revision, awarding of certificates, and numerous other matters. Evaluation is the manner through which we generate the information to make these decisions.

> ***What is Evaluation?***
>
> *[Evaluation is defined as] . . . the generation of information that is then used for a wide range of educational decision-making.*

While one of the most common forms that evaluation takes is indeed testing, this is certainly not the only form, which it may embody. Rather, evaluation may occur as observations, interviews, project work, or surveys, among others. Particularly in the 21st Century, classroom evaluation strategies have been evolving rapidly so that assessments that were never possible 20 years ago are increasingly routine. This includes electronic testing, electronically tracking the amount of time students spend on line, etc.). Similarly, evaluation standards (e.g., the difficulty level of questions) may be set at a very high level or a very low level. Relatedly, the scoring techniques used in one's evaluation may also vary ranging from relative rankings of students as is frequently done at the end of each month in Cambodian classrooms or the use of absolute standards of performance (e.g., setting 5 as the criterion for passing on a test of 10 points), as is usually done in most Cambodian classrooms. These variations in evaluation practice should underline the



Evaluation in the 21st Century: A student in a New Generation School takes a test 'electronically'.

point that one's evaluation may design will vary according to the decision, which one wishes to make. If the evaluation design used is not consistent with the purpose, it is likely that the evaluation conducted will not be very effective.

The list of evaluation practices presented in Box 1 provides a set of examples of evaluation that is in some way faulty. If you have ever found yourself using evaluation in some of the ways described, then it is likely that your evaluation was not as effective as you thought. For those who might be surprised to learn that the examples described in Box 1 are instances of poor evaluation practice, the reasoning behind each case will be discussed in subsequent sections of this manual. For now, the most important point to grasp is that there must be consistency between one's avowed purpose in evaluating (e.g., promotion, selection, instructional planning, etc.) and the nature and design of the evaluation selected.

Following upon the line of thought explained above, the starting point for all evaluation MUST be with determining the purpose of the evaluation to be conducted. For the classroom teacher, there basically two purposes for which evaluation is generally conducted. One of these purposes refers to *formative* uses while the other refers to those that are *summative* in focus.

The technical terminology used above should be not intimidating. Most teachers are probably already very familiar with the kinds of evaluation strategies entailed by both of formative and summative evaluation. For example, homework assignments, weekly quizzes, and question and answer techniques are all examples of *formative evaluation,* which seeks to help the teacher 'form' new instructional planning (e.g., what lessons should be re-taught, which students need the most extra help, etc.). Annual, term, and monthly tests are examples of *summative evaluation,* which the teacher uses to make final marking records that are used in promotional decisions.

Box 1: Examples of Faulty Evaluation Practices

- **Common Testing Practice:** Grading a test whose purpose is formative and recording student scores in the Classroom Marking Book for promotion decisions.
  Why It's Wrong: *Formative evaluation helps teachers know what to re-teach. We never record the grades from formative tests in the Final Marking Book, as this is not its purpose.*
- **Common Testing Practice:** Developing a very difficult test to determine students who should be passed to the next grade.
  Why It's Wrong: *Promotional tests should include mostly questions of moderate difficulty with some small number that are either easy or difficult. We should never include many questions of high difficulty in a promotional test. Difficult questions are only appropriate for specialized selection tests such as for a scholarship or special award.*
- **Common Testing Practice:** Using essay questions exclusively on a test to determine students' overall level of achievement.
  Why It's Wrong: *Essay questions have very poor sampling coverage in terms of curricular content. Summative tests seeking to assess overall student achievement should include mostly objective questions that can be answered quickly with only a small number of essay questions that focus on higher level thinking skills that objective test items cannot easily assess.*

If you have ever used any of these common testing practices in your own evaluation, then this manual is especially for you.

1.2 The Purpose of This Manual

It commonly happens that teachers sometimes do not consider the purpose of their evaluation before they start developing their assessment strategies. This results in a mismatch between purpose and design. In the same way, teachers often do not consider important design principles that relate to validity, question difficulty, and other important evaluation concepts when developing their tests. This manual is designed to address these and similar deficiencies that frequently occur in the way that student assessment is carried out in Cambodian classrooms.

Relevant Content: The content of this manual has been designed with the following outcomes in mind:

1. Participants can carry out student assessment in a way ensures harmony between the purpose of evaluation and the design of assessment strategies to fulfill this purpose.
2. Participants can use concepts of validity to assess the appropriateness of the assessment tools that they develop.
3. Participants can document their educational objectives in a way that facilitates the evaluation process.
4. Participants can use guidelines for effective test development that utilize an understanding of the use of Tables of Specifications and the advantages and disadvantages of objective and subjective question types.
5. Participants can use concepts of item difficulty and discrimination to determine the appropriateness of a test item on a given test for a given purpose.
6. Participants can develop question banks that archive questions according to analyses of their effectiveness, grade level, and subject.

1.3 Applications of This Manual in Cambodia

The present manual has been designed especially for teachers in a *New Generation School* setting who have access to significant amounts of resources to carry out student assessment effectively. This includes hardware and software for the development and administration of examinations as well as computers to develop well-designed tests, planning tools, and question banks that support effective student assessment. At the same time, teachers in other state schools that are not accredited as *New Generation Schools* may also find it possible to adapt many as-

pects of the training content on student assessment to their classrooms, even in the absence of access to technology. Teachers should discuss with their school director and colleagues how this might be done, based on the guidelines presented in this manual.

This manual contains a set of user-friendly *Session Plans* to help a trainer to systematically present a training program on Student Evaluation. This includes fundamental principles in evaluation as well as practical strategies in the design of assessment tools. Each session plan is set out with a suggested time frame, statement of needed preparation, useful materials and resources, and learning objectives. The manual also contains a set of *Participant Course Materials* that should be provided to teachers participating in the training program so that they can use these as reference documents after the conclusion of the training workshop.

2. EXPLANATION ABOUT HOW TO USE THIS MANUAL

This manual uses the following standard symbols to make the manual as user friendly as possible for the trainers using it. These symbols quickly convey the kinds of activities to be used with participants for each step of each session plan.

Timing Required for the Lesson

Pre-Training Preparation: Contains information on how to set up your training area for learning activities. It also gives suggestions on how to organize materials needed for the activity.

Resources & Materials Needed: This provides an overview of necessary materials. Most of the time these will be very basic things, like pens or paper. Other material in the training sessions will be provided through handouts that are attached in this manual. Sometimes they need to be duplicated by the trainer.

Learning Outcomes: Gives a statement of what should have been achieved and assessed at the end of the session.

Steps and Process Icons

Section 3 of this manual provides a series of training sessions on how to train the primary school teachers who are expected to employ Constructivist Learning techniques in their classrooms. The symbols below are used to help guide the actual training session. These symbols will tell the facilitator quickly what sorts of activities need to be planned for in this part of the training session. This section of the manual includes possible activities, stimulating questions, examples to clarify exercises and optional extra tasks. Although it is advisable to read through the whole lesson clearly from the beginning, especially when used for the first time, trainers can easily see what he or she has to do because of the icons used.

Action to be Taken: This symbol indicates that the facilitator must take a concrete action such as passing out a Handout, re-arranging desks, organize groups, etc.

Questioning Behavior: This indicates that the facilitator needs to ask a key question to the participants as a prelude to an activity or discussion.

Discussion: This symbol indicates that the facilitator must lead a discussion or allow participants to discuss something in their groups.

Writing Tasks: This symbol indicates that the participants need to write something on poster paper, complete an exercise, or other written task.

Explanation: This symbol indicates the facilitator must explain something to participants.

SECTION 3: Facilitator Session Plans

PART 1: Basic Principles and Concepts of Student Evaluation

3.1 Measurement & Evaluation in Educational Decision-making

Lesson Time: 2 Hours and 30 Minutes

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all handouts

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 1:** *Why Do We Evaluate?*
- **Handout 2:** *Types of Educational Decision-making*
- **Handout 3:** *How Do We Get Information for Our Educational Decision-making?*
- **Handout 4:** *How Evaluation Purpose Affects Test Design*

Learning Outcomes:

1. Participants can **explain** why we evaluate, specifically the links between Educatonal *Decision-making, Information,* and the *Evaluation Process.*
2. Particpants can **explain** the different types of educational decision-making (e.g., certification decisions, remedial decisions, etc.) by giving specific examples of each (e.g., Bac II Examination, Scholarship Tests, etc..
3. Participants can **state** the different methodologies (e.g., written tests, oral tests, surveys, observations, etc.) that one might use for gathering information for educational decision-making.
4. Participants can **determine** how test design (e.g., frequency, question difficulty, scope, etc.) might change depending on the purpose of one's evaluation.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

Explaining Why We Evaluate

The Facilitator should begin this session by asking a simple question,

"Why do we evaluate?'

Write this question on the white board for all participants to see. Try to brainstorm a list with participants on the blackboard about all the possible reasons that we do evaluation. Possible answers might include the following:

- To put marks in our grade books
- To pass and fail students
- To know who the students are that we need to reteach.
- To know how much of our lesson the students understood.
- The Ministry requires us to do evaluation on a regular basis.
- Etc.

If someone says, 'To get information' or 'To make decisions', stop immediately and bring attention to this answer because this is one of the two responses that we are looking for. If no one gives this response, keep on asking 'why' for each of the responses provided above: why do we need to put marks in our grade books, why does the Ministry ask us to do evaluation, etc. until the facilitator can arrive at one of the two desired responses.

Once the facilitator helps participants to arrive at the conclusion that the reason we evaluate is to get INFORMATION and that we need information to make DECISIONS, write the following formula on the board and explain the connection between each term:

Evaluate ➔ To get Information ➔ For Decision-making

For example, what happens if we get bad information? Does the nature of our decisions affect the design of our evaluation? How can one's purpose affect evaluation design?

The Facilitator should explain how confusion about one's purpose can lead to faulty educational decisions. For example, teachers often administer formative tests (whose purpose is to re-teach students whose understanding is still weak) and then record the marks in their grade books for a 'summative' purpose. The marks that they record may no longer represent the final understanding level of the student after they

have been retaught. If the student fully understands the lesson after reteaching, then the score recorded in the marking book after the formative test does not provide accurate information about the student's 'true' understanding of a given lesson. Thus, a faulty decision may result because teachers used the information generated by their evaluation for a summative purpose when the original purpose was formative in nature. Such problems often arise because teachers are not clear themselves about the 'purpose' of their evaluation.

Next, pass out **Handout 1:** 'Why Do We Evaluate' and review the points made in the previous discussion.

Kinds of Educational Decisions & Getting the Information Needed to Make Them

Following the above discussion, the Facilitator should review the kinds of educational decisions that we may need to make as educators. Pass out **Handout 2:** 'Types of Educational Decision-making' to help provide this explanation. The Facilitator should try to elicit different examples of the various kinds of educational decision-making indicated in the Handout. Write out some of the examples provided by participants in the sample table provided below:

Educational Decison	Examples
Promotion Decisions	• Passing students • Repeating students
Remedial Decisions	• Placing students in special groups where they can receive extra help • Levelled Reading Grouping
Instructional Design Decisions	• Revising a lesson plan • Revising instructional materials
Certification Decisions	• Bac II Exam • Awarding Diplomas
Selection Decisions	• NGS Admission Test • Scholarship Awards

Next, the Facilitator should quickly review some of the evaluation strategies that might be used to collect the needed information to make the educational decisions that were reviewed in the handouts. For this purpose, pass out **Handout 3:** 'How Do We Get Information for Our Educational Decision-making?'

Lead a short discussion to review each of the evaluation methods that might be used for collecting information, many of which are probably already well-known to participants (e.g., written tests, oral tests, surveys, etc.). During the discussion, ask participants which strategies go best with what kinds of educational decisions.

How Evaluation Purpose Affects Test Design

The Facilitator should next start a discussion about how one's evaluation purpose will affect the design of one's test. This discussion gets to the heart of the issue concerning the importance of knowing one's purpose before starting to

design one's evaluation. Start the discussion by first identifying the various parameters to consider in test design and how purpose can affect each of these. To help with this explanation, pass out **Handout 4:** 'How Evaluation Purpose Affects Test Design.' The first page of this Handout explains seven parameters in test design and how these can vary on a test.

The Facilitator should explain each of these parameters to participants as presented in the table below and in the Handout.

Parameter	Options	Parameter	Options
Scoring Procedures	• Criterion-Referenced • Normative	**Timing**	• Often/Infrequently • Continuous/Terminal
Test Length	• Short • Medium • Long	**Kinds of Questions**	• Objective/Subjective • Product or Process-focused
Question Difficulty	• Easy • Difficult	**Evaluation Strategies**	• Written Test • Oral Test • Observation • Survey • Etc.
Content Coverage	• Comprehen-sive • Sampling		

Following this explanation, the Facilitator should lead a discussion with particpants about how each of these parameters might vary in a test's design when the purpose is 'selection.' An example of how each parameter might vary is provided in the Handout. Review the example with participant by going over each parameter, asking questions about why it is best for the test to have the stated characteristics.

Following the review of this example, break participants into small groups and ask them to do a similar exercise on their own when the purpose of the evaluation is 'formative' in nature. Provide each group about 30 minutes for this exercise and then review the answers provided by each group in plenary session.

Compare the answers of each group with preferred answers as provided in the completed table below. Resolve any areas of differences through discussion. Don't forget to remind particpants that when the purpose of one's evaluation is formative, the teacher is usually looking to see if students have achieved basic mastery of a majority of the objectives (usually 50% or more of educational objectives). Thus, the questions should be relatively easy. Since we should conduct formative evaluation frequently, the number of objectives evaluated is comprehensive though few in number.

Evaluation Purpose: Formative

Parameter	Options	Parameter	Options
Scoring Procedures	• Criterion-Referenced	**Timing**	• Often • Continuous

Test Length	• Short	**Kinds of Questions**	• Subjective (though objective questions can also sometimes be used) • Process-focused
Question Difficulty	• Easy	**Evaluation Strategies**	• Written (or Oral) Test
Content Coverage	• Comprehensive		

3.2 Types of Measurement & Evaluation: Formative and Summative Evaluation

Lesson Time: 3 Hours and 30 Minutes

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 5:** *'Types of Evaluation for the Classroom*

Learning Outcomes

1 Participants can *define* different kinds of evaluation (e.g., Formative, Summative, etc.) in terms of their purpose.

2 Particpants can *explain* the differences between different kinds of evaluation in terms of when it is used and how it is done.

3 Participants can *use* examples of formative evaluation to help them analyze students' mistakes.

4 Participants can *explain* the similarities and differences between summative and formative evaluation.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

The Different Kinds of Evaluaton and the Relationship with Purpose

Start this session by summarizing the different kinds of evauation that teachers should know about, most importantly *Summative* and *Formative* Evaluation. Once again point out that the most important way to define a kind of evaluaton is by its stated 'purpose.' It might also be useful to point out that in English, the name given to different kinds of evaluation often suggests its purpose. For example:

- ***Summative:*** Based on the word 'sum,' as in summing something up.
- ***Formative:*** Based on the word 'form,' such as forming a plan based on information.

It is useful to point this out because the Khmer translation of these terms sometimes does not capture its 'purpose,' which is essential for understanding its definition.

After this introduction, the Facilitator should next pass out **Handout 5A:** 'Types of Evaluation for the Classroom.' Review as a large group some of the points raised above that are also covered in the handout. Be sure to also review additional kinds of Evaluation such as *Diagnostic* and *Strategic Evaluation.*

Key Discussion Points: The following are some important points to raise during the large group review led by the Facilitator:

- *Diagnostic* and *Formative Evaluation* are similar but the main difference is that Diagnostic Evaluation is always done 'before' teaching while Formative evaluation is mainly used during or afer teaching.
- The most common example of *Strategic Evaluation* is for placement or admission decisions.
- Both *Summative* and *Formative Evaluation* require the development of what are known as Tables of Specification to systematically plan the tests. However, Summative Tests tend to cover more content and a wider range

of skills. Summative tests tend to 'sample' the content taught while Formative tests tend to cover all the topics taught because there are usually fewer topics.

- Summative tests require questions of moderate difficulty while Formative tests should focus on questions that are easier.
- In general, Summative Tests use product-oriented questions (e.g., multiple choice questions) while Formative Tests use process-oriented questions so that it is easier for the teacher to analyze students' mistakes and formulate remedial action.

After the Facilitator's review of **Handout 5A,** ask participants to work in their small groups to complete the two exercises provided. One exercise deals with 'Analyzing Students' Mistakes' while another requires participants to design a summative test. Give about one hour for this exercise.

Analyzing Students' Mistakes

No	*Student Work That Indicates a Mistake*	*Your Analysis of WHY the Student Did This Wrong*
1.	*1,300* *- 522* *878*	*When subtracting the hundreds column, the student did not realize that it is also necessary to reduce the '3' to '2' so that the final answer should be 778.*
2.	*140* *- 21* *120*	*The student has misunderstood that 0 -1 in the ones column equals 0.*
3.	*1,300* *- 522* *788*	*The student has forgotten to subtract 1 from the tens column so that he/she is subtracting 2(0) from 9(0), giving the sum 778.*
4.	*521* *+ 888* *13,109*	*The student is expressing the answer as separate sums from right to left: 1+8=9; 2+8=10; 5+8=13*
5.	*51* *+ 49* *90*	*The student can add individual columns of numbers correctly but does not understand how to carry over units from one column to the next.*
6.	*9 > 11* *10 < 9*	*The student has misunderstood that the sign > should always point to the smaller number.*
7.	*1 + 2 + 3 = 123*	*The student has misunderstood an addition sentence to mean that one simply expresses the answer as a consecutive list of the addends.*
8.	*recieve* *niegbor*	*The student does not understood the spelling rule: 'i' before 'e' except after 'c' and sometimes when followed by 'g.'*
9.	ផំដី តុចទា	*The student has placed adjective before the noun instead of after as is the rule in Khmer.*
10.	ក ៃ កែតី ភ=ត ก	*a) The student has written the letters backwards.* *b) The student has expressed the vowel incorrectly.* *c) The student is not able to distinguish the difference between these two letters.* *d) The student has forgotten to place a 'hat' over the letter kaw.*

Exercise: Designing a Summative Test

Parameter	Suggested Design Feature	Parameter	Suggested Design Feature
Scoring Procedures	• Criterion or Norm Referenced	**Timing**	• Terminal
Test Length	• Medium to long	**Kinds of Questions**	• Product-oriented • Objective Questions
Question Difficulty	• Moderate • Some Difficult Questions	**Evaluation Strategies**	• Written Test
Content Coverage	• Multiple Units • Sampling Content		

When participants have completed the exercises provided in the Handout, discuss together as a large group. The Facilitator may use the answers provided above to help guide the review of participants' work.

Summarizing the Differences between Summative and Formative Evaluation

When the Facilitator has completed reviewing the exercises above, pass out **Handout 5B** to review together the differences between Formative and Summative Evaluation in the matrix provided. This is a good opportunity to answer any questions or queries that participants might have about Summative and Formative Evaluation.

3.3 Useful Frameworks for Interpreting Test Scores: Normative and Criterion-referenced Testing

Lesson Time: 3 Hours and 30 Minutes

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 6:** *Useful Frameworks for Interpreting Test Scores*
- **Handout 7:** *Criterioon-Referenced Scoring*
- **Handout 8:** *Norm-Referenced Scoring*
- **Handout 9:** *Comparison between Norm and Criterion-Referenced Scoring*
- **Handout 10:** *Checking Your Knowledge on Evaluation Principles*

Learning Outcomes

1- Participants can *define* the meaning of Criterion- and Norm-Referenced Scoring in terms of when it is used and for what purpose.

2- Participants can *use* different scoring frameworks (i.e., criterion and norm-referenced) to interpret the meaning of a test score.

3- Particpants can *determine* the situations in which to use criterion and norm-referenced scoring frameworks.

4- Participants can *answer* questions about marking on a 'curve' and how students' marks might be transformed based on a normative scoring framework.

5- Participants can *create* their own curves using the guidelines about Norm-referenced scoring discussed.

6- Participants can *explain* the differences between Criterion and Norm-Referenced Scoring according to different parameters (e.g., Purpose, Evaluation Strategies, Timing, etc.).

7- Particpants can successfully *complete* exercises reviewing the evaluation principles discussed up to this point.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

Introduction to Criterion and Norm-Referenced Measurement

Start this next section by asking the following question:

Is the meaning of a test score a straightforward matter with little need for interpretation?

After receiving some responses from participants, the Facilitator should hopefully be able to convince everyone that the answer to the above question is 'No.' All test scores are open to interpretation depending on the framework that we are using to interpret them. Two of the most commonly used frameworks used for interpreting test scores are Criterion-referenced Frameworks and Norm-Referenced Frameworks.

Use the example provided below to explain how the same score on a test can be interpreted in different ways. Draw the table on the whiteboard, which presents two sets of identical scores but with totally different interpretations depending on the contextual framework. The set of scores on the left hand side of the table represent a 'Promotional Context' in which the cut-off point for 'passing' is 5. In this context, ask participants which students are determined to have passed the test? (*Answ:* Phally, Sovan, Malis, Bun, and Sina). The context shown on the right hand side of the table represents a 'Selection Context,' in which only the top two students can be chosen for a scholarship. In this context, which students have passed the test? (*Answ:* Phally and Sovan). This example should help to demonstrate the idea presented earlier that the same test score is open to diffeent interpretations depending on the context.

Example of Same Sets of Scores Having Different Interprettions

Student Name	Promotion Decision Context	Student Selection Context
1. Phally	9 ←	9 ←
2. Sovan	8 ←	8 ←
3. Malis	7 ←	7
4. Bun	7 ←	7
5. Sina	5 ←	5
6. Heng	4	4
7. Rith	4	4
Description of Context: ➔	• Promotional context. • The criterion for passing is '5' • In this framework, 5 students pass	• Selection context. • Only the top 2 students can get a scholarship

The Facilitator should conclude this introduction by distributing **Handout 6:** 'Useful Frameworks for Interpreting Test Scores.' Quickly review the points

made earlier, emphasizing the the interpretation of test scores will change depending on the use of an *absolute criterion* or a *normative standard.*

About Criterion-referenced Scoring

After the above introduction, distribute **Handout 7:** 'Criterion-referenced Scoring.' Review the handout in plenary session. Lead a guided discussion that covers the following points:

- Criterion-referenced scoring is the most commonly used marking framework and should be familiar to all teachers.
- Criteria are usually set arbitrarily. In this regard, the Facilitator should compare the different criteria used for pass-fail decision in different countries such as the United States and the UK.
- Ask participants how these criteria compare to the one used in Cambodia. Why do you think the criteria are different? Possible answers might include tradition, to combat grade inflation, it is not unreasonable to expect students to know 50% or more of what they learn as a minimum standard, etc.
- Criterion referenced scoring is generally used for purposes involving *Certification, Promotion,* or *Attainment of Minimum Learning Standards.*
- The use of objectives figures prominently in how criteria are applied because the criteria will indicate how many learning objectives have been achieved by a student.

About Norm-referenced Scoring

To help the explanation of Norm-referenced Scoring, pass out **Handout 8:** 'Norm-referenced Scoring.' Review the handout in plenary session. Lead a guided discussion that covers the following points:

- Norm-referenced scoring shows a student's standing in comparison with other students; it is not based on an absolute criterion as in Criterion-referenced scoring.
- Norm-referenced scoring can take a number of different forms. For example, if your purpose is 'selection' based on a quota of available seats (e.g., for a scholarship), then passing students are simply counted off from the top of the distribution. As in the example shown earlier, if 7 students applied for a scholarship but there are only enough resources for two studnets, then the two top scoring students would be selected.
- Another example of norm-referenced scoring involves marking students on a 'curve.' When marking on a curve, teachers re-assign grades to students using the median score as an important point of reference. Teachers find scores relating to particular percentiles (e.g., 90th percentile, 10th percentile, etc.) and then decide at what percentile they want students to pass. Look at the example of marking on a 'curve' provided in **Handout 8** and review it with participants. Be sure to explain the concept of a percentile.

After reviewing the example about creating a 'curve,' answer the *Questions for Discussion* at the end of the handout. The following are the answers to help the Facilitator with the resulting guided discussion:

Answers to the Discusson Questions

Q1: 40 students
Q2: 50th Percentile = 4.5 in old distribution; 7 in new distribution; 20 students scored above this or 50% of the students.
Q3: 5 would have been the cut-off point for a Criterion-referenced Tests. 50% would have failed if this had been a Criterion-referenced Test.
Q4: Under the curve, only 4 students or 10% are failing (i.e., get F scores). If the teacher uses the 5-point scale, then 8 students or 20% would fail, it depends on how the teacher wants the curve to work.

Q5: The teacher's purpose in making this curve was to ensure that more students would pass. In the original distribution, 50% of the students would have failed, which would have been too many.

Comparison between Norm and Criterion-referenced Scoring

Review the differences and similarities between Norm-and Criterion-referenced Scoring by passing out **Handout 9:** Comparison between Norm and Criterion-referenced Scoring.' Review each parameter with participants and discuss how these two scoring frameworks are alike and different.

Pass out **Handout 10:** 'Checking Your Knowledge on Evaluation Principles' and ask particpants to complete the questions individually. Provide about 10 to 15 minutes for this exercise. When all partiicpants have completed the exercise, review the answers together using the key provided. Provide any necessary explanations for those participants who may have answered the questions incorrectly.

3.4 Characteristics of Good Tests and Examinations: Concepts of Validity

Lesson Time: 3 Hours and 30 Minutes

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 11:** *Concepts of Assessment Validity*
- **Handout 12a:** *Kinds of Validity*
- **Handout 12b:** *Reinforcement Exercise on Concepts of Validity*
- **Handout 13:** *Some Final Guidelines to Ensure Validity in Your Tests*

Learning Outcomes

1- Participants can define validity by giving examples of when a test is valid and when it is not.

2- Participants can explain how validity will affect the decisions that one makes based on the information generated by a test.

3- Participants can distinguish between the different types of validity (e.g., content validity, construct validity, etc.) when examining different case studies that exemplify them.

4- Participants can correctly answer questions about a test's validity when given a description of a particular assessment.

5- Participants can describe specific guidelines that one should follow to ensure that a student assessment is valid.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

Defining Concepts of Validity

Begin this session by asking participants if they have ever heard of the concept of 'validity' before. Ask people what they think this concept means. Make a list of their answers on the whiteboard. This should help the Facilitator better understand participants' current knowledge and how quickly the facilitator can move through this session.

In trying to interpret participants' answers, the Facilitator should return to an important concept that was raised in **Session Plan 3.1:** *Measurement & Evaluation in Educational Decision-making,* which describes the link between 'Making Decisions' and the information that assessment generates. That is, we make Decisions based on Information. The Facilitator should remind participants that we can only make good decisions when the data that we receive is accurate. Then ask this question:

How do we know if the data generated by an assessment is accurate?

After giving participants some time to think about this question, the Facilitator should come back to the concept of 'validity'. That is, when a test is valid, it shoud be generating accurate data.

The Facilitator can now get to the crux of the matter about defining validity. Pass out **Handout 11:** 'Concepts of Assessment Validity.' In explaining this Handout, there are three important concepts that participants should understand in order to define validity. Write these concepts on the whiteboard in summary form as follows:

- *The test **Serves the Purpose** for which it was designed*
- *The test is **Relevant** to the information taught*
- *The test is **Reliable***

Next, go through the handout by highlighting the examples provided to further elaborate each of these concepts because they provide frequent mistakes that teachers often make, which undermines the validity of an assessment instrument. But if a teacher can be reasonably sure that a test serves its intended purpose, is relevant, and is reliable, then we can conclude that the test is valid and will enable us to make good educational decisions.

Ask participants if they have ever been in a situation where the mistakes described in the examples given were made? For example, have they ever given a very short test to assess many educational objectives or used a formative test for a summative purpose? Lead a discussion about why such mistakes undermine validity.

Kinds of Validity

Following the above explanation about defining 'validity', the Facilitator should next introduce the different kinds of validity that teachers may encounter when studying student evaluation. To better facilitate this explanation, pass out **Handout 12a:** 'Kinds of Validity.'

The Facilitator should point out to participants that there are basically four kinds of validity:

- **Content Validity:** The degree to which a test is 'relevant' to the content taught.
- **Construct Validity:** The degree to which a test is 'relevant' to the thinking skills that have been taught (e.g., remembering, understanding, etc.).
- **Concurrent Validity:** The degree to which a test is 'reliable' or consistent with other similar assessments.
- **Predictive Validity:** The degree to which an assessment can 'predict' an individual's potential of success.

After explaining these definitions, ask participants to review the **Case Study** provided in the Handout about Mr. Sophea's Test on a Mathematics Unit. Read the case study out loud to participants and ask them to consider the questions in small groups (without looking at the answers provided at the bottom of the page!).

- **Question 1:** Did Mr. Sophea's test have *Content Validity?*
- **Question 2:** Did Mr. Sophea's test have *Construct Validity?*
- **Question 3:** If Mr. Sophea administered a new test that covered all 4 lessons and included questions on Memory, Comprehension, and Application, do you think he would get a similar result? Why or why not? Be sure to phrase your answer in terms of Concurrent Validity.

Following the small group discussions, review the answers of each group as a large group. Discuss any discrepancies that may have arisen in the answers of each group and try to resolve any differences in the inverted answers provided at the bottom of the sheet.

Review the other Case Studies provided in the Handout such as the one on Predictive Validity and the case of Albert Einstein and the Case Study on Content Validity (which is optional). Discuss how these case studies affect specific kinds of validity such as Predictive Validity or Content Validity.

Reinforcement Activity

Pass out **Handout 12b:** 'Reinforcement Exercise on Concepts of Validity' in order to check participants' understanding of the concepts presented above. In this Handout, there are 5 short case studies that exemplify issues in Assessment Validity. In their small groups, ask participants to read each case study and identify the kind of validity implied (there may be more than one) and to be prepared to justify their answers in plenary session.

CASE STUDIES

1. Most conventional schools in the world tend to emphasize a limited number of intelligences in their curricular programming such as 'Verbal Intellegence' and 'Mathematical Intelligence.' If you are someone who has high 'Social Intelligence' or high 'Mechanical Intelligence', you will probably not do well on most of the tests administered at such schools even though you might be very successful in jobs that require these kinds of skills. What sort of assessment validity is implied in this case study?

Preferred Answer: *This case study implies 'Predictive Validity' because it suggests that assessment in conventional schools would probably be a poor predictor of someone's success in life if they have a knd of intelligence other than Verbal or Mathematical.*

2. Most people know that Jack Ma, the Chinese billionaire who created *Alibaba,* was an academic failure during his time at university. What sort of assessment validity is implied by the evaluation that he experienced while at school?

Preferred Answer: *This case study implies 'Predictive Validity' because it suggests that the assessment outcomes experienced by Jack Ma clearly were not predictive of his actual success in the business world.*

3. Some studies of educational achievement in Cambodia have found that there is often little relationship between the marks that students receive on their internal tests and the marks that they receive on externally administered examinations such as the Bac II Examination or the PISA test. What sort of validity is implied in this case study?

Preferred Answer: *This case study most clearly implies 'Concurrent Validity' because the assessment results from internal and external tests do not seem to correlate even though they pertain to be evaluating the same thing. This could be caused by such factors as 'rien kua' where students often buy their marks from teachers or other factors relating to the content and constructs assessed in which case Content and Construct Validity could also be implied.*

4. Many Cambodian teachers prefer to use open-ended questions and essay questions, which require a great deal of time to answer, when designing their tests, even when they have a great many lessons to evaluate. What sort of validity might this habit affect in terms of student assessment?

Preferred Answer: *This case study implies 'Content Validity' because it suggests that kinds of question formats used by teachers are not efficient in covering all or most of the content that was taught.*

5. Cambodian teachers receive a great deal of pressure from development partners to change their teaching in a way so that they are teaching more higher order thinking skills such as creativity and evaluation. They are encouraged to use new methods of teaching such as 'project work' and 'problem-based learning'. However, when students are evaluated in their external examinations such as the Bac II Exam, they mainly encounter questions at the level of memory and understanding. What sort of validity is implied in this case study?

Preferred Answer: *This case study implies 'Construct Validity' because it suggests that external examinations are not evaluating the kinds of thinking skills that teachers may be teaching in their classrooms, especially if they are using project work or PBL methods.*

Give participants about 30 to 40 minutes for this exercise and then review as a large group. Preferred answers are provided above to help the Facilitator guide the discussion.

 	**Guidelines to Ensure Validity When Designing Student Assessments** Bring the session to a close by reviewing specific guidelines that teachers should observe to ensure that their assessments have validity. The Facilitator should pass out **Handout 13:** 'Some Final Guidelines to Ensure Validity in Your Tests' to each participant and review each guideline in plenary session. Be sure to emphasize that the 'conditions' of testing as well as the 'design' of a test may have an impact on an assessment's valididity. Answer any questions that may arise when reviewing this Handout.

Part 2: Practical Strategies for Test Design and Development

3.5 Instructional Objectives in the Educational Process

Lesson Time: 3 Hours and 30 Minutes

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 14:** *Why Instructional Objectives are Important in Assessment*
- **Handout 15:** *The Role of Instructional Objectives in the Education Process*
- **Handout 16:** *Defining an Instructional Objective*
- **Handout 17:** *Kinds of Instructional Objectives*
- **Handout 18a:** *Guidelines When Writing Instructional Objectives*
- **Handout 18b:** *Using Bloom's Taxonomy to Develop and Classify Instructional Objectives.*

Learning Outcomes

1- Participants can *explain* why it is important to use Instructional Objectives and what role they play in the educational process, particularly as this concerns its role in student assessment.

2- Participants can *identify* the parts of an Instructional Objective including its 'Content,' its 'Behavioral Construct,' and the 'Conditions' that sometimes form a part of the objective.

3- Participants can *explain* the difference between 'General' and 'Specific Objectives.'

4- Participants can *classify* the thinking skill level of Instructional Objectives using the framework outlined in Bloom's Taxonomy.

5- Participants can *write* 'good' objectives using specific guidelines that are provided in Handouts.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

Why Educational Objectives Are Important in Education

Start this session by asking participants the following questions:

Have you ever taken a long trip somewhere?

Have you ever first taken such a trip without first knowing what your destination is?

Does knowing the destination help you to prepare for the trip? How does it help you?

These questions and participants' responses during discussion should help the Facilitator to set the stage for a comparison between the process of writing instructional objectives and the process of setting the destination for a long trip, the needed preparations for the trip, and determining what you have to do to get there.

Key Idea: The main idea here is that one has to know where one is going before one starts the preparations for a trip. In the same way, one has to know what one's learning outcomes are before one starts teaching or evaluating. Thus, one has to begin one's lesson planning with the end point in mind. Instructional Objectives enable us to do just that.

After completing the discussion and explanation above, pass out **Handout 14:** 'Why Instructional Objectives are Important in Assessment.' Review the first page of the Handout, emphasizing the key idea discussed above. At the end of the Handout, there is a short exercise about preparing for a trip. The Facilitator may ask each group to work on this exercise using the example of a trip across a desert and a mountain range. Each group should complete the table provided by indicating what they need to prepare and how they will use it along the way. Discuss the answers of each group and how such preparatons might compare to preparing a lesson plan.

Example: Suppose one's objective was for children to know how to use a dictionary. What things might one need to prepare and teach children to achieve this objective? (e.g., providing pocket dictionaries to each student, teaching the order of letters in the alphabet, ordering lists of words according to their alphabetical sequence, etc.).

The Role Educational Objectives Play in Education

Once the above discussion has been completed, ask participants how we use Instructional Objectives in the education system. Possible answers might include the following:

- To make our lesson plans.
- To know what materials we need for the lesson.
- To help guide the steps in our teaching.
- To help with making tests
- Etc.

Make a list of participants' responses on the whiteboard.

Next, the Facilitator should pass out **Handout 15:** 'The Role of Instructional Objectives in the Education Process.' Review the Handout with participants noting that there are three main roles or purposes of Instructional Objectives in education, namely:

- To Guide Evaluation
- To Plan Instruction Systematically
- To Provide Structure to Curriculum Development

As the Faciliator goes through these purposes, try to match them with the list that was made by participants earlier. Stress also that for purposes of this session, we are focusing on the uses of objectives for instructional and assessment purposes and not curriculum development, since most of those present in the workshop are teachers.

Defining Instructional Objectives

The next step in this session is to review the actual definition of an Instructional Objective. For this purpose, pass out **Handout 16:** 'Defining an Instructional Objective.' Review the definition provided with participants, bringing attention to the idea that teachers should try to ensure that their Instructional Objective shows a 'visible behavior' at the end of instruction so that we can verify that one or more students has achieved the objective. Sometimes we call such objectives 'behavioral objectives.' When learning outcomes are observable, they are easier to evaluate.

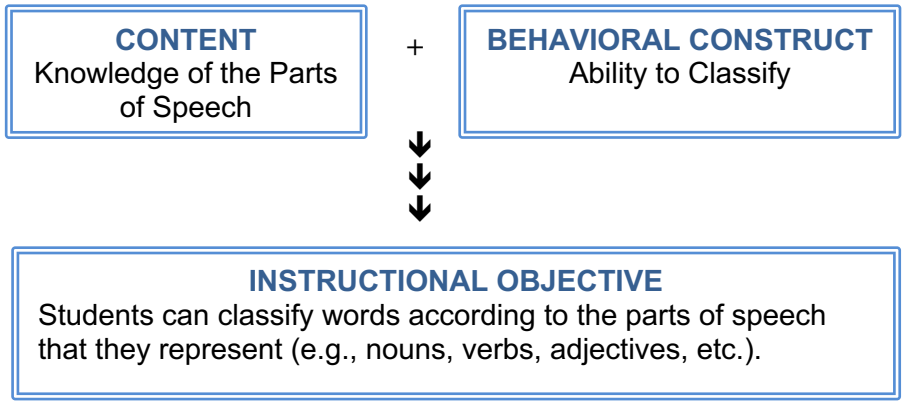
What is an Instructional Objective?

*"**. . . .** A clear and unambiguous description of the goals or changes in the student's behavior that the teacher wishes to observe as a result of instruction."*

Following the above explanation, the Facilitator should start to review the component parts of an objective. Review these component parts using the examples that are provided in the Handout.

Parts of an Objective:

- *An instructional should contain two or three components. These include the following:*
  - *The Content*
  - *The Behavioral Construct*
  - *The Condition(s) under which the learning should occur (OPTIONAL)*



When explaining the use of a conditional statement in an objective, note that this part of an objective is 'optional.' Some educators prefer not to include them but others find that they can give an objective greater clarity for what the teacher has to do when teaching (e.g., distribute dictionaries, give maps to students to examine, do an experiment, etc.).

After your explanation, ask participants to try to complete the exercises provided at the end of **Handout 15,** which start with a conditional statement. Give participants about 20 to 30 minutes to do this in their groups and then share with the large group. Check for logic of the resulting Instructional Objectives and also whether they include a good statement of Content and Behavioral Construct.

Kinds of Instructional Objectives

This next topic to discuss in this session refers to the different kinds of objectives. For this purpose, pass out **Handout 17:** 'Kinds of Instructional Objectives.' The Facilitator should explain that there are two kinds of objectives:

> **General Objectives:** These are general statements of understanding followed by multiple statements of observable learning outcomes, also known as Specific Objectives.
>
> **Specific Objectives:** These are statements of observable learning outcomes that are used with General Objectives but which may also be used on their own, especially in the context of a teacher's lesson plan.

Explain to participants that General Objectives may use such general terms as 'know' and 'understand' because they are later clarified by Specific Objectives. On the other hand, Specific Objectives never use such terms because they must describe 'observable' behaviors. Review the examples provided in the Handout to make sure that this is clear.

The Facilitator should explain that educators are not always in agreement about

the use of 'General' and 'Specific' Objectives, but usually the former are used in formal curriculum documents while the latter are most often used in lesson planning by teachers.

Guidelines to Use When Writing Instructional Objectives & Bloom's Taxonomy

The next topic in this session concerns useful guidelines to write effective Instructional Objectives as well as the use of Bloom's Taxonomy to ensure that a teacher has a good mix of objectives that cover both higher and lower order thinking skills. Start the session by distributing **Handout 18a:** 'Guidelines to Use When Writing Instructional Objectives.' There are five important guidelines in this Handout. The Facilitator should review each with participants using the examples provided.

Instructional Objective Writing Guidelines

1. Always use verbs that demonstrate observable behaviors when writing 'specific objectives.' (e.g., determine, explain, summarize, write, list, etc.)
2. Avoid using words like *strengthen, encourage, support,* etc. in your objectives as these do not suggest any 'observable' cognitive behavior.
3. Never put two behavioral constructs into one objective. *(e.g., students can 'describe' and 'analyze' the characters of a novel).*
4. Ensure that your objectives include a mix of both lower and higher order thinking skills. Use Bloom's Taxonomy to help you know which objectives reflect higher order skills and which reflect lower order skills.
5. Classify each objective by the level that it implies in Bloom's Taxonomy (e.g., Remembering, Understanding, Applying, etc).

The Facilitator should note that Guidelines 4 and 5 require some further explanation, especially if participants have never heard of Bloom's Taxonomy. To ensure proper understanding of the uses of Bloom's Taxonomy in writing Instructional Objectives, pass out **Handout 18b:** 'Using Bloom's Taxonomy to Develop and Classify Instructional Objectives.' Next, use the Handout to review the various levels of the taxonomy and in particular the definitions provided for each.

Following the above explanation, ask participants to work in groups to complete the classification of useful verbs used to demonstrate a Behavioral Construct in an objective according to what level of Bloom's Taxonomy that they exemplify. Be sure to note that one verb may sometimes be used with more than one level in the Taxonomy. Give participants about 30 minutes for this task. When all groups have completed the task, review and discuss as a large group. In order to help the Facilitator in this review process, the following answers are provided below. If participants' answers happen to be different from the list provided, ask participants to justify their classification based on the answers provided in the table on

Bloom's Taxonomy shown earlier.

Answers to the Exercise in Handout 18b

English	Taxonomy Level	English	Taxonomy Level
Adapt	Analyzing Creating	Explain	*Understanding*
Answer	Remembering Understanding	Formulate	*Creating*
Analyze	Analyzing	Identify	*Understanding*
Apply	Applying	Illustrate	*Understanding Analysis*
Arrange	Understanding Analyzing	Indicate	*Remembering Understanding*
Calculate	Applying	Interpret	*Understanding Analyzing*
Categorize	Analyzing	Judge	*Evaluating*
Clarify	Understanding	Label	*Remembering Understanding*
Classify	Analyzing	List	*Remembering*
Combine	Analyzing Creating	Match	*Remembering Understanding*
Compare	Analyzing	Measure	*Applying*
Complete	Understanding Applying	Name	*Remembering*
Compose	*Creating*	Outline	*Understanding*
Contrast	*Analyzing*	Predict	*Applying Analyzing*
Create	*Creating*	Recite	*Remembering*
Critique	*Analyzing*	Rephrase	*Understanding*
Defend	*Evaluating*	Report	*Remembering Understanding*
Define	*Remembering Understanding*	Select	*Understanding*
Demonstrate	*Analyzing*	Solve	*Applying*
Describe	*Remembering*	Specify	*Understanding*
Determine	*Understanding Applying Analyzing*	State	*Remembering Understanding*
Diagram	*Understanding Applying*	Summarize	*Understanding*
Differentiate	*Analyzing*	Synthesize	*Creating*
Distinguish	*Understading Analyzing*	Tell	*Remembering*
Enumerate	*Remembering*	Use	*Applying*
Evaluate	*Evaluating*		

Following this exercise, try another classification exercise in which participants must read a set of 10 Instructional Objectives and classify them according to the thinking skill that they demonstrate in Bloom's Taxonomy. To save time, this exercise can be done in plenary session. Ask particpants to conceal the answers given at the bottom of the page so that they can use their own understanding to do the exercise. Discuss why some participants may have classified some Instructional Objectives differently and try to reach a consensus based on the Taxonomy Table reviewed earlier.

Writing Instructional Objectives Using the Guidance Provided

The final task in this session requires particpants to actually write their own objectives in their small groups. The final exercise for this purpose is provided at the end of **Handout 18b.** Pass out poster paper so that each group can write the objectives that they composed. The Facilitator should review the directions with participants so that they actively apply the Instructional Objective writing guidelines that were discussed earlier. The Facilitator should explain to participants that they may choose whatever 'behavioral construct' they want for the objective that they write, as long as it is logical.

Topical Areas for Instructional Objective Writing Exercise

- **English:** Vocabulary Words
- **Mathematics:** The idea of a set
- **Science:** The elements of the Periodic Table
- **Khmer:** The differences and similarities of characters in the story, Thum-Thiew
- **Geography:** Geographical maps
- **History:** The causes of World War II

Give particpants about 45 minutes to complete this exercise, then review together as a large group, comparing the similarities and differences in the objectives that each group wrote.

3.6 Developing Tables of Specification

Lesson Time: 2 Hours

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 19:** *Developing Tables of Specification*

Learning Outcomes

1- Participants can *explain* what a Table of Specifications is and why we should use them in developing tests.

2- Participants can *answer* questions about the design of a test by looking at the Table of Specifications used to plan the test.

3- Participants can *answer* questions about how a Table of Specifications can strengthen a test's validity by examining case studies about poor test design.

4- Participants can *use* Tables of Specifications to make tests for their own students.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

What is a Table of Specifications?

The Facilitator should start this session with some questions about how teachers design their tests.

How do you currently make tests for your students?
How confident are you that the way you make tests ensures high levels of validty?
Have you ever heard of a Table of Specifications before?

Such questions will help the Facilitator to know whether participants have ever heard of Tables of Specification before or whether they have actually used them. If participants have heard of Tables of Specification before and actually used them, then it will be easier to review this session quickly. If they have not heard of them before, then it may require the full amount of time put aside for this lesson to deliver the content.

Assuming that most participants have not heard of Table of Specifications, the Facilitator should start the session by passing out **Handout 19:** 'Developing Tables of Specification.' Review the definition of a Table of Specifications provided and why it can be useful for test development.

A Table of Specifications is defined as a test blueprint that enables the development of a test, which is 'balanced' and 'relevant' in terms of the content and thinking skills taught.

The Format of a Table of Specifications

Next, the Facilitator should use the Handout to show an example of the format of a Table of Specifications, bringing attention to its provisions to list Content Areas (usually lessons or sub-units within a lesson) on the left had side and thinking skills identified in Bloom's Taxonomy along the top. Review the process of completing a Table of Specifications as indicated in the Handout:

How Does One Fill in a Table of Specifications?

1) Determine the content areas that you want to test. These can be lesson names or topics from one lesson.
2) Reflect on how you taught each content area. Did you ask students to simply remember things, understand things, apply principles, etc.?
3) Fill in the numbers in your table:
    a. The numbers can be either the ***number of questions*** for each subject area/construct or the ***number of points*** on the test for each area.
    b. If the numbers represent questions, all questions should be worth the same number of points.
4) Make totals for your content and constructs. The number of points or questions

that you have indicated for each topic and construct should reflect the amount of time and emphasis that you placed on each topic/construct when teaching. If it does not, then there is a problem with the test's Content or Construct Validity.

Following this explanation, the Facilitator should ask particpants to read the three Case Studies provided in the Handouts as a large group. Then, ask participants to try to answer the questions at the end of each Case Study. Lead a guided discussion on the Case Studies using the sample answers provided below:

Case Study Answers to Help Guide Discussion

Case Study 1: The test lacks *Content Validity* because each of the three lessons tested should have had the same number of questions or points. Instead, 80% of the questions or points were devoted to the last lesson; therefore, the test lacks overall validity. Using a Table of Specifications could have reminded the teacher to review her lesson plans, which would have shown her that there should have been an equal number of questions or points devoted to each lesson. These specifications could have, then, been easily built into her Table of Specifications.

Case Study 2: The test lacks *Construct Validity* because during the teaching process, students were asked to mainly remember facts and concepts and were not expected to demonstrating 'knowing' at the level of 'understanding' or 'application,' as required in the test. If the teacher had used a Table of Specifications, this would have reminded him to review the Instructional Objectives in his lesson plans at which time he would have realized that all of his objectives emphasized 'remembering' and not 'understanding' or 'application'. Teachers have to test what they teach in order for tests to be valid. If the teacher wanted the test to include 'knowing' at the level of 'understanding' and 'application,' then he should have addressed this need during the teaching process. Developing a Table of Specifications would have demonstrated clearly to the teacher that his test questions should be placed in the remembering column of the table only.

Case Study 3: Once again, the test lacks *Content Validity* because too many of the questions overemphasize one lesson at the expense of the others, which were all given an equal amount of time in teaching. As in Case Study 1, a Table of Sepcifications would have helped the teacher to see clearly that too many questions had been assigned to the last lesson of the unit.

Reading a Table of Specifications

The topic in this session focuses on how to read a Table of Specifications. For this purpose, the Facilitator should bring participants' attention to the example of a completed Table of Specifications for Khmer Language. Look at the table together and answer the questions together in a plenary session. The answers to the questions are provided below to help the Facilitator lead a guided discussion on reading a Table of Specifications.

Questions for Discussion

1) How many content areas are there in this test?

   Answer: *There are 4 content areas tested as indicated in the first column of the table.*

2) How many skills are measured in this test?

   Answer: *There are 4 thinking skills that are tested including Remembering, Understanding, Applying, and Analyzing.*

3) Which content area has the most emphasis? The least emphasis?

Answer: *The Content Area with the most emphasis is 'Grammar' because it has 20 questions assigned to it. On the other hand, Vocabulary, Poetry, and Composition have less emphasis than Grammar but are assigned an equal number of questions (see the Total Column on the far righthand side of the table). To be valid, this assignment of questions should also reflect the same amount of emphasis given to each topical area during teaching.*

4) Which construct area has the most emphasis? The least emphasis?

Answer: *The Skill Area with the most emphasis is 'Applying' because it has 20 questions assigned to it (see the Total Row at the very bottom of the table). On the other hand, 'Remembering' has the least number of questions assigned to it (only 5 questions). To be valid, this assignment of questions should also reflect the same thinking skills that were actually taught during class. The teacher should make sure that the thinking skill level indicated in his Instructional Objectives are properly reflected in the Table of Specifications.*

5) If the numbers in the table represent the number of questions, how much is each question worth on a test with 100 points.

Answer: *Assuming that each numeral represents the number of questions, the value of each question would be 2 points since 100 points in total divided by 50 questions is 2.*

Following the completion of the above discussion, the Facilitator should ask particpants if they have any further questions on Tables of Specifications and provide explanations accordingly.

3.7 Writing Objective Test Items

Lesson Time: 6 Hours

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- Textbooks for all grades and subjects
- **Handout 20:** *About Objective and Subjective Test Questions*
- **Handout 21:** *How to Write Objective Test Questions Effectively*

Learning Outcomes

1- Participants can correctly define an 'objective question.'

2- Participants can identify the key characteristics of 'objective' questions.

3- Particpants can explain the difference between 'objective' and 'subjective' questions.

4- Participants can explain when it is most appropriate to use objective questions and when it is appropriate to use subjective questions.

5- Participants can indicate whether a specific question format (e.g., extended essay, multiple choice, etc.) is subjective or objective in nature.

6- Particpants can identify the advantages and disadvantages of specific kinds of objective questions (e.g., True-False, Mulitple Choice, Matching, etc.).

7- Participants can indicate the various thinking skills in Bloom's Taxonomy that are associated with each objective question.

8- Particpants can effectively write objective questions including Short Answer, Matching, True-False, Multiple Choice, and Classification Questions using the guidelines that have been provided and discussed.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

Why We Need a New Terminology to Describe Question Types That Moves Beyond 'Open' and 'Closed' Questions

The Facilitator should start this session by reviewing some common terminologies about describing question-types in Cambodia. The most commonly used typology in this regard is what are called 'open' and 'closed' questions. For purposes of this session, we will avoid using this terminology because it misses a key element in how assessment specialists distinguish between question types – this refers to the way that questions are scored. The Facilitator should bring participants' attention to how teachers score questions by presenting the following two question examples:

- *The Angkorian Period in Cambodia began under what King?* _____
- *Which Angkorian King was the greatest king of them all? Be sure to justify your answer with examples and logical arguments.*

  _____

  _____

  _____

  _____

  _____

Write each of these questions on the board for the entire group to consider. Then, the Facilitator should ask them to respond to the following questions:

How many answers are possible for the first question?

How many answers are possible for the second question?

Would you consider both of these questions to be open-ended questions? Why or Why not?

How would a teacher assign points to each student response when correcting these questions?

The Facilitator should lead a discusson about the three questions above. When leading the discussion, the Facilitator should be sure to make the following points:

Guided Discussion Points

- It is clear that the first question about the founder of the Angkorian Period has only ONE possible answer: Jayavaraman II. Any other response to this question would be wrong.
- The second question could have MULTIPLE answers that are all correct depending on how well the student justifies his selection of a great king.
- According to the definition of an open-ended question, both questions would appear to be open ended even though the way that we score each question seems to be quite different. The first question would be scored 'dichotomously,' which

means that it is either completely correct (full points) or completely wrong (zero points). There is no grey area. On the other hand, the second question could involve the award of points that are full, partial, or zero depending on how well the student answers the question. This is quite different from the first question.

- The fact that both questions are considered to be 'open-ended' even though the way that we score them is quite different suggests that using this terminology (i.e., open-ended, closed) for describing questions is not very useful.

What is the Difference between Objective and Subjective Questions?

At the end of the above discussion, the Facilitator is now ready to pass out **Handout 20:** 'About Objective & Subjective Test Questions.' The Facilitator should use this Handout to introduce a much better typology for describing question types that includes the following two kinds of questions:

- Objective Questions
- Subjective Questions

This typology of describing question types is most commonly used in other countries and emphasizes the differences in how an educator scores a given question. If a question has only one possible answer and we score it dichotomously (i.e., the student receives a full award of points or zero), then the question is considered to be 'objective.' There is only one correct answer and this will not change regardless of who corrects the question. If a question has multiple possible answers and the award of points varies among those correcting the question, then the question is considered to be 'subjective.' Thus, the way that we define a question type depends heavily on how the question is scored and whether there is any variation in how points are awarded by those scoring the question.

Kinds of Objective and Subjective Questions

The Facilitator should be sure to bring participants' attention to how we classify commonly used question formats in terms of being either 'objective' or 'subjective.' This is noted in the Handout. Review why such questions as Multiple Choice, True-False, Matching, etc. are considered to be objective questions (***Answ:*** because there is always only ONE correct answer to such questions and that they are scored dichotomously).

Essay Questions on the other hand are considered to be 'subjective' because answers may vary from student to student and point awards may be either full, partial, or zero. The Facilitator should explain that we will consider how to write good Essay Questions in another section but for now we will first consider how to write effective objective questions.

Characteristics of Objective Questions

The Facilitator should start the next topic of this session by passing out **Handout 21:** 'How to Write Objective Questions Effectively.' The Facilitator should note that this is a long and very important Handout that provides guidelines for writing effective objective questions in each of the various formats that they may take (e.g., Short Answer, True-False, Multiple Choice, etc.). But before getting into these guidelines, the Facilitator should review the key point that Objective

Questions can only have ONE answer and if this is not the case, then it means that the teacher has either written the question in a faulty way or that the question is not objective in terms of its classification. Review the definition of an Objective Question provided in the Handout:

Next, the Facilitator should note the **advantages** and **disadvantages** of Objective Questions. For example, their ability to be answered quickly means that they can be used to cover a great deal of content in a short period of time. This makes them ideal for the development of Summative Tests in which there is usually a great deal of content to be covered.

What is an Objective Question?

An Objective Question is a kind of question for which there is only ONE correct answer. When scored, the question must be evaluated as either completely right or completely wrong.

Review and discuss the other advantages and disadvantages of Objective Questions provided in the Handout:

Format of Objective Questions

- Such questions have multiple formats including Fill-in the blank, Matching, True-False, and Multiple Choice.

Scoring Objective Questions

- Scoring is done 'dichotomously', meaning that objective questions are marked completely right or completely wrong.
- There is only ONE Correct Answer

Advantages

- Effective for covering a lot of content
- Students can answer quickly leading to time efficiencies
- Easy to correct with high inter-rater reliability
- Can be used to measure constructs at the level of Memory, Understanding, Application, and Analysis

Disadvantages

- Cannot be used to measure creativity or synthesis level skills
- Cannot be used to measure process skills
- Difficult to write

Important Guidelines to Effectively Write Objective Questions of Different Formats

The remaining content in this session focuses exclusively on improving participants' understanding of how to write objective questions of different formats (e.g., Multiple Choice, True-False, etc.) well. The Facilitator should note that particpants are probably already aware of each of these different question for-

mats but that teachers often write them in a faulty manner. Indeed, it is important to note in this regard that objective questions are much more difficult to write than Essay Questions. Thus, the guidelines to be discussed going forward will help to provide a structured discussion on effective question writing that covers the following points:

- **The Basic Structure of a Question Format:** Whether it is a Short Answer Question or Multiple Choice, the Handout gives a clear description of the basic structure of each kind of question format.
- **Subvarieties of the Question Format:** The Handout provides examples of the different varieties and sub-varieties that a particular question type may have.
- **When to Use it:** The Handout dicusses in what contexts and for what sorts of content and thinking skills a particular question format is most appropriate (e.g., to assess memory level skills, higher order skills, etc.).
- **Strengths & Weaknesses:** The Handout also dicussess the Advantages and Disadvantages of each question format (e.g., its ability to prevent guessing, how difficult it is to write, its flexibility, etc.).
- **Guideiines on Writing Specific Question Formats:** The most important discussion in the Handout will provide actual rules for writing objective questions of different formats. These writing guidelines are supplemented with acutal examples, each of which exemplify a given guideline.

The Facilitator should present each of the question formats described in **Handout 21** using a question-and-answer type approach to better gauge how familiar with each question participants are. The Facilitator should place a particular focus on common mistakes in writing different objective questions using the examples provided. Ask participants if they can see some of the faulty characteristics in the examples provided before actually telling them what the problems are.

Writing Exercises

When the Facilitator has completed the presentation of all question formats, pass out textbooks, poster paper, and marker pens to each small group. It is advisable to make sure that participants are organized into small groups according to their subject area of expertise. Using the textbooks, ask participants to choose any lesson from the textbooks and write one or more objectives for the lesson followed by questions that use three or more of the different question formats that were discussed earlier. Provide particpants at least one hour to complete this activity. Participants should write their objectives and corresponding questions on poster paper so that it can be presented to the large group.

When participants have completed this exercise, ask them to tape their poster paper sheets on the walls around the classroom to present them to the large group. The Facilitator should help to critique the questions that particpants have written in terms of the guidelines earlier provided. When critiquing particpants' work, be sure to consider some of the following issues:

- Are the questions developed by participants able to measure the thinking skills indicated in the objectives? For example, if participants have devel-

	oped an instructional objective at the application level, does the question also assess students' ability to apply principles and/or concepts as well? • Do the question formats used by participants show variety? • Do the questions follow the writing guidelines explained earlier? For example: o Are the stem and responses of multiple-choice questions properly structured? o Do questions follow the structural format that was explained in the Handout? o Do questions include any 'clues' that might promote guessing behavior? o Do the responses in a question overlap with one another? o Are there always enough responses to minimize guessing behavior (e.g., Multiple Choice Questions should always have at least 4 responses; Matching Questions should have more responses than things to be matched, etc.). o Etc.
👂	When the Facilitator has completed critiquing each group's work, provide some time for wrap-up and additional questions from participants about Objective Question types.

3.8 Writing Essay Questions

Lesson Time: 3 Hours

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts as listed below.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- **Handout 22:** *Defining Subjective Test Questions and Understanding their Limitations*
- **Handout 23:** *The Use of Directing Words When Writing Essay Questions*
- **Handout 24:** *Challenges in Scoring Essay Questions*
- **Handout 25:** *Overview of Essay Questions*

Learning Outcomes

1- Participants can correctly define what a Subjective Question is.

2- Particpants can explain the difference between Extended Response Essay Questions and Restricted Respons Essay Questions.

3- Participants can explain the limitations of using essay questions to assess students' understanding in terms of multiple factors including their ability to sample content, the amount of time needed to answer essay questions, sampling reliability, and the use of directing words.

4- Participants are able to use Directing Words effectively when writing essay questions.

5- Participants can explain some of the key challenges that occur when scoring essay questions in terms of issues of reliability.

6- Participants are able to explain what the Halo Effect is and how this plays a role in scoring essay questions.

7- Participants are able to explain different methods for scoring essay questions including the 'Analytical Scoring Method' and the 'Global (or Holistic) Scoring Method.'

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

Characteristics of Subjective Questions

The Facilitator should start this session by reflecting once again on the differences between objective questions and subjective questions, also called Essay Questions. The Facilitator may summarize these differences by drawing the following table on the whiteboard:

Factor	Objective Questions	Subjective Questions
Scoring	Dichotomous	Scores may vary depending on the scorer
Response Generation	Students choose predetermined responses	Students must generate responses that comprise sentences or paragraphs

The Facilitator may either try to elicit responses from participants when completing this table or simply explain the table at one time. The important thing to note is that Objective and Subjective Questions are mainly distinguished by the way that they are scored and how students generate responses, as noted above. Be sure that these two key differences are well understood.

After providing the above explanation, the Facilitator is now ready to disbribute **Handout 22:** 'Defining Subjective Questions and Understanding their Limitations.' Review the definition of a Subjective Question in the Handout and link this definition with the table that was drawn on the board above.

> ***What is a Subjective (Essay) Question?***
>
> *Subjective Questions generally take the form of what is known in English as an Essay Question. An Essay is a 'free response' question that requires students to produce a written response in sentence or paragraph form, rather than to select the correct response from a number of alternatives or to generate a short word or phrase. Subjective Questions are not scored dichotomously and point awards for a student's response may vary from scorer to scorer.*

Different Kinds of Subjective Questions

Afer reviewing the basic definition of a Subjective Question, the Facilitator is now ready to help participants distinguish between the two basic types of Subjective Questions noted on the Handout:

- ***Extended Response Essay Questions***
- ***Restricted Response Essay Questions***

The Facilitator should explain each of these two types of Subjective Questions using the explanation provided on **Handout 22.** In order to summarize the differences between these two types of questions, draw the following table on the whiteboard and ask partipcants to help complete it based on the explanation provided:

(Complete the table below in plenary)

	Extended Response Question	Restriccted Response Question
Advantages	• Allows students to show their creativity • Useful for Instructional Objectives at the level of Evaluation & Creating	• Useful for Instructional Objectives at the level of Remembering, Undersanding, Applying, and Analysis. • Easier to score than Extended Resonse Essays • Has higher Reliability
Disadvantages	• Difficult to score • Low Reliability	• Not useful for measuring thinking skills at the level of Evaluation & Creating

The Facilitator should fill in the table with the large group using the above example as a guide for the ensuing discussion.

The Limitations of Subjective Questions and Why They Require Caution When Used

The Faciltiator should start this next topic with a question:

Many teachers like using Essay Questions for their end of semester tests. Do you think this is a good idea? Why or Why not?

The Facilitator should lead a large group discussion to answer this question. Use the discussion guide below to help lead the discussion:

Guided Discussion Points

- It is the opinion of most assessment specialists that exclusive use of Essay Questions on summative tests is not good practice because they have *limited content sampling ability* and *low reliability*.
- One important reason for the problem of *limited sampling coverage of curricular content* is that Essay Questions take a long time to answer. Thus, only a few questions can be asked in the limited time available.
- Essay Questions may be used on summative tests but should not represent more than 20% of the total points on the test as a general rule of thumb.
- Limit the use of Essay Questions to higher order thinking skills such as Evaluating and Creating because objective questions cannot assess these skills.

After the large group discussion using the guided discussion points above, the Facilitator should next review the limitations of Subjective Questions, mainly

Essays, that are described in **Handout 22.** These points should echo many of the same points that were made in the discussion above.

The Importance of Directing Words in Writing Essay Questions

The Facilitator should next introduce the topic of 'Directing Words' by passing out **Handout 23:** 'The Use of Directing Words When Writing Essay Questions.' Directing Words refer to the key verbs in the Essay Question that tell students what they should include in their answers. Review the guidelines for choosing Directing Words and ensuring that students understand the meaning of these words, as this is explained in **Handout 23.** In particular, the Facilitator should note that Directing Words directly correspond with the various levels of thinking skill as described in Bloom's Taxonomy. Bring special attention to commonly worded questions at various levels of Bloom's Taxonomy, as shown in the table below:

The Chart below illustrates some appropriate Directing Words for different levels of thinking in Bloom's Taxonomy. . .

Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
-What . . . -Where . . -When . . -Who . . . -Define .. -Outline . -State . . .	-Why . . . -How . . . -State in your own words . -Show . . . -Demonstrate -Summarize	-Apply . . . -What would happen if . . -What best illustrates . . . -Explain how X would react to . . . -Illustrate . . . -Prove . . . -Demonstrate . .	-What relationship exists between . . . -Identify the main idea . . . -Analyze . . . -Distinguish -Examine . .	-Draw conclusions . . -Defend the idea that . . . -Evaluate . . . -Compare . . .	-Propose an alternative to . . . -Devise . . . -How else would you . . .

After reviewing the topic of Directing Words, ask participants to try to develop Essay Questions at each level of Bloom's Taxonomy as these relate to the famous story, *Tum Tiew.* This exercise is explained at the end of **Handout 23.** Pass out poster paper and marker pens to each small group for this purpose. Give participants about 30 minutes for this exercise. When they are done, ask each group to present their questions to the whole group. The Facilitator should help to critique each presentation according to the guidelines presented.

Challenges in Scoring Essay Questions

The final topic in this session concerns scoring Essay Questions. The Facilitator should start this section by noting to participants that while Essay Questions are easier to write than objective questions, they are much more difficult to score. This is the opposite of objective questions, which are difficult to write but easy to score. To better explain the challenges of scoring Essay Questions, the Facilitator should distribute **Handout 24:** 'Challenges in Scoring Essay Questions.' As noted in a previous Handout, Essay Questions have significant limitations in terms

of their reliability. The award of points for the same student response may vary between teachers and may even vary for the same teacher depending on when he or she corrected the question. This probem is sometimes referred to as *inter-rater reliability.*

In order to demonstrate the problem of reliability, the Facilitator should do the exercise provided in **Handout 24.** In this exercise, the Faciliator asks participants to read a sample of a student response to an Essay Question to assign a score between 1 to 10, based on their own assessment. Give participants about 5 minutes to read and score the student's response. Then, do a survey to find out the spread of scores using the table provided in the Handout. Indicate how many participants awarded 1 point, 2 points, etc using the table provided below:

When the Facilitator has completed the survey of participant score awards, ask participants to answer the questions provided in the Handout. Discuss these answers as a large group. Some of the key points to highlight in this discussion include the following:

Points Awarded	How Many Participants Gave This Score?
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

- Teachers vary from one to the other in awarding point scores to the same response.
- Scores tend to cluster towards the middle, because it is 'safe' to avoid an extremely high or low score.
- If clearer criteria had been provided for scoring this question, this might have lessened the amount of variation in scoring; however, even when providing clear criteria for scoring, it is likely that some variation will still occur. That is, we can never achieve the same level of reliability that exists for objective questions when compared to marking an Essay Question.

Two General Approaches for Scoring Essay Questions

The Facilitator should next note that two methods of scoring Essay Questions exist to help teachers address problems relating to reliability. These methods are known as the following:

- ***Analytical Method***
- ***Global Method***

In order to effectively explain these scoring methods, the Facilitator should come back to **Handout 24:** 'Challenges in Scoring Essay Questions.' Explain that this Handout provides useful guidelines for correcting Essay Questions using either the Analytical or Global Methods. But the Facilitator should first emphasize once again that Essay Questions present significant difficulties for issues relating to Reliability as we already saw in the survey exercise that was just done earlier.

The Facilittator should review the techniques used in each scoring method using the Discussion Guide below:

Analytical Method

- The teacher should write a model answer to the question. Alternatively, the teacher may also choose a student answer that is a model as well.
- The teacher should create a system that identifies specific criteria for giving points. The criteria identified by the teacher may have different weighting. Take the following example below for a question worth 10 points:
  - Logic and Organization of the Answer: 5 points
  - Effective Writing Style and Presentation: 3 points
  - Spelling and Grammar: 1 point
  - Neatness: 1 point
- Notice in that in the set of criteria described above, the teacher puts more weight on the 'substance' than the 'form' of the answer. Breaking down the scoring criteria in this way helps to strengthen reliability even though it creates quite a lot of extra work for the teacher.

Global Method (Sometimes also called the Holistic Method)

- The teacher should create 4 or 5 spaces on their desk to organize papers from best to worst:

- Read a student's paper and place it into one of the categories organized on the teacher's desk as in the diagram above. Suppose the first student answer read by the teacher goes into the 'Excellent' space; but let's further suppose that a second answer read by the teacher is even better than the first one. This may require the first paper to go into the 'Very Good' category while the second paper goes into the 'Excellent' space. The teacher may continuously adjust the classification of papers as he reads through students' answers.
- This method can be very time consuming and may require re-reading students' answers several times before a final judgement can be made.

After presenting this explanation, the Facilitator should take questions from participants and discuss any comments that they might have. During this discussion, the Facilitator should be sure to explain the problem of what is known as the *'Halo Effect.'* This is a common problem in many areas of judgement, including the correction of Essay Questions. The most common example of the Halo Effect is when teachers give execessively high marks to students who have nice handwriting and present their answers in a very neat form, even though their answers may not have much substance. Another example of the Halo Effect is when students engage in what is called 'bluffing,' which occurs when students use flowery languge in their answers to disguise the fact that they actually do not know the answer. The Halo Effect is not a problem in objective questions, which is one of their primary strengths. Nevertheless, teachers must always be on their guard against the Halo Effect when scoring Essay Questions.

Overview of Essay Questions

Finally, the Facilitator is ready to summarize this session on Essay Questions. For this purpose, pass out **Handout 25:** 'Overview of Essay Questions.' This Handout provides a good summary of the key characterisitics of Essay Questions including their strong and weak points. For example, Essay Questions are easy to write but difficult to score. They are excellent for measuring higher order thinking skills but because of the great difficulty involved in scoring them, they should be used sparingly in examinations. The Facilitator should close the session by taking any remaining questions from participants.

Factor	Characteristics
How easy to design?	• Essay Questions are relatively easy to write
Level of Thinking Measured?	• Restricted Response Essay Questions are appropriate for assessing Comprehension, Application, and Analysis. • Extended Response Essay Questions are appropriate for Evaluation and Creation.
How Efficient to Cover Content?	• Because Essay Questions take a long time to answer, the amount of content that they can be used to cover is highly limited.
Impact of Guessing?	• Guessing is not an issue in Essay Question Responses. However, Essay Questions are susceptible to the Halo Effect when scoring.
Dangers of Irrelevant Clues that influence responding?	• Essay Questions rarely give irrelevant clues to students to help them to respond.
Scoring?	• Essays are very difficult and time-consuming to score and suffer from very low reliability.

Part 3: Question Banking

3.9 Conducting Item Analysis and Constructing Question Banks

Lesson Time: 4 Hours

Trainer Preparation:

- Write up the Learning Outcomes of the lesson on a sheet of poster paper to introduce the lesson.
- Make copies of all Handouts and other forms as listed below.
- The trainer should bring one or more sets of examination papers from an actual test administration that occurred in someone's school. Specific questions from these tests will be analyzed by participants using Item Analysis procedures.

Resources/Materials:

- Poster paper, marker pens
- Poster sheet summarizing the learning outcomes of the lesson.
- Samples of actual examination papers answered by students
- Item Data Tabulation Sheet
- Item Analysis Score Card
- **Handout 26:** *About Item Analysis*

Learning Outcomes

1- Participants can explain the Definition, Purpose, and Advantages of using Item Analysis.

2- Participants can define Item Difficulty and Discrimination

3- Participants can calculate Indices of Difficulty and Discrimination using standardized formulae.

4- Participants can organize Item Analysis procedures including (i) the ranking and selection of student test papers; (ii) encoding data on standardized tabulation forms; (iii) determining Indices of Difficulty and Discrimination based on tabulated data; and (iv) transferring data to an Item Analysis Score Card.

5- Participants can interpret data generated by an Item Analysis in a way that enables them to improve the functioning of specific questions.

6- Participants can explain what a Question Bank is.

Training Session Plan

Outcomes of the Lesson

Place a sheet of poster paper up on the board that summarizes the learning outcomes for the lesson. Explain the outcomes and that these results exemplify what the participants should be able to do at the completion of the lesson.

The Definition, Purpose, and Advantages of Item Analysis

The Facilitator should start this session with a series of questions about the tests that teachers give to their students such as the following:

- *When you give tests, do you see big fluctuations in the performance of your students from test to test?*
  - ***Discussion Notes:*** Test scores among students often fluctuate and this may be a result not of changes in learning outcomes but rather in the validity of the questions that have been developed.
  - ***Discussion Notes:*** Problems in the validity of questions may suggest that they are too easy or too difficult and do not discriminate well between the best performing students and those who are not performing well.
- *How confident are you that the questions that you put in your tests are functioning well?*
  - ***Discussion Notes:*** If teachers said they are confident in the functioning of their tests, what sort of evidence did they base this conclusion on? Such conclusions should be based on firm evidence from question analysis but the sad truth is that most teachers never analyze their questions after they have been administered; therefore, they really have no idea how well their tests are functioning.
- *Do you ever re-use questions on tests from year to year or do you just throw away the questions that you wrote and write new questions?*
  - ***Discussion Notes:*** Many teachers do not re-use questions because they are afraid that students may have seen old tests, which gives them unfair advantage. Sadly, throwing questions away from year to year means that teachers are losing a valuable educational asset because analyzed questions can be improved in terms of their validity, thereby raising the overall quality of testing instruments.

The Facilitator should lead a guided discussion on these questions using the discussion notes provided under each question above. The main point that the Facilitator wants to make after this discussion is that one's tests will only yield valid evaluations of student learning if the questions are functioning properly (e.g., not too hard, not too easy, aligned to the purpose for which they were designed, etc.). Unfortunately, teachers usually throw away used questions and start with new questions on the next test instead of analyzing how well they functioned and making improvements accordingly. Throwing away unanalyzed questions, therefore, results in the loss of a potentially valuable resource.

The Facilitator should next note that today's session seeks to help teachers analyze their test questions, make improvements in questions based on solid evidence, and improve the quality of classroom tests in the process. The best way to achieve this outcome is through a process called ***Item Analysis.***

Pass out **Handout 26: 'About Item Analysis'** to all participants. Explain the first page of the Handout (Sheet 1) focusing on the Definition, Purpose, and Advantages of Item Analysis. To some degree, these issues may already have been understood as a result of the earlier discussion. The Facilitator should review these points again for reinforcement, as well as any outstanding points in the Handout not already covered.

Information Provided by Item Analysis

The Facilitator should next move to the kind of information that Item Analysis can generate to help teachers know whether a question is functioning properly. For this purpose, ask participants to look at Sheet 2 of **Handout 26.**

Start the discussion by asking participants whether a question in which all students answered correctly (or incorrectly) is a good question? Clearly, when everyone is responding correctly or incorrectly, the question is operating at the extremes and probably not generating accurate information about students' understanding. The Facilitator should explain that, as we saw in a previous section of this manual, summative tests should contain questions of 'moderate' difficulty. For formative tests, however, we may want questions in the 'easy' range.

But how do we know if a question is of easy, moderate, or high difficulty?

The Facilitator should explain that Item Analysis will tell the teacher how easy or difficult a question is.

Moving to the next issue raised in the Handout, review what teachers think about a question in which the poorly performing students answer correctly while those students who are stronger performers answer incorrectly. In general, we expect that questions should be able to discriminate well between the high and low performers. The question described in the Handtout on Sheet 2 is, therefore, a poorly performing question because it has low discrimination power. Once again, Item Analysis will tell a teacher how well a question can discriminate between high and low performing students.

In summary, the Facilitator should stress that Item Analysis will tell the teacher the **Difficulty Level** and the **Discriminating Power** of a question.

Steps in Conducting Item Analysis

The Facilitator should next ask participants to turn to Sheet 3 of **Handout 26.** This sheet explains how to organize the Item Analysis process and tabulate data. For this purpose, the Facilitator shoud organize the participants into two or three large groups of perhaps 5 to 10 persons each.

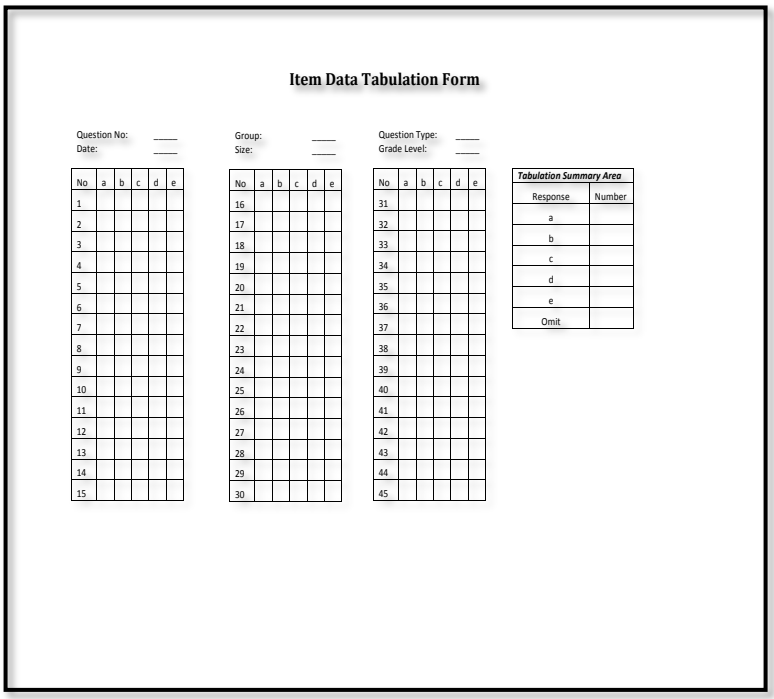
Next, pass out three separate sets of test papers from three different classes. The test papers should be actually marked tests that have been completed by students and comprise mainly 'objective test questions.' Each test paper should have a clearly visible total mark at the top of the front page of the test that summarizes each student's total score. The number of test papers should be anywhere between 30 to 50 papers for each group.

Explain to each group that the first step in conducting an Item Anaysis involves ranking the test papers from the highest to the lowest score. Once this has been done, the groups should create what is called an Upper Group and a Lower Group. Usually, 27.5% of the top scoring students are assigned to the Upper Group while the 27.5% of the lowest scoring students are assigned to the Lower Group.[1] For example, if a test group has 40 students in it, one would take the top 11 scoring students to form the Upper Group (i.e., 40 x 27.5% = 11) and the 11

[1] Kelly, T. L. (1939). The Selection of Upper and Lower Groups for the Validation of Test Items. *Journal of Educational Psychology.* Vol. 30, p.p. 17-24.

lowest scoring students to form the Lower Group. The remaining student test papers in the middle are put aside and not used in the Item Analysis.

The Facilitator should next explain that participants are now ready to tabulate the test data. In order to tabulate test data, one has to use the Item Data Tabulation Form shown in **Handout 26.** To get some practice in using this form, the Facilitator should distribute additional tabulation forms to each group. For each question on a test, one has to use two tabulation forms. One form is used to tabulate the response patterns of the Upper Group and another form is used to tabulate the response patterns of the Lower Group. After completing the information required at the top of the form, one should next look at the response to Question 1 by the first student in the Upper Group. If the student chose Response 'a' for the question, one would check (√) the box under Column 'a'. Then, go to the next student in the group and see what response he/she chose for Question 1. If that student chose Response 'd,' then check the box under Column d for Row 2 and continue in this way until the responses of all students in the Upper Group to Question 1 have been recorded. Follow the same procedure for students in the Lower Group on a separate Tabulation Form and summarize the response patterns of both groups in the small box at the far-right hand side of the form. Finally, staple the two tabulation forms for Question 1 together so that they do not become separated.



Item Data Tabulation Form

Question No: ____
Date: ____

Group: ____
Size: ____

Question Type: ____
Grade Level: ____

No	a	b	c	d	e
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

No	a	b	c	d	e
16					
17					
18					
19					
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22					
23					
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25					
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29					
30					

No	a	b	c	d	e
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					

Tabulation Summary Area	
Response	Number
a	
b	
c	
d	
e	
Omit	

Following this explanation, ask all participant groups to continue analyzing test questions for each question on the tests that they received, using two tabulation forms per question. For the information required by calculating Indices of Difficult and Discrimination, wait until the completion of the following section.

Calculating Indices of Difficulty and Discrimination

The Facilitator should next start a discussion that explains how to calculate Indices of Difficulty and Discrimination. Start first with finding the **Difficulty Level** of a question. For this purpose, ask participants to look at Sheet 4A in **Handout 26,** where they can see the formula for calculating a question's difficulty level:

$$\textit{Index of Difficulty} = \frac{N_u + N_l}{N_{u+1}}$$

The Facilitator should explain that this formula essentially means that one counts up the number of students anwering a given question correctly in both the Upper

and Lower Group and then dividing by the total number of students in both groups. In the example provided, there are 8 students in the Upper Group and 8 in the Lower Groups for a total of 16 students. Five students in the Upper Group answered a question correctly whereas only 2 could do so in the Lower Group, so the total number of students answering correctly was '7.' Therefore:

$$7 \div 16 = 0.44 \times 100 = 44\%$$

The Index of Difficulty for this question is 44%. Using the interpretive scale provided in Sheet 4A, this means that the question is of 'moderate' difficulty.

Following this example, ask participants to calculate the Index of Difficulty for some of the questions that they have already analyzed and be prepared to interpret what the Difficulty Index that they calculate actually means, using the interpretive scale provided in Sheet 4A of the Handout.

The Facilitator should next move to showing participants how to calculate the Index of Discrimination. This explanation can be found in Sheet 4B of **Handout 26.** Remind participants that Discrimination refers to the ability of a question to demonstrate correct responding among high performing students and incorrect responding among more poorly performing students.

The Facilitator should continue to explain that the formula to find the Index of Discrimination is similar to the formula for Difficulty with some important differences. First, we subtract the number correct responders in the Lower Group from the Upper Group (instead of adding them together). Then we divide by the total number of students in a single group (instead of taking the combined number of students in both groups). Therefore, the formula reads as follows:

$$\textit{Index of Discrimination} = \frac{N_u - N_l}{N_g}$$

Using the example from before, one would calculate the Index of Discrimination as follows:

$$(5 - 2) \div 8 = 3 \div 8 = 0.38$$

Using the interpretive scale provided in Sheet 4B, this means that the question has a moderate level of Discrimination, since 0.38 falls within the range of 0.20 to 0.39. Questions with moderate or high levels of discrimination are considered to be functioning properly but questions with low or even negative discrimination need to be revised or even thrown out completely.

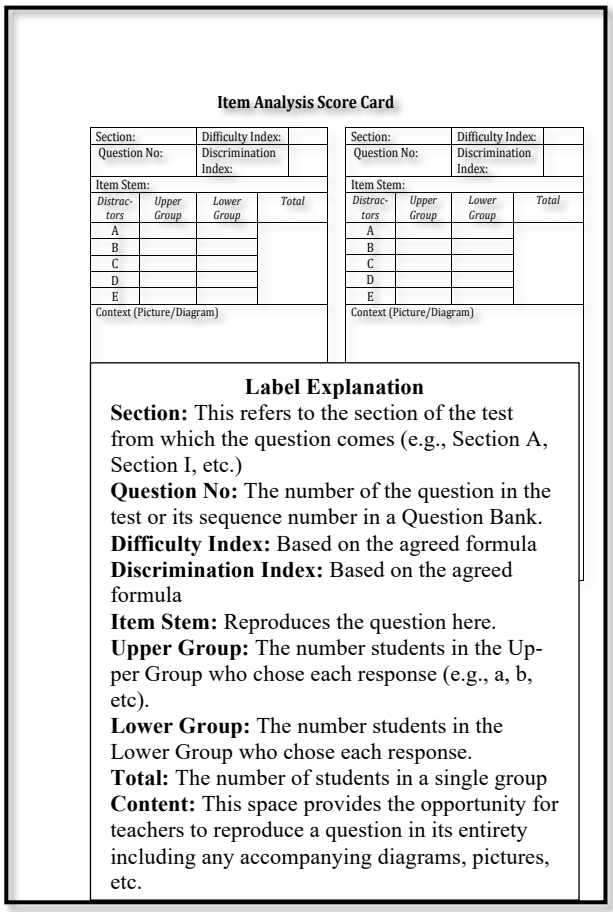
Following this example, ask participants to calculate the Index of Discrimiation for some of the questions that they have already analyzed and be prepared to interpret what the Discrimination Index that they calculate actually means, using the interpretive scale provided in Sheet 4B of the Handout.

Interpreting Your Findings from Item Analysis

Once the Facilitator has completed the above explanations about Difficulty and Discrimination, the participants are now ready to go to the last step of Item Analysis – this refers to actually *interpreting* what the data from the analysis actually means.

In order to prepare participants for making interpretations about data generated by Item Analysis, bring their attention to the Item Analysis Score Card shown in

the Handout. Point out that one score card is used for one question. There are two tables shown in a score card because this helps to show the user the evolution of a question after multiple administrations with respect to its functionality. Explain what information goes into each space of the card, as noted at the bottom of the figure to the left.



Item Analysis Score Card

Section:	Difficulty Index:	
Question No:	Discrimination Index:	

Item Stem:

Distractors	*Upper Group*	*Lower Group*	*Total*
A			
B			
C			
D			
E			

Context (Picture/Diagram)

Section:	Difficulty Index:	
Question No:	Discrimination Index:	

Item Stem:

Distractors	*Upper Group*	*Lower Group*	*Total*
A			
B			
C			
D			
E			

Context (Picture/Diagram)

Label Explanation

Section: This refers to the section of the test from which the question comes (e.g., Section A, Section I, etc.)
Question No: The number of the question in the test or its sequence number in a Question Bank.
Difficulty Index: Based on the agreed formula
Discrimination Index: Based on the agreed formula
Item Stem: Reproduces the question here.
Upper Group: The number students in the Upper Group who chose each response (e.g., a, b, etc).
Lower Group: The number students in the Lower Group who chose each response.
Total: The number of students in a single group
Content: This space provides the opportunity for teachers to reproduce a question in its entirety including any accompanying diagrams, pictures, etc.

After providing the above explanation, review the examples given in Sheet 5 of **Handout 26.** Ask the questions provided and discuss participants' responses based on the examples given.

Following the review of examples described above, the Facilitator should ask participants to complete their own Item Analysis Score Cards based on the data they generated in their tabulation sheets. Ask participants to write in their data into an Item Score Card. Pass out additional Score Card sheets as needed. Then, ask particpants to present their findings to the large group and indicate whether a question needs to be revised in any way. Be sure to ask particiapnts why a question needs to be revised (e.g., too easy, too difficult, does not discriminate well between high and low performing students, etc.). Discuss each group's analysis in plenary.

Question Banking

When the discussion has been completed, the Facilitator should point out that when we bring together multiple question analyses in one place, we have created what is called a Question Bank. The collected Item Analysis Score Cards form the content of the Question Bank. Questions in a Bank should be organized by topical areas so that they can be easily accessed. Be sure to urge participants to create their own Question Banks when they return to their schools. Such banks can be formed at the class level or for an entire school.

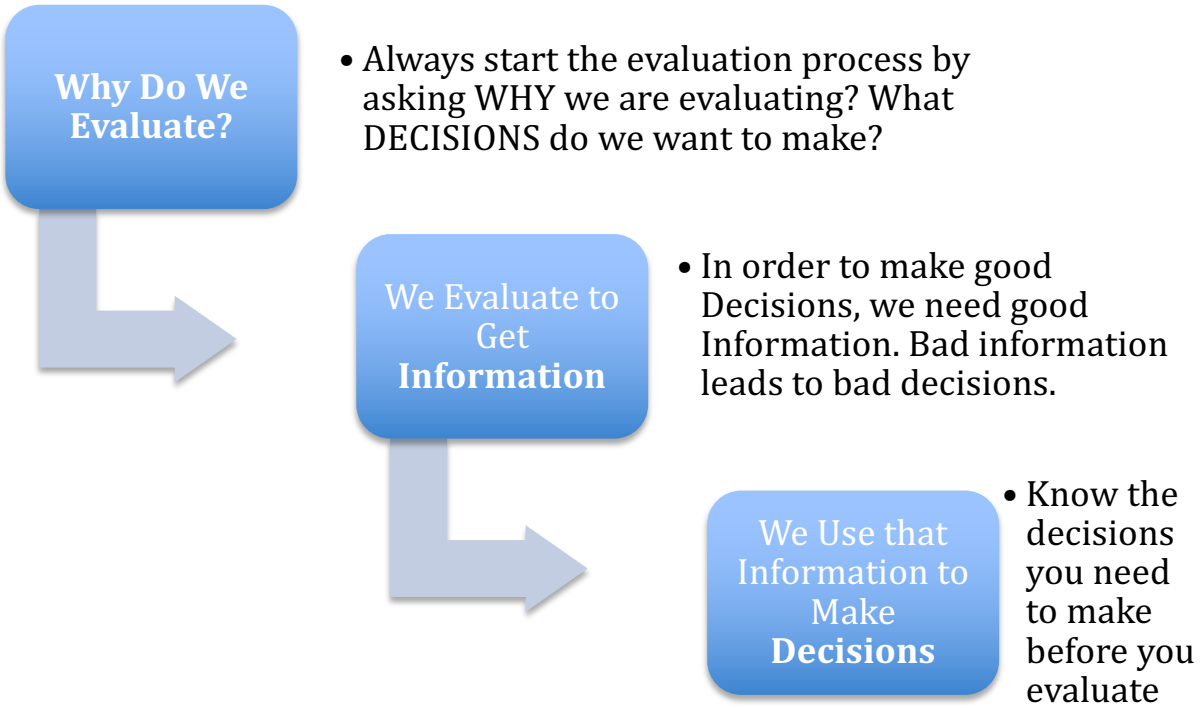
SECTION 4: Course Materials

HANDOUT 1: Why Do We Evaluate?

Understanding the Purpose of Evaluation

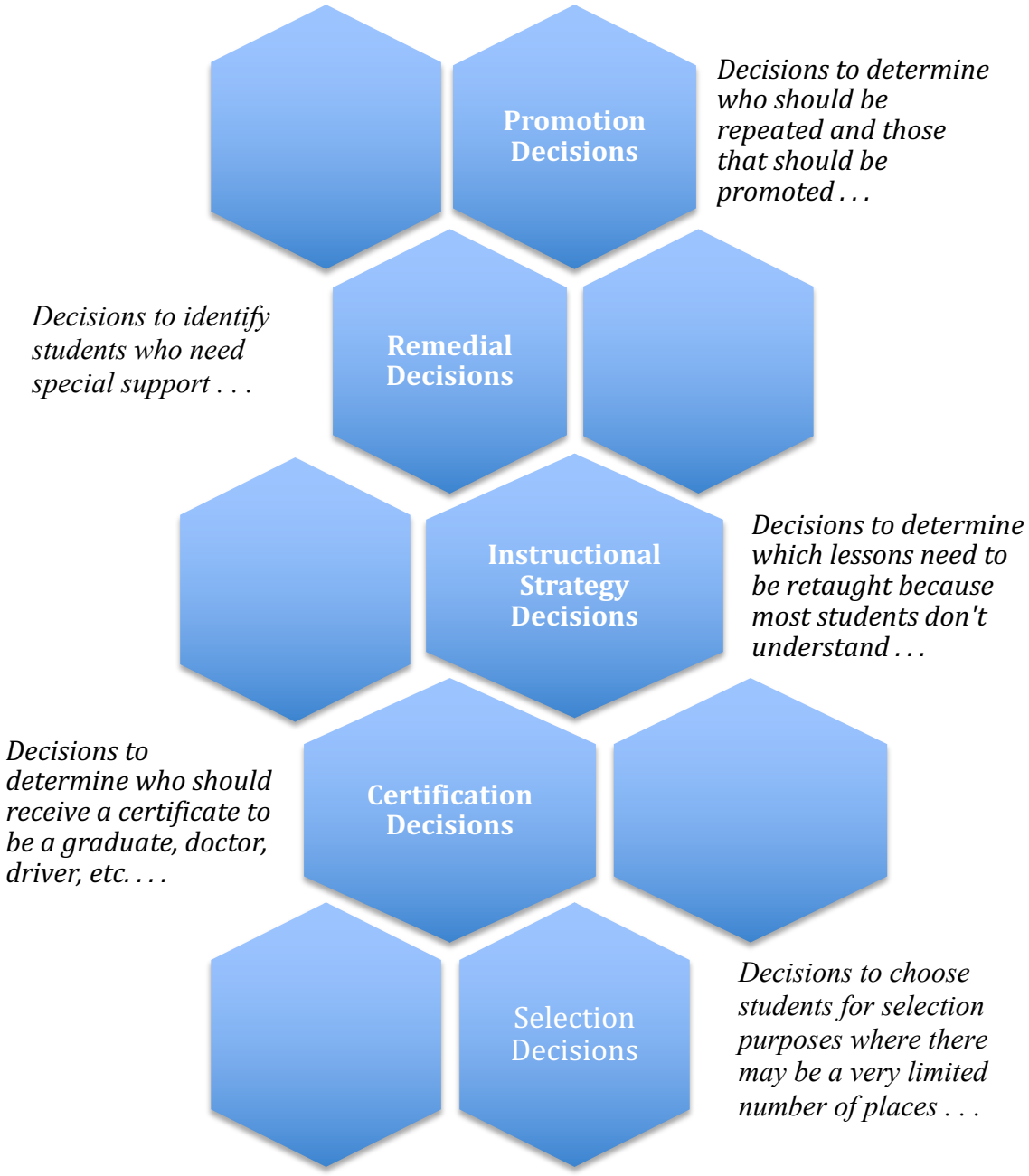
Many teachers often do assessments without knowing clearly 'why' they are doing the evaluation. Often teachers do evaluation mechanically because it is something that the Ministry asks them to do. It is important for every teacher to reflect on what decisions need to be made **before** they start organizing their evaluation because the kinds of decisions that need to be made may affect the design of the evaluation.

In order to make **good decisions,** we need **good information.** If the design of the assessment that we organize does not match the purpose of the evaluation (i.e., the decisions that need to be made), we may get bad information. Bad Information will lead to Bad Decisions.



HANDOUT 2: Types of Educational Decision-making

We do evaluation to get **information** to make decisions. These decisions are often very different and may include the following **purposes** . . . .



HANDOUT 3: How Do We Get Information for Our Decision-making?

There are many ways that an evaluator can use to get information in order to make decisions. Some of these ways may be suitable for the classroom and others may be suitable for use outside of the classroom, depending on our purpose.

Some of the instruments and methods used to collect information may include the following:

Evaluation Strategies to Gather Information

HANDOUT 4: How Evaluation Purpose Affects Test Design

Explanation: Knowing the Purpose of one's evaluation is important because different purposes may affect the design of the assessment tool that one develops. There are 6 parameters to consider as summarized in the diagram provided below. Under each parameter, there may be different options to consider when designing one's evaluation.

Parameter	Options	Parameter	Options
Scoring Procedures	• Criterion-Referenced • Normative	**Timing**	• Often/Infrequently • Continuous/Terminal
Test Length	• Short • Medium • Long	**Kinds of Questions**	• Objective/Subjective • Product or Process-focused
Question Difficulty	• Easy • Difficult	**Evaluation Strategies**	• Written Test • Oral Test • Observation • Survey
Content Coverage	• Comprehensive • Sampling		

An Exercise and an Example

Directions: Consider the evaluation purposes provided below and determine how the purpose might affect the design of a test based on the parameters reviewed above.

Evaluation Purpose: Selection

Parameter	Suggested Design Feature	Parameter	Suggested Design Feature
Scoring Procedures	• Normative	**Timing**	• Once
Test Length	• Medium to Long	**Kinds of Questions**	• Mostly Objective • Product-focused
Question Difficulty	• Medium to High Difficulty Level	**Evaluation Strategies**	• Written Test
Content Coverage	• Sampling of Content		

Discussion: When one's purpose is 'selection' (e.g., for a scholarship or limited number of places in a school or university), it means that the number of candidates selected will be but a small handful of those applying. This suggests that one would only choose the top scoring candidates up to a point that equals the number of available places. That is, the scoring procedure would be 'normative.' The test should be medium to long to sample as much content as possible and the questions should tend towards the high difficulty level to get the most qualified candidates. In order to sample as much content as possible, one should use objective, product-focused questions, which can be answered quickly by candidates. This would be a one-time test since the purpose is a one-time selection.

Evaluation Purpose: Remedial Decisions

Parameter	Suggested Design Feature	Parameter	Suggested Design Feature
Scoring Procedures	•	**Timing**	•
Test Length	•	**Kinds of Questions**	•
Question Difficulty	•	**Evaluation Strategies**	•
Content Coverage	•		

Discussion: _____
_____
_____
_____

HANDOUT 5A: Types of Evaluation for the Classroom

Explanation: Different kinds of evaluation are usually characterized according to the purpose, which they serve. Two of the most important kinds of evaluation used by classroom teachers include:

Summative Evaluation & Formative Evaluation

The Name of the Evaluation Shows Its Purpose: Notice how in English the name of a particular kind of evaluation suggests its purpose. For example, the name *Summative* comes from the word 'summarize' or the purpose of summarizing a student's academic achievement. Similarly, the name *Formative* comes from the English word 'form' or the purpose of forming one's educational plans. In Khmer language, the term generally used to name Formative evaluation does not suggest its purpose. For this reason, we will generally use the English term to refer to Formative Evaluation.

Other Types of Evaluation: There are many other kinds of evaluation to be aware though Formative and Summative Evaluation are the most important to know for classroom teachers. Other kinds of evaluation to be aware of include:

Diagnostic Evaluation: This is a form of pre-assessment that allows a teacher to determine students' individual strengths, weaknesses, knowledge, and skills prior to instruction. It is primarily used to diagnose student difficulties and to guide lesson and curriculum planning. In this sense, it is similar to Formative Evaluation but only occurs *before* instruction begins and not during or after instruction.

Strategic Evaluation: This is a kind of evaluation that is done for very specific purposes such as determining a student's ***entry status*** (e.g., placement in an advanced class or a remedial support class), ***selecting*** a student for a scholarship of which only a few are available, or ***classifying*** a student's rank on a particular task or set of tasks. Strategic Evaluation is usually only conducted *once* to meet the specific purpose for which it was intended.

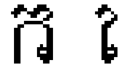
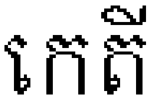
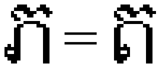
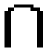
Formative Evaluation:

<table>
<tr><td>What is it?</td><td>A kind of evaluation that occurs before or during instruction for the purpose of guiding instructional planning and/or improve the effectiveness of one's teaching.</td></tr>
<tr><td>When is it used?</td><td>Formative Evaluation can be used for one or all of the following purposes:
1 Forming educational plans for a new group of students whose abilities in a specific subject are not yet known.
2 Assessing the effectiveness of currently used instructional strategies in the classroom.
3 Reviewing a specific topic to determine areas in need of re-teaching.
4 Identifying individual students who need remedial help in a given lesson.</td></tr>
<tr><td>How is it done?</td><td>The following pointers should help teachers to conduct Formative Evaluation effectively:
1 First, identify the specific learning unit that one wishes to evaluate. Usually the learning unit evaluated should have a limited domain with a small number of related objectives.
2 Second, be sure the learning area evaluated has a documented set of objectives.
3 Third, develop a test plan that covers all the objectives of the learning unit. The number in parentheses indicates the number of questions asked.
Subject: Set Theory
<table><tr><th>Topic</th><th>Remembering</th><th>Understanding</th><th>Application</th><th>Total</th></tr><tr><td>Idea of a Set</td><td>Objective A (2)
Objective B (2)
Objective C (2)</td><td></td><td></td><td>6</td></tr><tr><td>General Set Notation</td><td>Objective D (2)</td><td>Objective E (2)
Objective F (2)</td><td></td><td>6</td></tr><tr><td>Kinds of Set</td><td>Objective H (2)</td><td></td><td>Objective G (2)</td><td>4</td></tr><tr><td>Total</td><td>10</td><td>4</td><td>2</td><td>16</td></tr></table>*Note: 2 Questions per objective.
4 Fourth, set questions according to the test plan developed. The questions should be of a relatively low level of difficulty and should enable teachers to observe the student's process of thinking. Usually, an equal number of test questions are set for each objective. In the above plan, two questions are set for each objective.
5 Fifth, After correcting the results, the teacher should try to see which questions/objectives students got wrong the most to determine areas in need of re-teaching.</td></tr>
</table>

Exercise: What's the Problem?
Analyzing Students' Mistakes

Directions: *Formative Evaluation involves reviewing students' processes of thinking in order to know how best to reteach certain concepts. Review the student work provided below and indicate the mistake in their reasoning (not the mistake itself) that led the student to solve the problem incorrectly.*

No	*Student Work That Indicates a Mistake*	*Your Analysis of WHY the Student Did This Wrong*
1.	*1,300* *- 522* *878*	
2.	*140* *- 21* *120*	
3.	*1,300* *- 522* *788*	
4.	*521* *+ 888* *13,109*	
5.	*51* *+ 49* *90*	
6.	*9 > 11* *10 < 9*	
7.	*1 + 2 + 3 = 123*	
8.	*recieve* *niegbor*	
9.	ផឹដី តុចទ្ធា	

10.		*a)*
		*b)*
		*c)*
		*d)*

Summative Evaluation:

<table>
<tr><td>What is it?</td><td>A kind of evaluation that occurs at the end of instruction for the purpose of summarizing and documenting student achievement.</td></tr>
<tr><td>When is it used?</td><td>Summative Evaluation is the kind of assessment with which teachers are most familiar. It is the typical graded test administered at the END of a lesson to determine students' achievement. The Final Examination is the most classic example of a summative test.</td></tr>
<tr><td>How is it done?</td><td>The following pointers should help teachers to conduct Summative Evaluation effectively:
1. First, determine the range of topics that the summative test will cover. Usually summative tests cover a broader domain of content than do formative tests.
2. Second, be sure the learning area evaluated has a documented set of objectives.
3. Third, develop a test plan that 'samples' the range of objectives that have been identified. Due to its broader domain of content, the summative test cannot cover all objectives as in a formative test but must contain a representative sample instead. In summative tests, some objectives may be weighted more heavily than others.
Subject: Science (Unit 1 on Plants and Unit 2 on Health)
<table>
<tr><th>Topic</th><th>Remembering</th><th>Understanding</th><th>Application</th><th>Total</th></tr>
<tr><td>1. Natural Environments</td><td>3 Questions</td><td></td><td>1 Questions</td><td>4</td></tr>
<tr><td>2. Usefulness of Plants</td><td></td><td>5 Questions</td><td></td><td>5</td></tr>
<tr><td>3. Life Cycle of Plants</td><td>2 Questions</td><td>2 Questions</td><td>1 Question</td><td>5</td></tr>
<tr><td>4. Plant Classifications</td><td>3 Questions</td><td>2 Questions</td><td></td><td>5</td></tr>
<tr><td>5. The Skeleton & Muscles</td><td>1 Question</td><td>3 Questions</td><td>2 Questions</td><td>6</td></tr>
<tr><td>6. The Eyes</td><td>1 Question</td><td></td><td>1 Questions</td><td>2</td></tr>
<tr><td>7. Dengue & Malaria</td><td>2 Questions</td><td></td><td>4 Questions</td><td>6</td></tr>
<tr><td>Total</td><td>12 Questions</td><td>12 Questions</td><td>9 Questions</td><td>33</td></tr>
</table>
*Note: 2 Questions per objective.
6 Fourth, develop questions for the test according to the test plan. The questions should be of a relatively moderate level of difficulty. Since remedial instruction is not the purpose of summative evaluation, teachers should try to use objectively scored and product-focused questions (e.g., Multiple Choice Questions) on their summative tests as much as possible.
7 Fifth, grade test papers according to the weighting scheme specified in the test plan.</td></tr>
</table>

Designing a Summative Test

Directions: Given what you know about the purpose of Summative Evaluation, what sorts of characteristics do you think that a summative test would have? Clarify the various characteristics of a summative test by completing the table provided below. Make any necessary clarifications in the space provided below for Discussion.

Evaluation Purpose: Summative Decision-making

Parameter	Suggested Design Feature	Parameter	Suggested Design Feature
Scoring Procedures	•	**Timing**	•
Test Length	•	**Kinds of Questions**	•
Question Difficulty	•	**Evaluation Strategies**	•
Content Coverage	•		

Discussion: _____
_____
_____
_____

HANDOUT 5B: Summary of the Differences between Summative & Formative Evaluation

Formative Evaluation	Summative Evaluation
1. Coverage of short lesson segments	1. Coverage of longer lesson segments and units
2. Has a 'comprehensive' coverage of the objectives that have been taught since the content domain is narrow	2. 'Samples' the objectives that have been taught since the content to be assessed is extensive
3. Administered continuously	3. Administered terminally
4. Questions have a narrower range of difficulty levels tending towards easier questions.	4. Questions have a wider range of difficulty levels tending towards questions of moderate or high difficulty (but mostly moderate)
5. Uses a Criterion-referenced scoring framework	5. Uses either Criterion or Norm-Referenced scoring frameworks
6. Uses 'process-oriented' questions	6. Uses 'product-oriented' questions that can be answered quickly to maximize coverage.
7. Most often used for remedial and re-teaching purposes and not for final grading	7. Important in final grading for promotion purposes

HANDOUT 6: Useful Frameworks for Interpreting Test Scores

QUESTION:

Is the meaning of a test score a straightforward matter with little need for interpretation?

ANSWER:

No! . . .All educational measurement is open to interpretation. The interpretation of test scores should occur in a framework that is in harmony with the purpose of the assessment.

Two of the most important and frequently used interpretive frameworks employed for educational decision-making are known as:

Criteriion-referenced Scoring &

Norm-referenced Scoring

HANDOUT 7: Criterion-Referenced Scoring

<table>
<tr><td>What is it?</td><td colspan="4">Criterion-referenced Scoring is defined as assessment that is based on each student's 'mastery' of course objectives. Within this framework, a fixed 'criterion' set by the teacher, the school, or the Ministry defines content mastery (e.g., 50%, 65%, etc.)</td></tr>
<tr><td>Is it common?</td><td colspan="4">Yes! . . .Whenever you have given a test and used a pass mark of 5 points out of 10, you have used a criterion-referenced scoring framework for interpreting an educational measurement.</td></tr>
<tr><td>How do you set the criterion?</td><td colspan="4">There are no fixed rules for setting a criterion. The teacher, the school director, or the Ministry simply make a judgment regarding the criterion that seems to be most suitable.</td></tr>
<tr><td rowspan="2">Did you know this?</td><td colspan="4">Criteria for passing a test vary widely from country to country. In Cambodia, the Ministry of Education, Youth, & Sport defines content mastery as 5 points out of 10 or more.
Here are some other examples of assessment criteria used in other countries:</td></tr>
<tr><td>United States:
Netherlands:
United Kingdom:</td><td>65% out of 100
55% out of 100
50% out of 100</td><td>New Zealand:
India:
Cambodia</td><td>50% out of 100
40% out of 100
5 out of 10</td></tr>
<tr><td>When should I use Criterion-Referenced Scoring?</td><td colspan="4">To answer this question, several factors must be considered:
Factor 1: Purpose of the Assessment: When the purpose of one's assessment is to make educational decisions that concern Promotion, Certification, or Attainment of Minimum Level Competencies, then a Criterion-Referenced scoring framework is recommended.
Factor 2: The Nature of the Objectives: School systems will often use Criterion-Referenced scoring when they have clearly identified educational objectives whose attainment they wish to assess.
When objectives are documented clearly, the criterion for mastery can be pegged to the attainment of a minimum number of objectives (e.g., 50% of all documented objectives).</td></tr>
</table>

HANDOUT 8: Norm-Referenced Scoring

What is it?	Norm-referenced Scoring is defined as assessment that reflects a student's standing or position in comparison with other students. In such frameworks, even if a student studies hard, he may only receive an average grade if it so happens that everyone else also studies hard too.
Is it common?	Norm-referenced scoring is most often used in higher education contexts and sometimes at secondary school level. Schools sometimes use this framework if their goal is to select students for some specific purpose. In some cases, if all students do poorly on an examination, a teacher may decide to grade students on what is known as a 'curve.'
Did you know this?	When Cambodian teachers classify students by their rank at the end of each month, they are using Norm-Referenced Scoring.
When should I use Norm-Referenced Scoring?	***To answer this question, several factors must be considered:*** **Factor 1: Purpose of the Assessment:** Norm-Referenced scoring is most appropriate when the purpose of one's assessment is for educational decisions relating to *Selection, Admission,* or *Classification.* **Factor 2: Nature of the Students Who Are Being Assessed:** When the students being assessed are very diverse in nature encompassing school populations with widely differing facilities and resources, Norm-Referenced Scoring may be highly desirable to ensure that there are provisions in place to push lower scoring students over the passing line (using a curve).
How is it done?	**First,** remember the goal of Norm-referenced Scoring. In this kind of scoring, the teacher's goal is to produce a distribution of student performance that conforms with what is known as the Normal Distribution. In this distribution, the majority of students cluster around the center while the highest and lowest performing students can be found in the tails of the distribution.

The Normal Distribution

Second, find the middle of your distribution. In the Normal Distribution, the middle of the curve represents the 'average' level of performance. The middle of the distribution becomes the anchor on which your scoring is based.

Third, make up a new scale of marks based on the distance from the middle score. In this way, the teacher can make more students pass than ordinarily might have been the case (in cases where too many students performed poorly) or alternatively make more students fail if too many students scored at the higher range of the scale. This rearrangement of scores can be done through the use of percentiles. A percentile is a statistic that represents the percentage of students who stand above or below a certain mark.

Follow the steps below to create a normative scoring framework for a particular test:

1. *Take the number of students in the entire class and estimate some key percentiles (e.g., 90th percentile; 80th percentile, 75th percentile, etc.). In the example provided, there are 40 students in the distribution. This would mean that the 4th student from the top would be at the 90th percentile while the 4th student from the bottom would be in the 10th percentile.*
2. *Mark the scores representing key percentile points such as the 90th, 80th, etc.*
3. *Designate new scores to shift the scale in the direction that you want. In the example provided below, too many students are failing. That is, more than half*

scored less than 5 points, which is the cut-off for a passing mark. In the example provided, the teacher has shifted the scale so that 4.5 (the 50th percentile) becomes 7. All other scores now also shift upwards accordingly.

4. *Based on the new scale, 20% of students are counted as high performers (A), 70% are middle performers (B, C, or D) and 10% are non-performers (F).*

Old Score	Number	Percentile	New Score	Letter Grade	
10	I		10	A	
9.5	I		10	A	
9	II	------- 90th	10	A	
8.5	I		10	A	20%
8	I		10	A	
7.5	I		10	A	
7	I	------- 80th	9.5	A	
6.5	II		9	B	
6	III	------ 75th	8.5	B	
5.5	IIII		8	B	
5	III		7.5	C	
4.5	IIII	------ 50th	7	C	
4	II		6.5	C	70%
3.5	II		6	C	
3	II		5.5	D	
2.5	II	------ 25th	5	D	
2	II		4.5	D	
1.5	II		4	D	
1	IIII	------ 10th	3.5	F	10%
	40				**100%**

In this example, the teacher wants to ensure that 90% of students 'pass' and 10% fail. This is the resulting curve.

In the curve, 4.5 was the original median score (50th percentile) which has now been changed to 7

Questions for Discussion

1) How many students took this test?
2) What score represented the 50th percentile or median score? How many students scored above this score? What percentage does this comprise of the total distribution of students?
3) If this had been a criterion-referenced test in your school, what would have been the cut-off point for failing? How many students would have failed with this criterion for failing?
4) With the norm-referenced framework that the teacher made, how many students are now failing?
5) What do you think the teacher's purpose was in making this curve?

HANDOUT 9: Comparison between Norm and Criterion-Referenced Scoring

Parameter	Norm-Referenced	Criterion-Referenced
Purpose	**Used for:** • Surveying abilities and skills, • Determining individual differences • Discriminating between students • Admission decisions	**Used for:** • Assessing master of content • Determining achievement of minimum competency standards • Making Certification decisions
Evaluation Type	Summative Only	Summative or Formative
Interpretation of Performance	• Relative interpretations • Comparison with performance of others	• Absolute standard • Comparison of performance to an absolute standard
Content Coverage	• Objectives sampled are usually from a broad domain	• Objectives sampled can be from a broad or narrow domain
Timing	• Infrequent/Terminal	• Frequent or Terminal
Test Length	• Tend to be long • Relatively large number of items	• Can be either long or short in length
Question Difficulty	• Wider range of difficulty levels representing varied question difficulty levels	• Narrower range of difficulty levels concentrating on moderate to easy difficulty
Evaluation Strategies	• Written	• Written

HANDOUT 10: Checking Your Knowledge on Evaluation Principles

Directions: Based on your knowledge of Formative and Summative Evaluation, answer the questions below by choosing the ONE response that is the most correct.

1. The evaluation methodology selected by a teacher should be determined by the:
   a. content area.
   b. purpose of the evaluation.
   c. course objectives.
   d. student competencies.

2. A summative test should NOT be used for which of the following purposes?
   a. Reviewing a lesson
   b. Promoting a student
   c. Evaluating overall achievement
   d. Professional certification.

3. A monthly test in a Cambodian school is an example of a:
   a. formative test.
   b. norm-referenced test.
   c. summative test.
   d. certifying examination.

4. Process-oriented questions are most appropriate on a:
   a. formative test.
   b. summative test.
   c. selection test.
   d. certification test.

5. Certification decisions should ideally be based on evaluation procedures that:
   a. measure relative achievement.
   b. primarily involve observations.
   c. involve paper and pencil tests exclusively.
   d. specify a minimum competency level.

6. The most frequently expressed purpose for using Norm-Referenced testing is for:
   a. Discriminating among learners.
   b. Determining certification decisions.
   c. Remedial testing
   d. Determining mastery of content.

7. Which of the following best describes the characteristics of a summative test?
   a. Narrow domain of content that samples all the objectives taught.
   b. Broad domain of content that samples all the objectives taught.
   c. Broad domain of content that assesses all objectives comprehensively.
   d. Narrow domain of content that samples all the objectives taught.

8. Which of the following is not an example of Criterion-Referenced scoring?

a. Bac II Examination
b. Monthly tests
c. Monthly ranking of children
d. Semester examinations

Answers:

1. b
2. a
3. c
4. a
5. d
6. a
7. b
8. c

HANDOUT 11: Concepts of Assessment Validity

When ever a teacher designs a test, he or she should always keep in mind the following guideline:

> ***Educational Decision-making should be based on measurements derived from tests that are VALID.***

Validity: What is it?

The following key concepts will help you to understand what validity is:

Validity is defined as the extent to which a test 'serves the purpose' for which it was designed

- **Example:** Recording the marks of a formative test in the Grade Book for promotion invalidates the purpose for which the test was designed.

A test is valid when it is 'relevant' to the information that it seeks to evaluate.

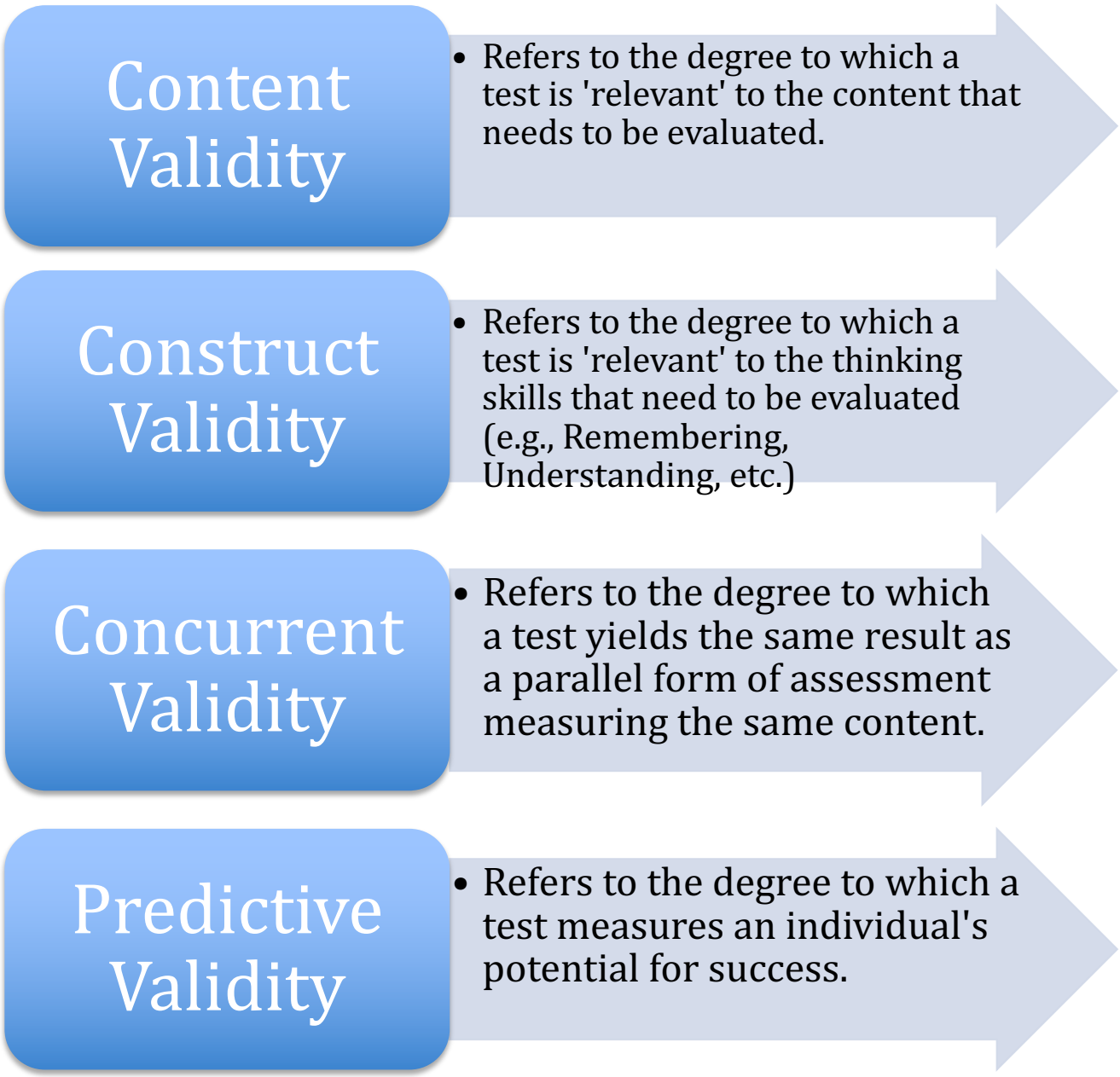
- **Example:** If a teacher teaches 50 objectives but then designs a test with only 5 questions, the test will have low validity because it was not relevant to what was taught.

A test is valid when the measurements obtained are 'reliable'.

- **Example:** If a teacher administers a test one week and gets a good result and administers a similar test on the same content the following week and gets a poor result, one or both tests may be invalid.

HANDOUT 12A: Kinds of Validity

There are 4 Kinds of Validity that the classroom teacher should understand. The definition of these kinds of validity will help the teacher to assess to what degree a test is valid or not.



Consider the Following Example:

Mr. Sophea taught a unit on Mathematics with 4 lessons. He taught educational objectives that were spread across the Memory, Comprehension and Application levels. However, his test focused mainly on memory questions and the last 2 lessons of the unit.

Questions for Discussion

Question 1: Did Mr. Sophea's test have *Content Validity?*

Question 2: Did Mr. Sophea's test have *Construct Validity?*

Question 3: If Mr. Sophea administered a new test that covered all 4 lessons and included questions on Memory, Comprehension, and Application, do you think he would get a similar result? Why or why not? Be sure to phrase your answer in terms of the test's *Concurrent Validity.*

Answers:

Answer 1: No, the test lacked 'Content Validity' because he omitted questions on the first two lessons of the unit.

Answer 2: No, the test lacked Construct Validity because he did not include questions at the Comprehension and Application level.

Answer 3: No, he would probably get a different result. Therefore, the previous test on the same unit probably lacks 'Concurrent Validity.'

About Predictive Validity

The Case of Albert Einstein

- In 1907, Albert Einstein applied for admission to the University of Bern as an Associate Professor.
- He was rejected . . .[2]
- Einstein went on to become the greatest scientist of the 20th Century.
- The evaluation standards of the university had very low predictive validity because their rejection of Einstein did not predict his later achievements and success.

Note: *Not an authentic letter.*

[2] **Note:** In 1908, Einstein resubmitted his application to the University of Bern and was accepted. Nevertheless, his initial rejection seems puzzling for such a great scientist.

An Example of a Test that Lacks 'Content Validity' (Optional)

Lesson	What a Teacher Actually Taught (A)	What the Test Evaluated (B)	A Students' Actual Understanding (C)	How the Teacher's Actual Test Represents the Student's Understanding (D)
1	10%	30%	0%	0%
2	10%	10%	10%	10%
3	20%	20%	20%	20%
4	40%	20%	40%	20%
5	20%	20%	20%	20%
	100%	100%	??	??

Assumptions:

- Column A indicates the amount of time that a teacher spent in teaching 5 lessons in a particular curricular unit.
- Let's assume an excellent student achieved perfect understanding of all lessons except for Lesson 1 because he became very sick during that week and completely missed the lesson.
- Let's assume that we have a special machine from the future that allows us to get a completely accurate depiction of the student's understanding of the lessons (Column C)
- Let's assume that the student gets perfect scores on the questions for Lessons 2 to 5 because he has 'full' understanding of these lessons; but let's also assume that the student incorrectly answers all questions on Lesson 1 because he was absent (Column D)

Questions:

- What is the 'actual' level of understanding of the student according to our machine from the future?
- What is the likely test result of the student according to the actual test that was administered?
- Does the likely test result (Column D) approximate the actual level of understanding of the student (Column C)?
- What can you conclude about the validity of this test?

HANDOUT 12B: Reinforcement Exercise on Concepts of Validity

Directions: Read each of the short case study examples about test design and administration below and indicate the kind of validity that is implied in each case. Be parpared to discuss your responses in a plenary session. In some cases, more than one kind of validity may be implied.

CASE STUDIES

1. Most conventional schools in the world tend to emphasize a limited number of intelligences in their curricular programming such as 'Verbal Intellegence' and 'Mathematical Intelligence.' If you are someone who has high 'Social Intelligence' or high 'Mechanical Intelligence', you will probably not do well on most of the tests administered at such schools even though you might be very successful in jobs that require these kinds of skills. What sort of assessment validity is implied in this case study?

   _____

2. Most people know that Jack Ma, the Chinese billionaire who created *Alibaba,* was an academic failure during his time at university. What sort of assessment validity is implied by the evaluation that he experienced while at school?

   _____

3. Some studies of educational achievement in Cambodia have found that there is often little relationship between the marks that students receive on their internal tests and the marks that they receive on externally administered examinations such as the Bac II Examination or the PISA test. What sort of validity is implied in this case study?

   _____

4. Many Cambodian teachers prefer to use open-ended questions and essay questions, which require a great deal of time to answer, when designing their tests, even when they have a great many lessons to evaluate. What sort of validity might this habit affect in terms of student assessment?

   _____

5. Cambodian teachers receive a great deal of pressure from development partners to change their teaching in a way so that they are teaching more higher order thinking skills such as creativity and evaluation. They are encouraged to use new methods of teaching such as 'project work' and 'problem-based learning'. However, when students are evaluated in their external examinations such as the Bac II Exam, they mainly encounter questions at the level of memory and understanding. What sort of validity is implied in this case study ?

   _____

HANDOUT 13: Some Final Guidelines to Ensure Validity in Your Tests

1. **Be sure to test what you teach. .**
   - If you taught memory, understanding, and application skills, be sure you have questions that cover all of these skill areas.
   - If there is a lesson that you did not teach, do NOT include it on the test even though it may be in the textbook.
2. **Cover all of the lessons in your test based on their priority and the amount of time you spent on them**
   - If you taught 10 lessons, be sure that you test all 10, even if this means that you only sample the objectives from each lesson.
   - When you have many educational objectives to assess, use question types that can be answered quickly so that you can cover as much content as possible in the time available.
   - Remember that too many open-ended questions that require a lot of writing will constrain the *Content Validity* in the test because you will not be able to cover as much content as you would like to cover.
3. **The lessons you spent the most time on should get the most questions or point weighting.**
4. **Make sure that the conditions of assessment are the same in each classroom.**
   - Different conditions from room to room will affect the *Concurrent Validity* of the test. For example, . . .
     - Make sure that you have taken equal precautions in all rooms to prevent cheating.
     - Make sure that the amount of time provided to students in each test room is the same.
     - Make sure that all invigilators have received the same instructions about how the administer the test.
     - Make sure that scoring guidelines are clear and consistent, especially if you are using open or subjective questions. One way to do this is to create a *model answer* for comparison purposes.

HANDOUTS FOR PART 2

HANDOUT 14: Why Instructional Objectives are Important in Assessment

Writing Instructional Objectives is Like Planning a Road Trip: Comparing educational objectives to a road map is a good way to understand their importance in the educational process. When one plans a road trip, one has to know one's ultimate destination before one can start the trip. That is, it makes no sense to start travelling if one has no idea where one is going.

➔Therefore, writing Instructional Objectives before one starts teaching and evaluating is akin to identifying one's destination when taking a trip.

Identifying the Terminal Behaviors That Students Need to Exhibit: One has to know what the ultimate behaviors that students should be able to exhibit are before we can start the teaching or assessment process. If teachers are not clear about what they want students to be able to do, it will nearly impossible to evaluate them. Thus, we should write instructional objectives by thinking about what we expect students to be able to do at the end of the lesson.

Exercise: Planning a Trip with the Final Destination in Mind

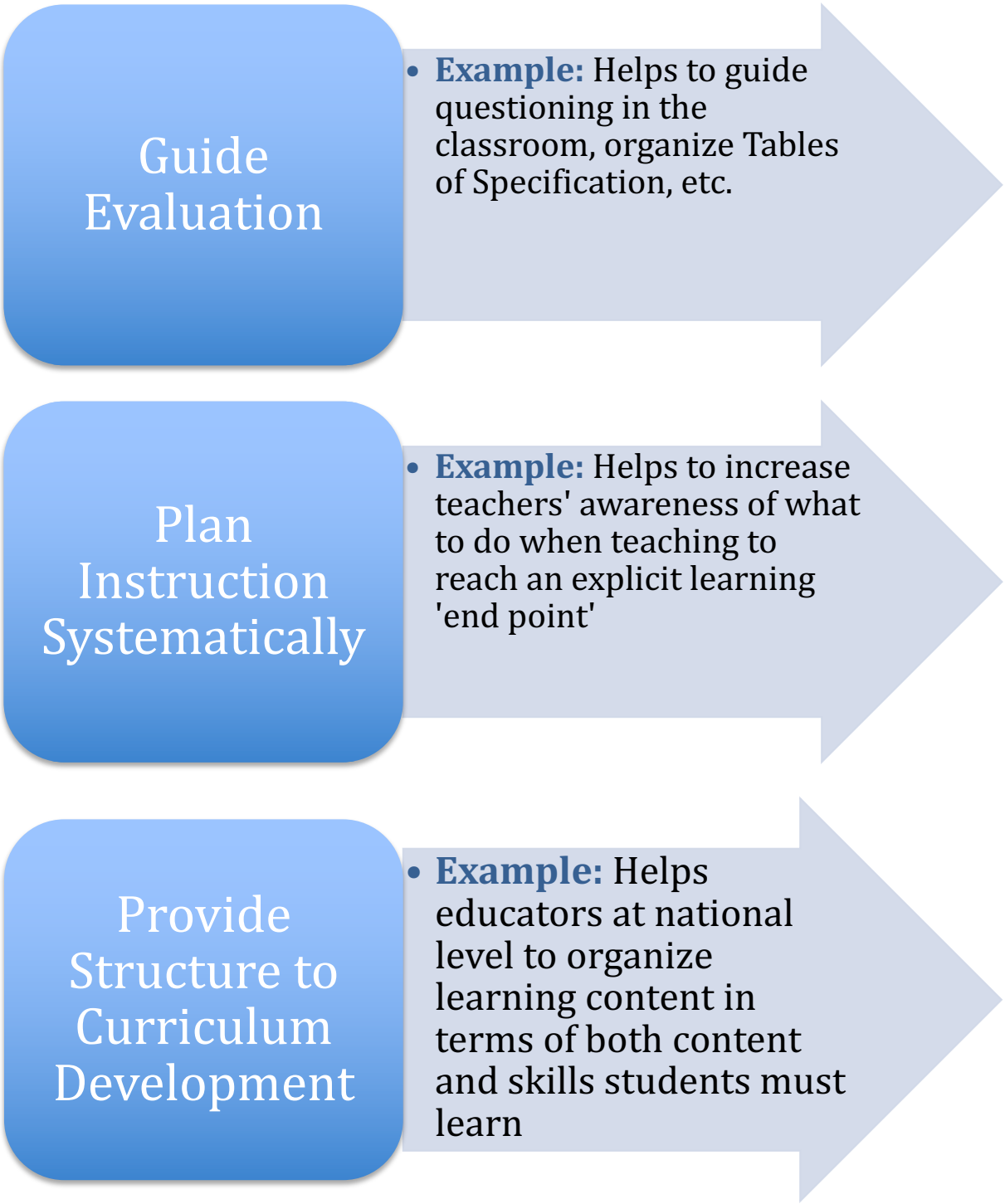
Imagine you need to take a trip. Between you and your final destination, there is a desert and a mountain range. What will you need to prepare and how will you use those preparations to get there.

What Do You Need to Prepare?	How Will You Use It Along the Way?
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•

HANDOUT 15: The Role of Instructional Objectives in the Education Process

Why is it important to use Educational Objectives?

Educational Objectives help educators to:



HANDOUT 16: Defining an Instructional Objective

An Instructional Objective is defined as follows:

" . . . . A clear and unambiguous description of the goals or changes in the student's behavior that the teacher wishes to observe as a result of instruction."

Parts of an Objective:

- *An instructional should contain two or three components. These include the following:*
  - *The Content*
  - *The Behavioral Construct*
  - *The Condition(s) under which the learning should occur (OPTIONAL)*

Example:

CONTENT
Knowledge of the Parts of Speech

+

BEHAVIORAL CONSTRUCT
Ability to Classify

⇓

INSTRUCTIONAL OBJECTIVE
Students can classify words according to the parts of speech that they represent (e.g., nouns, verbs, adjectives, etc.).

Including a Condition in the Objective . . .

- Sometimes, it is also possible to include a condition to further clarify the objective.
- The 'condition' often describes something that the teacher has to do that provides guidance about how the learning context is structured.
- This can include, . . .
  - Providing dictionaries for students to use
  - Watching a video or movie
  - Providing maps for a particular task
  - Setting up an experiment that students have to perform
  - Etc.
- **EXAMPLE . . .**

INSTRUCTIONAL OBJECTIVE
Students can classify words according to the parts of speech that they represent (e.g., nouns, verbs, adjectives, etc.).

+

CONDITION
Using a dictionary

⇓

NEW INSTRUCTIONAL OBJECTIVE
When provided with a dictionary, students can classify words according to the parts of speech that they represent (e.g., nouns, verbs, adjectives, etc.).

However . . .

- Some educators like Gronlund (1985) advise not to use ‘conditions when writing instructional objectives because they reduce the flexibility of teachers in instruction.
- However, others encourage their use because they provide guidance to teachers about ‘how’ to teach the lesson.
- For this reason, it is up to the teacher whether they want to include conditions in their objectives.

Exercise

Directions: Complete the following educational objectives using the conditions provided.

- When provided with a map, students can . . .
- Following an experiment on precipitates, students can . .
- When given word problems relating to the multiplication and division of fractions, students can . . .
- After reading the story Thum Thiew, students can . . .
- When provided with a set of different atoms from an atomic toolkit, students can . . .

HANDOUT 17: Kinds of Instructional Objectives

What is a Good or Bad Objective?

- There are differences of opinion among educators regarding the form an objective should take.
- Consequently, it is sometimes difficult to make judgments about what is a 'good' or 'bad' objective.
- Our judgments will likely depend on the general educational philosophy that we hold.

General & Specific Objectives

- One general view holds that instructional aims should be written in a 'general' form followed by multiple statements of observable learning outcomes.
- These observable learning outcomes are known as 'specific' objectives.
- Bloom's Taxonomy provides many useful examples of observable cognitive behaviors to use when writing objectives (see Handout 18).

For example, . . .

1. ***Students understand the meaning of written material (General Objective)***

1.1 Students can identify information explicitly stated in a passage.

1.1.1 Students can underline specific details in the passage as determined by the teacher (e.g., names, dates, etc.)

1.1.2 Students can select statements that best summarize the meaning of the passage.

1.1.3 Students can list facts that best support the major theme of the passage.

1.2 Students can summarize ideas in a passage.

1.2.1 Students can write a shortened version of the passage.

- In this example, the teacher starts with **general objectives** that use unobservable behaviors like 'understand.'
- But then more **specific objectives** that use observable behaviors like **underline, select, list,** and **write** are added to clarify the general objective.

On the other hand . . .

- Some educators feel that it takes too much time to write objectives in this amount of detail for a lesson plan.
- They suggest that it is only necessary to write the 'specific' objectives, as long as these state the observable behavior underlying the objective.
- This is especially true if the objective will be used for the classroom . . .

HANDOUT 18A: Guidelines to Use When Writing Instructional Objectives

1. Always use verbs that demonstrate observable behaviors when writing 'specific objectives.' (e.g., determine, explain, summarize, write, list, etc.) (See Exercise below).
    - *Specifying observable behaviors makes it easier to assess whether the object has been achieved*
2. Avoid using words like *strengthen, encourage, support,* etc. in your objectives as these do not suggest any 'observable' cognitive behavior.
3. Never put two behavioral constructs into one objective. *(e.g., students can 'describe' and 'analyze' the characters of a novel).*
    - *Including two behavioral constructs makes it difficult to know if the objective has been achieved since one behavior may have been demonstrated but not the other.*

4. Ensure that your objectives include a mix of both lower and higher order thinking skills. Use Bloom's Taxonomy to help you know which objectives reflect higher order skills and which reflect lower order skills.
5. Classify each objective by the level that it implies in Bloom's Taxonomy (e.g., Remembering, Understanding, Applying, etc).

HANDOUT 18b: Using Bloom's Taxonomy to Develop and Classify Instructional Objectives

Bloom's Taxonomy is the best tool to use to better understand the various thinking skills that an Instrucitonal Objective may convey. There are 6 levels in the Taxonomy as described below.

LEVEL	DEFINITION	SAMPLE VERBS		SAMPLE OBJECTIVES
REMEMBERING	Student recalls or recognizes facts, concepts, and principles in the approximate form in which they were learned.	Write List Label	Name State Define	Students can define the 6 levels of Bloom's taxonomy of the cognitive domain.
UNDERSTANDING	Student translates, comprehends, or interprets information based on prior learning.	Explain Summarize Paraphrase	Describe Illustrate Give examples	Students can explain the purpose of Bloom's taxonomy of the cognitive domain.
APPLYING	Student can use one or more principles to solve a problem or task with a minimum of direction.	Use Compute Solve	Demonstrate Apply Construct	Students can write an instructional objective for each level of Bloom's taxonomy.
ANALYZING	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	Analyze Categorize Compare	Contrast Separate	Students can compare and contrast the cognitive and affective domains.
EVALUATING	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend	Critique Justify	Students can judge the effectiveness of writing objectives using Bloom's Taxonomy.
CREATING	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	Create Design Hypothesize	Invent Develop	Students can design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.

Exercise: Thinking Skill Classification Exercise

Directions: Review each of the verbs below and indicate what level of Bloom's Taxonomy that you think they apply to. One verb may be appropriate to more than one level in the taxonomy depending on how it is implemented. Please indicate all levels that apply to the verb provided.

English	Khmer	Taxonomy Level	English	Khmer	Taxonomy Level
Adapt			Explain		
Answer			Formulate		
Analyze			Identify		
Apply			Illustrate		
Arrange			Indicate		
Calculate			Interpret		
Categorize			Judge		
Clarify			Label		
Classify			List		
Combine			Match		
Compare			Measure		
Complete			Name		
Compose			Outline		
Contrast			Predict		
Create			Recite		
Critique			Rephrase		
Defend			Report		
Define			Select		
Demonstrate			Solve		
Describe			Specify		
Determine			State		
Diagram			Summarize		
Differentiate			Synthesize		
Distinguish			Tell		
Enumerate			Use		
Evaluate			Write		

Exercise: Try This:

Directions: Below you will find some behavioral objectives for various subjects. Using Bloom's Taxonomy, identify the level of thinking at which you think the behavioral objective is taking place. Write **R** for Remembering; **U** for Understanding, **Ap** for Applying, **An** for Analyzing, **E** for Evaluating and **C** for Creating in the blank in front of each objective.

_____ 1. Students can define the following terms in their own words providing suitable examples of each.

a) planet b) comet c) star d) satellite

_____ 2. Students can state the capitals of all of the countries of Southeast Asia.

_____ 3. When given an ordered pair, student can plot the point that this pair represents on a graph.

_____ 4. Students are able to determine the kinds of products made in different parts of Cambodia by consulting political and resource maps concurrently.

_____ 5. Given a list of physical conditions, students can predict the changes that might occur in the state of water based on an understanding of its physical properties.

_____ 6. Students can express an opinion regarding the merits and demerits of socialism and capitalism being sure to provide a justification for any position taken.

_____ 7. Students can develop a project that demonstrates hydraulic principles in Physics.

_____ 8. Students can construct a chart that summarizes the differences between Chinese and Indian civilization.

_____ 9. When given a sentence that is grammatically incorrect, students can correct the sentence using rules of grammar that they have learned.

___ 10. Students can explain the chemical composition of a compound in words based on its chemical notation.

Answers

1. U; 2. R; 3. Ap; 4. An; 5. Ap; 6. E; 7. C; 8. An; 9. Ap; 10. U

Exercise: Try This:

Look at the subject areas below and expand the general learning area provided into a series of 'specific' behavioral objectives. Use the guidelines that were discussed earlier to make sure that your objectives are written properly. Write at least ONE Specific Objective for each content area provided.

- **English:** Vocabulary Words
- **Mathematics:** The idea of a set
- **Science:** The elements of the Periodic Table
- **Khmer:** The differences and similarities of characters in the story, Thum-Thiew
- **Geography:** Geographical maps
- **History:** The causes of World War II

HANDOUT 19: Developing Tables of Specifications

What is a Table of Specifications?

> ***A Table of Specifications is defined as a test blueprint that enables the development of a test, which is 'balanced' and 'relevant' in terms of the content and thinking skills taught.***

Why Use a Table of Specifications?

Ensures Robust Validity

- The table helps to summarize content areas and thinking skills that have been taught so that tests accurately refllect those content areas and thinking skills.

Promotes Fairness

- The table helps to remind the teacher what he/she taught so that students experience a test that evaluates the things that they actually studied.

Rationalizes Accurate Weighting of Questions

- The table helps to ensure that areas taught for many hours receive more questions than areas that were taught for fewer hours.

What Does a Table of Specifications Look Like?

Con-struct / Content	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	Total
Total							

How Does One Fill in a Table of Specifications?

1) Determine the content areas that you want to test. These can be lesson names or topics from one lesson.
2) Reflect on how you taught each content area. Did you ask students to simply remember things, understand things, apply principles, etc.?
3) Fill in the numbers in your table:
    a. The numbers can be either the ***number of questions*** for each subject area/construct or the ***number of points*** on the test for each area.
    b. If the numbers represent questions, all questions should be worth the same number of points.
    c. If the teacher wishes to develop a test in which the questions have different point values, then the numbers in the Table of Specifications should represent 'points' and not the number of 'questions.'

4) Make totals for your content and constructs. The number of points or questions that you have indicated for each topic and construct should reflect the amount of time and emphasis that you placed on each topic/construct when teaching. If it does not, then there is a problem with the test's Content or Construct Validity.

Case Study Exercises

Case Study 1: A teacher taught a unit with 5 lessons. Each lesson was equally important and the teacher spent the same amount of time teaching each lesson. However, the teacher developed a test in which 80% of the questions were on the last lesson. Is there a problem with this test?

Case Study 2: A Biology Teacher taught several lessons on disease transmission focusing primarily on memorization of facts and concepts. But when she made her test to assess students, she included many questions at the level of understanding and application. Is there a problem with this test?

Case Study 3: A Physics Teacher taught three lesson on Motion and Force. One student demonstrated excellent understanding of the first two lessons but then fell sick and was absent while the teacher taught the third lesson. When the student took a test on the unit, she found that 90% of the questions were on the third lesson. Will this test accurately reflect the student's understanding of what was taught? Why or why not? What kind of validity will be in question?

An Example of a Table of Specifications:

Subject: Khmer Language **Unit:** 5 **Grade Level:** 10

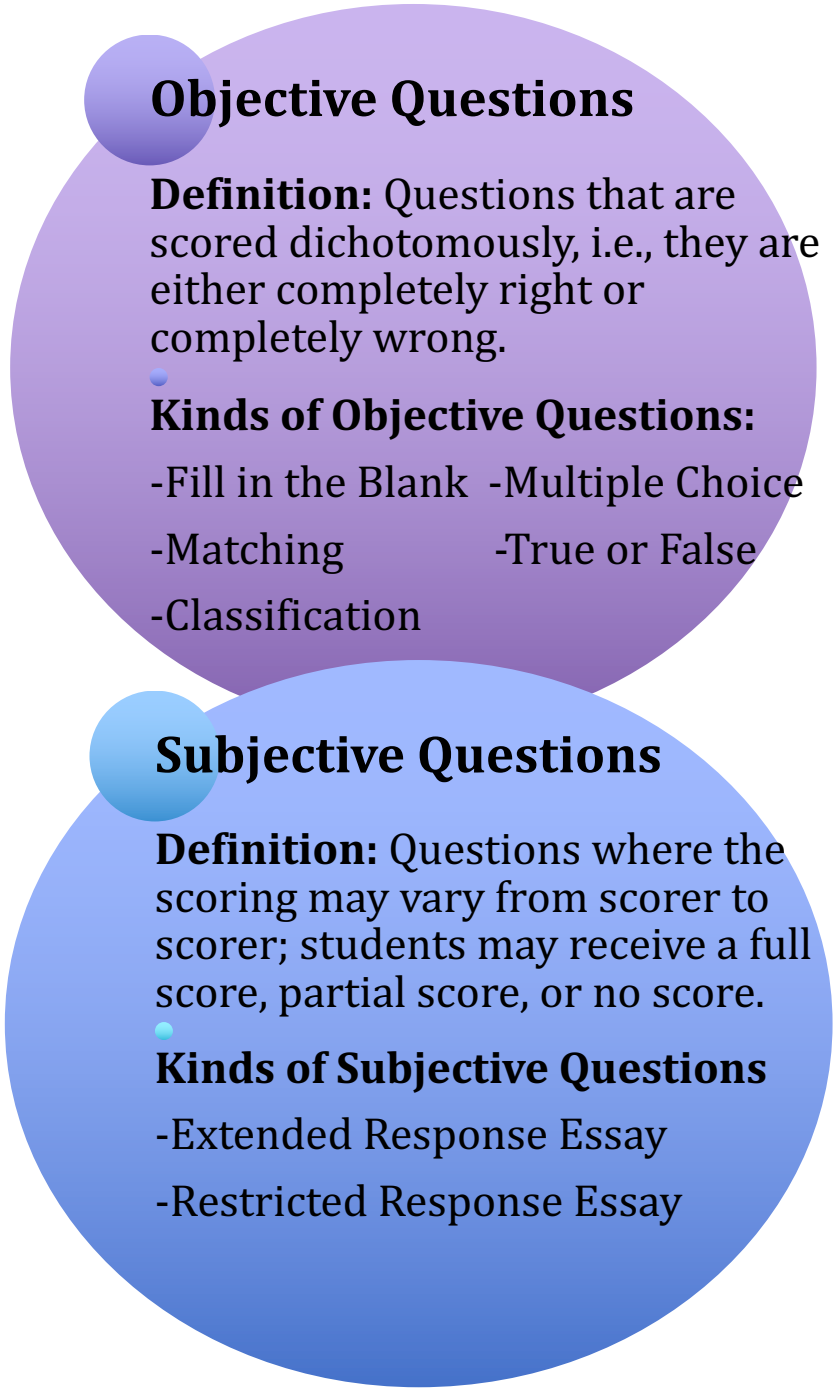
Con-struct / Content	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating	Total
1) Vocabulary	5	5					10
2) Grammar		10		10			20
3) Poetry			10				10
4) Composition			10				10
Total	**5**	**15**	**20**	**10**			**50**

Questions for Discussion

1) How many content areas are there in this test?
2) How many skills are measured in this test?
3) Which content area has the most emphasis? The least emphasis?
4) Which construct area has the most emphasis? The least emphasis?
5) If the numbers in the table represent the number of questions, how much is each question worth on a test with 100 points.

HANDOUT 20: About Objective & Subjective Test Questions

Explanation: In Cambodia, questions are usually defined in terms of their format, that is whether they are **open** or **closed**. However, it is more customary to define questions in terms of HOW THEY ARE SCORED. We call such questions **Objective** or **Subjective** Questions.



HANDOUT 21: How to Write Objective Test Questions Effectively

What is an Objective Question?

An Objective Question is a kind of question for which there is only ONE correct answer. When scored, the question must be evaluated as either completely right or completely wrong.

Characteristics of Objective Questions

Format of Objective Questions

- Such questions have multiple formats including Fill-in the blank, Matching, True-False, and Multiple Choice.

Scoring Objective Questions

- Scoring is done 'dichotomously', meaning that objective questions are marked completely right or completely wrong.
- There is only ONE Correct Answer

Advantages

- Effective for covering a lot of content
- Students can answer quickly leading to time efficiencies
- Easy to correct with high inter-rater reliability
- Can be used to measure constructs at the level of Memory, Understanding, Application, and Analysis

Disadvantages

- Cannot be used to measure creativity or synthesis level skills
- Cannot be used to measure process skills
- Difficult to write

The Short Answer Question

Different Varieties

- **The Question Variety**
  - *How many provinces are there in Cambodia? _____.*
- **The Completion Variety**
  - *In geography, positions of north, south, east, and west are expressed in degrees of _____ and _____.*
- **The Association Variety**
  - ***Directions:*** In the blanks provided, write the name of the Mathematical Laws of Equality that are demonstrated:
  - *1. 3 x 2 = 2 x 3* _____
  - *2 (2 + 3) + 5 = 2 + (3 + 5)* _____
  - *3 6 x (3 + 4) = (6 x 3) + (6 x 4)* _____

When to Use It

- The Short Answer Question is generally used to test Memory Level Questions only.

Suggestions When Writing Short Answer Questions

- 1) Be sure that the question can be answered only by a unique word, phrase, or number. Look at the following example:
  - *The Cambodian Parliament meets in _____.*
  - *There are multiple possible answers to this question including January, Phnom Penh, or emergencies. How would you revise this question?*
- 2) Provide as many blanks or spaces as there are words in the answer. For example:
  - *Indochina is made up of the countries of _____, _____, and _____.*
- 3) Do not delete too many words from a statement to be completed. For example:
  - *The old _____ of Cambodia was _____.*

The True False Question

General Information

- The True False Question most typically consists of a declarative statement containing an assertion that the student must decide is true or false.
- Such statements are difficult to write because it is often hard to find statements that are unequivocally true or false. Sometimes, even experts disagree.
- In general, most teachers feel that True False Questions are easy to write when in fact the opposite is true.

Different Varieties

- **The Basic Variety (True or False)**
  - *T F A number can be divided by '0'.*
  - *T F Air occupies space.*
  - *T F Battambang is the third largest city in Cambodia.*
- **The Correction Variety**
  - *T F Angkor Vat was built by Jayvaraman VII.*
  - _____
  - *In this variety, if the statement is incorrect, students must replace the underlined word in the blank provided below to make it correct.*
- **Right Wrong Variety**
  - *R W Running down the hill, the ball fell between my legs and tripped me.*
- **Fact Opinion Variety**
  - *F O The Angkorian Period was the most famous period of Cambodian history.*
  - *F O Less than half of Cambodians can speak English.*

When to Use True False Questions

- The True False Question is useful to measure a wide range of thinking skills including Memory, Understanding, Application, and Analysis.
- On very important summative examinations, the use of True-False Questions should be avoided because of the high probability of guessing, which affects concurrent validity.

Suggestions When Writing True False Questions

- 1) Do not make True False Questions too long as this introduces the irrelevant factor of reading ability into the process of answering.
- 2) Avoid using words known as 'specific determiners' in True False Questions. This includes words such as all, none, never, always, etc. Using such words makes it likely that such statements are false since there are always exceptions.
- 3) Do not use negatively worded True False statements as this will make the question confusing. For example:
  - *T F Oxygen is not one of the elements to be found in salt.*
- 4) Test only one point in each question. Do not have two points in a statement some of which are true while others are false. For example:
  - *T F Sound can travel through air, liquids, solids, and vacuums.*
  - *In this statement, some items are true while one is false.*
- 5) Do not use statements of opinion in True False Questions unless you attribute the source. For example:
  - *T F The Angkorian Period was the most famous period of history in Cambodian history.*
  - *T F According to many historians, the Angkorian Period was the most famous period of history in Cambodian history.*
- 6) Avoid systematic patterning of answers.
- 7) Use a somewhat larger number of false items than true items on a test.

Multiple Choice Questions

General Information

- The Multiple Choice Question is the most flexible of the objective queston formats.
- It can be used to test any type of thinking skill from Memory to Analysis Level.
- It is superior to True False Questions in that its multiple response format minimizes the probability of correct responding due to guessing.
- One of its major advantages is that it allows assessment of complex thinking skills without requiring the skill of writing. This greatly enhances the ability of a test to enhance its content and construct validity.

Basic Format of Multiple Choice Questions

- **The Stem**
- The stem of a multiple choice question is typically worded as a direct question or an incomplete sentence. For example:
  - *What is the most populated province in Cambodia?*
    - *a) Battambang b) Takeo c) Phnom Penh d) Kandal*
  - *The most populated province in Cambodia is:*
    - *a) Battambang b) Takeo c) Phnom Penh d) Kandal*
- Whatever form the stem takes, it MUST be able to elicit appropriate responses from students. Look at the following example of a faulty stem:
  - *Food Chains*
    - *a) are combinations of proteins, carbohydrates and fats.*
    - *b) are illustrations which show the final destination of farm products.*
    - *c) are diagrams that help us to understand how prey and predators are related.*
    - *d) are illustrations that show the relationship between plants and animals.*

Basic Format of a Multiple Choice Question (Cont.)

- **The Responses**
- The second major part of the Multiple Choice Question refers to the responses that are placed under the stem.
- There are normally 4 or 5 possible responses in a Multiple Choice Question.
- Using less than 4 responses is not advised because this adversely affects the *reliability* of the question.
- Responses can be indicated by letters or numbers. Where possible, responses should be arranged in a logical order where one exists (e.g., alphabetical, lowest to highest, etc.).
- In most cases, it is advisable to arrange responses vertically instead of horizontally (except in cases of very short responses). For example:
  - *Why has Africa often been called the Dark Continent?*
    - *a) Many of the people of Africa have dark skin b) Very little was known about Africa for a long time c) The jungles of Africa are dark and forbidding d) Most of Africa is covered with black earth soils*

  - *Why has Africa often been called the Dark Continent?*
    - *a) Many of the people of Africa have dark skin*
    - *b) Very little was known about Africa for a long time*
    - *c) The jungles of Africa are dark and forbidding*
    - *d) Most of Africa is covered with black earth soils*
- Clearly, the second form of the question is much easier to read.

Basic Format of a Multiple Choice Question (Cont.)

- **Punctuation of Multiple Choice Questions**
- Where the stem of a multiple choice question is an incomplete sentence, there is usually no punctuation at the end of the stem. Each response, however, should have appropriate punctuation at its end.
- Where the stem is a question, it should always have a question mark (?) at the end.
- The responses of questions having incomplete sentences as stems should begin with lower case letters. If the stem is a question, responses should begin with upper case letters.

Different Varieties

- **The Correct Answer Variety**
- This is the most commonly used kind of a Multiple Choice Question. In such questions, there is only ONE completely correct response while all of the other responses are completely wrong. For example:
  - *My mother took 5,000 Riels to the market. She bought 800 riels of fish and 2,400 Riels of pork. How much did she have left?*
    - *a) 1,500 Riels*
    - *b) 1,800 Riels*
    - *c) 1,850 Riels*
    - *d) 1,870 Riels*

Different Varieties (Cont.)

- **Best Answer Variety**
- In this kind of question, one or more responses may have some element of truth in it. However, students must choose the question that is the MOST correct.
  - *Which of the following things best symbolizes Cambodia?*
    - *a) The Independence Monument*
    - *b) Angkor Vat*
    - *c) The Royal Palace*
    - *d) The Sugar Palm Tree*
- In the example, all of the responses are correct to some degree but only one is the MOST correct.
- **The Negative Answer Variety**
- In this variety of question, all of the responses are correct except one. Students must choose the response that is NOT correct. For example:
  - *All of the following statements are characteristics of corn EXCEPT*
    - *a) Corn is a seasonal crop.*
    - *b) Corn is a cash crop.*
    - *c) Corn is a self-fertilizing crop.*
    - *d) Corn powder can be used to make cakes.*

Different Varieties (Cont.)

- **The Multiple Answer Variety**
- *In this variety of question, students must choose a response or combination of responses that are correct. For example:*

- *Which of the following picture(s) represent a vertebrate?*


I


II


III


IV


V

a) I only
b) II, III, and IV
c) II, IV, and V
d) I and III

Suggestions When Writing Multiple Choice Questions

- 1) Make sure that the Stem of each question contains a clearly defined problem (see earlier example).
- 2) Do not use more words than necessary to make your meaning clear. For example:
  - ***(Weak)***
  - *Phnom Penh*
    - *a) is located at the intersection of two rivers.*
    - *b) is located in Kandal Province.*
    - *c) is located in Siem Reap Province.*
    - *d) is located on Tonle Sap Lake*
    - ***(Better)***
    - *Phnom Penh is located*
      - *a) at the intersection of two rivers.*
      - *b) in Kandal Province.*
      - *c) in Siem Reap Province.*
      - *d) on Tonle Sap Lake.*
- 3) Make sure that your responses are parallel in grammatical structure and that the wording is appropriate to the stem. For example:
  - ***(Weak)***
  - *Why do we give vaccinations to children against small pox?*
    - *a) Because some children have the disease*
    - *b) To prevent them from getting the disease.*
    - *c) For experimental purposes.*
    - *d) Stop the spreading of germs.*
  - ***(Better)***
  - *We need to give vaccinations to children against small pox to:*
    - *a) cure children who already have the disease.*
    - *b) prevent them from getting the disease.*
    - *c) experiment on methods to prevent the disease.*
    - *d) stop the spread of germs that cause the disease.*

Suggestions When Writing Multiple Choice Questions (Cont.)

- 4) Do not allow your responses to overlap so that one response includes one or more other responses. For example:
  - *Butterflies are a member of which of the following animal groups?*
    - *a) Invertebrates*
    - *b) One-celled animals*
    - *c) Insects*
    - *d) Annelida*
- 5) Try to keep all responses the same length as there is a tendency for teachers to make the longest response the correct response.
- 6) Avoid the use of responses such as 'None of the above' or 'All of the above.'
- 7) Vary the position of the correct response from question to question.
- 8) Do not allow the stem to provide an irrelevant clue as to the correct response. This hurts the overall validity of the examination. Look at the following examples:
  - ***(Weak)***
  - *What major factors cause the seasons to change on the earth?*
    - *a) The rotation of the earth.*
    - *b) The wind from the oceans*
    - *c) The revolution of the earth around the sun and its tilted axis.*
    - *d) The distance of the earth from the sun*
  - ***(Weak)***
  - *What is an equation?*
    - *a) A mathematical expression where one side is equal to the other side.*
    - *b) A number sentence with at least two members on either side.*
    - *c) Two number sentences with similar value.*
    - *d) Any number sentence that does not contain the signs (<) and (>).*

The Matching Question

General Information

- The Matching Question is a variation of the Multiple Choice Question.
- The Matching Question consists of items each of which has the same set of alternative responses. Look at the following example:
- **Directions:** Choose the name of the country on the right that corresponds to the name of the famous building on the left. Write the letter of the famous building in front of the name of the country in the space provided. A country may be used more than once or not at all.
  - _____ *1. The Great Wall of China* *a) France*
  - _____ *2. The Parthenon* *b) China*
  - _____ *3. The Pyramids* *c) Egypt*
  - _____ *4. Stonehenge* *d) Greece*
  - _____ *5. The Sphinx* *e) England*

- One of the major advantages of the Matching Question is its efficiency. If the above exercise had been written as a multiple choice question, it would have taken up considerably more space.

When Is It Used

- The Matching Question is generally limited to assessing Memory Level skills.

Suggestions When Writing the Matching Question

- 1) Write very precise directions when developing a Matching Question. Do not simply say, 'Match the following.'
- 2) Always use the longer of the elements to be matched and shorter elements as the responses. This helps to reduce the amount of time students need for reading the question.
- 3) Use short lists of phrases to be matched. The elements to be matched should never exceed 10 in number.
- 4) Try to use more responses than phrases to be matched.
- 5) Arrange the responses in a logical order (e.g., alphabetical, chronological, etc.) if such an order exists.
- 6) Use items and responses that are similar. Do not mix apples and oranges. Here is an example of a faulty question:
- _____ *1. Date of India's independence* *a) Nile River*
- _____ *2. Largest river in the world* *b) Amazon River*
- _____ *3. Longest river in North America* *c) Mississippi River*
- _____ *4. Longest river in the world* *d) 1947*
- _____ *5. Famous African explorer* *e) Livingstone*

- 7) Never spread a Matching Question over 2 pages as this causes students to lose time in answering.

- 8) Unless required by the objectives one is evaluating, do not make wide use of the Matching Question in your test because it is only effective in assessing Memory Level objectives.

The Classification Question

General Information

- The Classification Question is similar in format to the Matching Question.
- It has one major advantage over the Matching Question in that it can be used to measure higher level thinking skills including Application and Analysis.

Format of the Classification Question

- The format of the Classification Question requires students to use two or more classifying principles to classify a set of factors or statements. For example:
  - **Example 1:**
  - **Directions:** Items 1 to 5 consist of living and non-living things. You must choose the grouping describing these items by placing the letter 'a' or 'b' in the blank provided to the left of the number items.
  - _____ 1. Rock
  - _____ 2. Water
  - _____ 3. Grass
  - _____ 4. Car
  - _____ 5. Rabbit

a. Living Thing
b. Non-living Thing

HANDOUT 22: Defining Subjective Test Questions and Understanding Their Limitations

What is a Subjective (Essay) Question?

Subjective Questions generally take the form of what is known in English as an Essay Question. An Essay is a 'free response' question that requires students to produce a written response in sentence or paragraph form, rather than to select the correct response from a number of alternatives or to generate a short word or phrase. Subjective Questions are not scored dichotomously and point awards for a student's response may vary from scorer to scorer.

There are TWO TYPES of Essay Questions that depend on the amount of freedom given to the student to answer the question:

Extended Response Essay Queston	Restricted Response Essay Question (Short Paragraph)
• In this type of essay question, few, if any limits are placed on the student in terms of the selection of pertinent information, the organization of the answer, or the integration of ideas. This lack of structure introduces scoring difficulties because there will be little consistency among students in the length or quality of their responses However, this type of question also allows a teacher to find out how well students perform tasks at the Evaluation and Creation level. • ***Example:*** *Evaluate the impact of Cambodia's contact with Western countries on its subsequent development.*	• In this type of essay question, specific guidelines are provided to limit both the content and form of student responses. This greater structure makes marking easier, but does not provide a measure of students' ability to evaluate and create information. Restricted Response type questions are best for measuring leearning outcomes at the Level of Understanding, Application, and Analysis. • ***Example:*** *Analyze the cause of the Fall of Angkor in terms of the following Factors: (a) Political Factors; (b) Social Factors; and (c) Economic Factors.*

The Need for Caution When Using Essay Questions

Sampling Coverage

- A test made up entirely of essay questions presents problems in terms of how well the test can cover or sample the course content.
- Thus, 'Sampling Reliability' is low.
- Limit the use of Essay Questions only to those topics that can not be evaluated with objective questions.

Time

- Because Essay Qustions take so long to answer, they offer limited coverage of course material.
- This negatively affects Sampling Reliability.

Sampling Reliability

- If you want to use Essay Questions exclusively on a test, you may increase Sampling Reliability by using several shorter Essay Questions rather than 'Extended Response Essay Questions.'

Directing Words

- Directing Words (e.g., Summarize, Compare, Explain, etc.) are very important in writing Essay Questions.
- Teachers must choose directing words carefully and ensure that students understand these words well.

Setting Test Expectations

- Essay Question should provide students with clear expectations.
- These expectations include: 1) Criteria for Evaluation; 2) Time Limits; 3) Marking Values; and 4) Length of Answers.

HANDOUT 23: The Use of Directing Words When Writing Essay Questions

Using 'Directing Words' in Essay Questions

Directing Words

- *The Directing Word in an Essay Question tells the student what to do:*

Explain . . . . Summarize . . . Compare . . . . Etc.

- *If students do not understand what the directing word tells them to do, their answers will suffer in quality.*
- *It is very important that teachers choose directing words carefully and ensure that their students know what these words mean. This may require pre-teaching or providing definitions of these words on the test itself.*
- *It is advised that the word 'Discuss' never be used as a directing word because it is too vague.*

Teachers need to be careful in their selection of Directing Words when writing Essay Questions. Some common examples of Directing Words and their meaning are provided in the table below.

Defining Some Useful Directing Words

Contrast	*Bring out the points of difference.*	**Illustrate**	*Use a picture, diagram, chart or concrete example to clarify a point.*
Compare	*Bring out points of similarity and difference.*	**Interpret**	*Make plain, show your thinking about something.*
Criticize	*State your opinion of he correctness or merits of an issue*	**Justify**	*Show good reasons for something*

Define	*Give the meaning of a word or concept by placing it in the class to which it belongs and describing it is different from other members in the same class.*	**Outline**	*Give, in order, the main points about something; sketch in general terms.*
Describe	*Give a picture of something.*	**Prove**	*Establish the truth of something by giving factual information.*
Evaluate	*Give the good and bad points of something.*	**Summarize**	*Briefly review the main points of something*
Explain	*Make something clear, Interpret something*	**Trace**	*Give a description of the development of something*

Directing Words and Bloom's Taxonomy

The Chart below illustrates some appropriate Directing Words for different levels of thinking in Bloom's Taxonomy. . .

Remembering
- -What . . .
- -Where . . .
- -When . . .
- -Who . . .
- -Define . . .
- -Outline . . .
- -State . . .

Understanding
- -Why . . .
- -How . . .
- -State in your own words . . .
- -Show . . .
- -Demonstrate . .
- -Summarize . . .

Applying
- -Apply . . .
- -What would happen if . . .
- -What best illustrates . . .
- -Explain how X would react to . . .
- -Illustrate . . .
- -Prove . . .
- -Demonstrate . .

Analyzing
- -What relationship exists . . .
- -Identify the main idea . . .
- -Analyze . . .
- -Distinguish
- -Examine . .

Evaluating
- -Draw conclusions . .
- -Defend the idea that . . .
- -Evaluate . . .
- -Compare . . .

Creating
- -Propose an alternative to . . .
- -Devise . . .
- -How else would you . . .

Some Useful Guidelines in Choosing Directing Words . . . .

- The diagram above lists some Directing Words and the levels of thinking they generally call for. Steps may easily overlap; for example, Application must include Memory and Comprehension.

- It is important to remember that just changing the Directing Word in an Essay Question does not automatically raise the level of the thinking required to answer the question.

- Once again, even though it is possible to formulate Essay Questions at the Memory and Understanding Level, teachers are urged to only use Essay Questions at the Application Level or higher. Memory and Understanding skills are better assessed by Objective Questions.

Exercise: Try writing some Essay Questions . . .

Directions: Consider the famous folktale, *Tum Tiew.* In the space provided below, write an essay question to assess students' understanding of *Tum Tiew* at each of the levels of thinking described earlier. Consider your choice of Directing Words as you write a question for each level of thinking.

MEMORY: _____

_____

UNDERSTANDING: _____

_____

APPLYING: _____

_____

ANALYZING: _____

_____

EVALUATING: _____

_____

CREATING: _____

_____

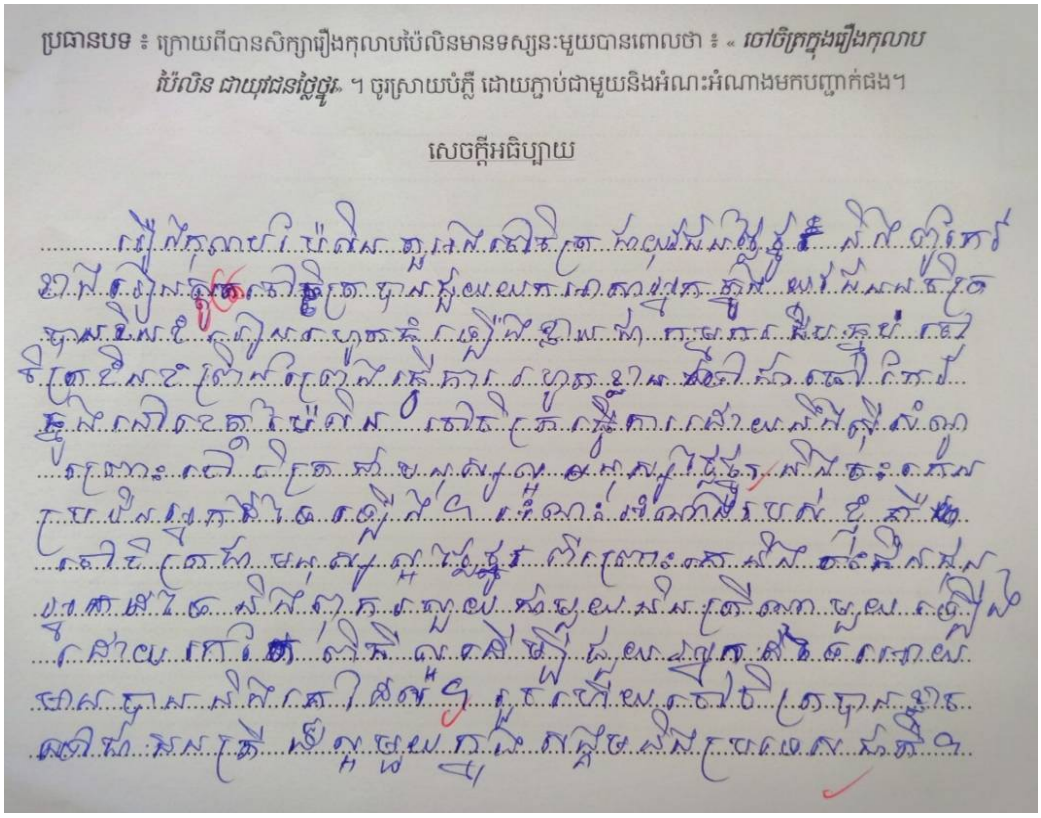
HANDOUT 24: Challenges in Scoring Essay Questions

Reliability in scoring Essay Questions is a serious and persistent problem!

Research shows that Essay Questions are scored differently by different teachers and that the same teacher will score an Essay Question differently at different times.

In one study, 100 teachers scored as Essay Question written by a Grade 12 student. Their task was to assign a numerical mark and then to judge what grade they thought the student was in. The numerical marks they assigned ranged from 60% to 98% and their estimated grade placements ranged from Grade 5 to second year university!

Try This: Look at the Essay Question Response written by a student in Grade 9. Read the student response and give a score on a scale of 1 to 10 based on the criteria that you usually use to score Essay Question Responses.



Follow-up and Questions for Discussion

After giving your score, make a comparison with the scores given by other participants.

- How great was the variation between scores?
- Where do the scores tend to cluster? Why do you think that they cluster there?
- What could be done to reduce any variation that was observed?

Points Awarded	How Many Participants Gave This Score?
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Two General Approaches for Marking Essay Questions

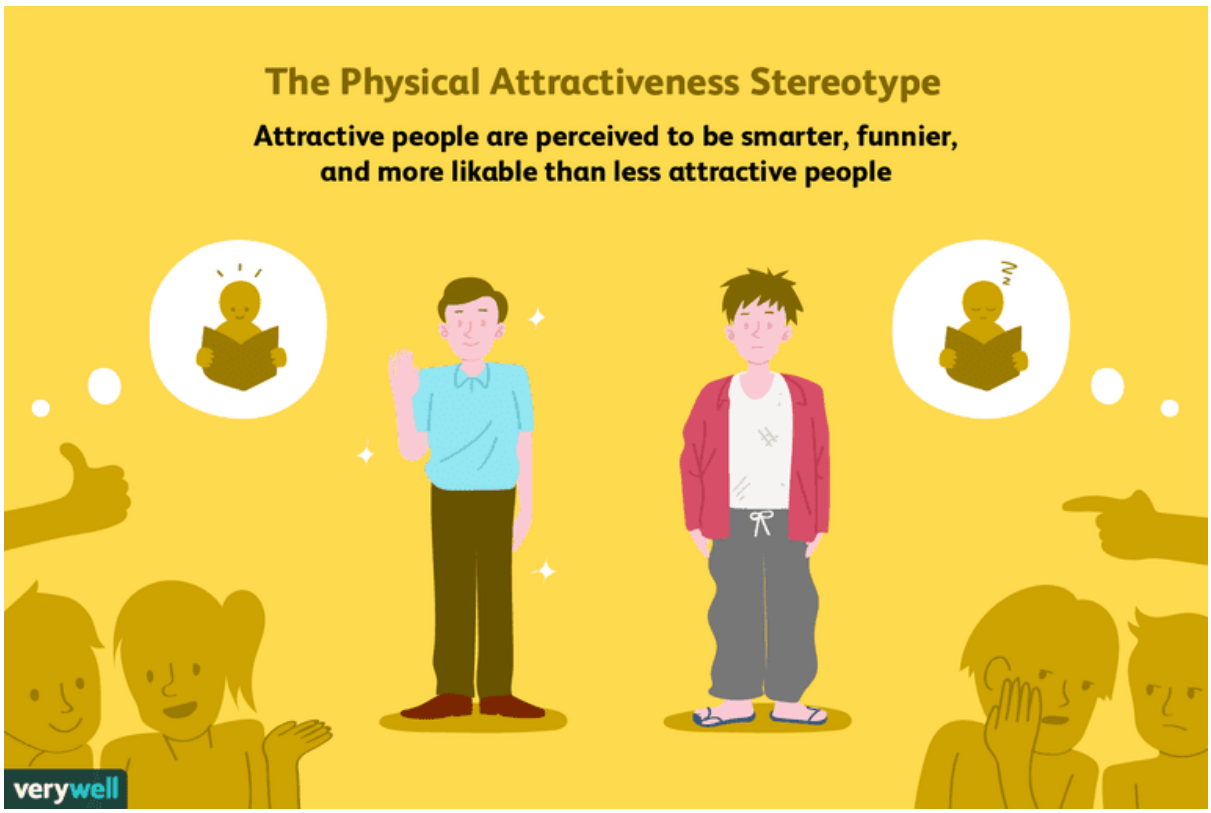
Analytical Method (Point Score Method)

- A 'model' or 'ideal' answer is prepared beforehand and broken down into specific segments, each of which is assigned a point value In addition to knowledge content, things like 'effectiveness of expression,' 'support of statements,' 'logical organization' are specified and assigned point values. This mehtod uses a kind of 'checklist' for scoring, which introduces some objectivity into the process.
- **Advantages:**
  - Increases the reliability of the scoring
  - Helps control for 'halo' effect
  - Makes it easier for the teacher to discuss and justify marks with students and parents
- **Disadvantages**
  - Can be laborious and time-consuming to prepare the checklist to score the responses
- **Recommended for:**
  - Extended Essay Questions

Global Method (Holistic Rating Method)

- Under this method, the 'model' or 'ideal' answer is not broken down into specific points, but serves as a standard for the 'best' answer. The teacher then selects from among the students' papers, samples that will serve as 'anchor points' for a set of rating categories such as Excellent, Above Average, Average, Below Average, and Poor. The teacher reads each student's answer and forms a general impression and then assigns it to one of the rating categories.
- **Advantages**
  - Simpler and quicker to use than the Analytical Method
- **Disadvantages**
  - More subjective than the Analytical Method
    - No Clear justification for the assigned grade
    - No specific feedback to students about areas of weak understanding
- **Recommended for:**
  - Shorter Essay Questions, which are likely to elicit detailed and uniformly structured answers

The ‘Halo Effect’ & Scoring Essay Questions



What Is the Halo Effect?

The halo effect is a type of cognitive bias in which our overall impression of a person influences how we feel and think about his or her character. Essentially, your overall impression of a person ("He is nice!") impacts your evaluations of that person's specific traits ("He is also smart!").

One great example of the halo effect in action is our overall impression of movie stars. Since we perceive them as attractive, successful, and often likable, we also tend to see them as intelligent, kind, and funny.

When correcting Essay Questions, teachers are often swayed in their assessments by the quality of handwriting, the sophisticated use of language, and neatness. In such cases, students often get good marks even if their answers lack substance.

HANDOUT 25: Overview of Essay Questions

Factor	Characteristics
How easy to design?	• Essay Questions are relatively easy to write
Level of Thinking Measured?	• Restricted Response Essay Questions are appropriate for assessing Comprehension, Application, and Analysis. • Extended Response Essay Questions are appropriate for Evaluation and Creation.
How Efficient to Cover Content?	• Because Essay Questions take a long time to answer, the amount of content that they can be used to cover is highly limited.
Impact of Guessing?	• Guessing is not an issue in Essay Question Responses. However, Essay Questions are susceptible to the Halo Effect when scoring.
Dangers of Irrelevant Clues that influence responding?	• Essay Questions rarely give irrelevant clues to students to help them to respond.
Scoring?	• Essays are very difficult and time-consuming to score and suffer from very low reliability.

HANDOUTS FOR PART 3

HANDOUT 26: About Item Analysis

BASIC FACTS

SHEET 1

About Item Analysis

- Definition of Item Analysis
- Purpose of Item Analysis
- Advantages of Using Item Analysis

Definition, Purpose, & Advantages

Definition of Item Analysis: *The set of procedures by which we demonstrate how effectively a given test question functions*

Purpose of Item Analysis: *By enabling teachers to identify the good questions and the bad questions on a test, item analysis can be an important too in developing valid tests in any educational setting.*

Advantages of Item Analysis:

1. *Allows teachers to construct more valid tests by keeping good questions and discarding or revising bad questions*
2. *By facilitating the creation of a Question Bank, Item Analysis saves time in making tests*
3. *Helps teachers to become better question writers*

CONDUCTING ITEM ANALYSIS

SHEET 2

What is a Good Question?

- Very difficult?
- Very easy?
- Moderate difficulty?
- Does it have discriminating power?

Information Provided by Item Analysis

Suppose . . . .

- *What if 100% of the students answering a question got it wrong. Is this a good question?*
- *What if 100% of the students answering a question got it right? Is this a good question?*

Answer: *Usually when one gets these extremes in responding patterns, the question needs revision.*

How difficult should a question be?

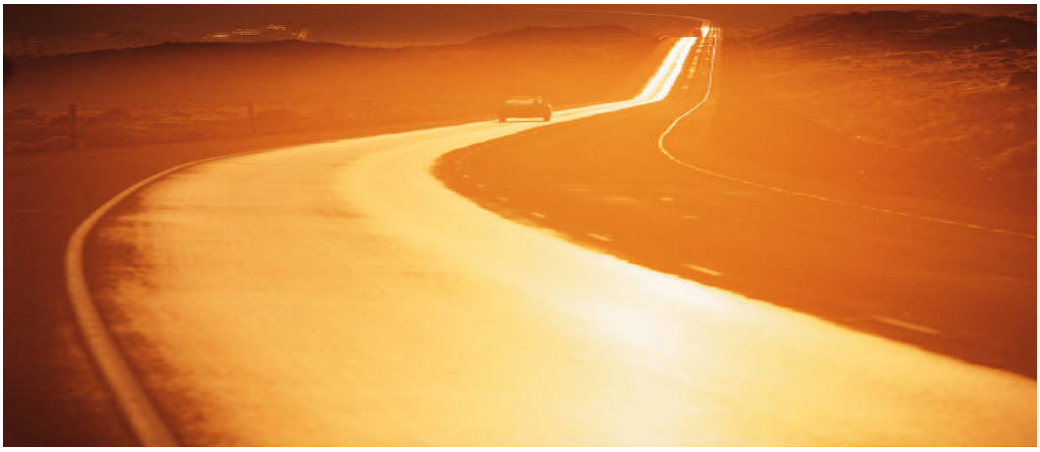
- *For most tests (e.g., summative tests), questions should be of moderate difficulty*
- *If 26% to 75% of the students answer a question correctly, we say it is of moderate difficulty*
- *Anything more or less than that is considered very easy or very difficult.*

Suppose . . . . .

- *Suppose that there were 5 students in a class who got nearly all the questions on a test right. They got the highest marks in the class*
- *But on Question X, all of these students got the wrong answer.*
- *Was Question X a good question?*
- ***Answer:*** *No, Question X is not a good question because it did not help us to discriminate the strong students from the weak ones*

CONDUCTING ITEM ANALYSIS

SHEET 3



Steps in Conducting Item Analysis

- Ordering test papers
- Forming upper and lower groups
- Tabulation

Steps in Conducting Item Analysis

Step 1: *Take all the test papers and rank them in order from the highest to the lowest scoring students.*

Step 2: *Form an Upper Group and a Lower Group by multiplying the total number of students by 27.5%. Then count this number of test papers from the top of the pile and the bottom of the pile. This is your Upper and Lower Group*

Step 3: *Tabulate the scoring patterns for each individual question for the Upper Group and again for the Lower Group. Use the* ***Item Data Tabulation Form*** *attached*

Step 4: *Transfer the data from the tabulation sheets onto a summary form for each question. Use the form provided entitled,* ***Item Analysis Score Card***

Step 5: *After compiling the data as described above, you are now ready to calculate the following key statistics:*

- *Index of Difficulty*
- *Index of Discrimination*

Item Data Tabulation Form

Question No: _____
Date: _____

Group: _____
Size: _____

Question Type: _____
Grade Level: _____

No	a	b	c	d	e
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

No	a	b	c	d	e
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

No	a	b	c	d	e
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					

Tabulation Summary Area	
Response	Number
a	
b	
c	
d	
e	
Omit	

Item Analysis Score Card

Section:	Difficulty Index:	
Question No:	Discrimination Index:	

Item Stem:

Distrac-tors	*Upper Group*	*Lower Group*	*Total*
A			
B			
C			
D			
E			

Context (Picture/Diagram)

Section:	Difficulty Index:	
Question No:	Discrimination Index:	

Item Stem:

Distrac-tors	*Upper Group*	*Lower Group*	*Total*
A			
B			
C			
D			
E			

Context (Picture/Diagram)

CONDUCTING ITEM ANALYSIS

SHEET 4A

Analyzing Item Analysis Data

- Index of Difficulty

Calculating & Interpreting Item Difficulty

In order to Calculate the Difficulty Index, use the following formula:

$$\frac{N_u + N_l}{N_{u+l}}$$

Where:

N_u= Upper group students responding correctly

N_l =Lower group students responding correctly

N_{u+l} = Total students in both groups

EXAMPLE

5 out of 8 students in an upper group got a question correct

2 out of 8 students in the lower group got the same question right

$$\frac{5 + 2}{16}$$

$$= \frac{7}{16}$$

$$= 0.44$$

$$=44\%$$

Interpreting the Index of Difficulty

75% and higher – Easy

25% to 74% - Moderate Difficulty

24% or Less - High Difficulty

CONDUCTING ITEM ANALYSIS

SHEET 4B

Analyzing Item Analysis Data

- Index of Discrimination

Calculating & Interpreting Item Discrimination

In order to Calculate the Discrimination Index, use the following formula:

$$\frac{N_u - N_l}{N_g}$$

Where:

N_u= Upper group students responding correctly

N_l =Lower group students responding correctly

N_g= Total students in each group

EXAMPLE

5 out of 8 students in an upper group got a question correct

2 out of 8 students in the lower group got the same question right

$$\frac{5 - 2}{8}$$

$$= \frac{3}{8}$$

$$= 0.38$$

Interpreting the Index of Discrimination

0.40 or greater – High Discrimination

0.20 – 0.39 - Moderate Discrimination

0.19 or Less - Low Discrimination

CONDUCTING ITEM ANALYSIS

SHEET 5

Exercise

- Checking your knowledge
- Look at the Item Analysis data provided and answer the questions below

Analyzing Question Data

Question 1:

1. *How many students in the upper group?*
2. *What is the correct answer to this question?*
3. *Was the question easy or difficult?*
4. *Which distractor worked better, A or C?*
5. *How would you describe the discriminating power of this question?*

Question 2:

1. *How many students are there in the lower group?*
2. *Can you calculate the difficulty of this question?*
3. *Can you calculate the discrimination of this question?*
4. *How many students did not answer the question?*
5. *Would you keep this question for your test? Why or why not?*

ANSWERS

Item Analysis Score Card

Section: 1	Difficulty Index:	0.31
Question No: 1	Discrimination Index:	0.38

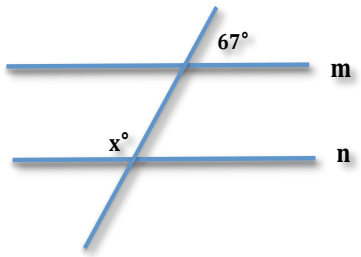
Item Stem: Given that lines m and n are parallel in the diagram below, then ∠x must be equal to:

Distractors	*Upper Group*	*Lower Group*	*Total*
A	9	17	35
B*	24	11	
C	1	1	
D	1	2	
Omit	0	4	

Context (Picture/Diagram)

Given that lines m and n are parallel in the diagram below, then ∠ x must be equal to:

A. 67°
B. 113°
C. 117°
D. 137°



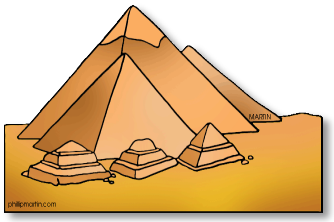
Section: 2	Difficulty Index:	50%
Question No: 2	Discrimination Index:	0.24

Item Stem: Where would you find this monument?

Distractors	*Upper Group*	*Lower Group*	*Total*
A	6	8	49
B*	47	25	
C	0	7	
D	0	7	
Omit	2	2	

Context (Picture/Diagram)

Where would you find this monument?



A. Greece
B. Egypt
C. United States
D. England

5. ASSESSMENT TERM GLOSSARY
English-Khmer

English Term	Khmer Translation	Meaning
Analytical Scoring Method		Analytic scoring is a method of scoring used for essay questions in which a fixed number of points is set for particular criteria such as the degree to which an answer addresses the question, writing style, grammar and other criteria deemed important by the teacher. Analytical scoring helps to strengthen the reliability of scoring an essay question.
Assessment		The process of appraising something or someone; the act of assigning a numerical value or rank to the quality, value or importance of something without making a final judgement.
Behavioral Construct		Behavioral constructs in assessment refer to skills that are exemplified by certain behaviors, e.g., the skill of remembering may be exemplified by the behavior of recitation.
Bloom's Taxonomy (Cognitive Domain)		Bloom's Taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding
Classification Question		This is an objective question that requires students to assess an object, statement, or concept using specific statements of principle.
Cognitive Bias		A cognitive bias is a systematic error in thinking that occurs when people are processing and interpreting information in the world around them.
Concurrent Validity		This is the degree to which a test corresponds to an external criterion that is known concurrently (i.e., occurring at the same time). For example, two separate test scores for the same student on the same topic will show concurrent validity (if the scores are similar) or the lack of it (if the scores are very different).
Construct Validity		This is the degree to which a test actually assesses the skills that it was intended to measure (e.g., Remembering, Understanding, etc.).
Content Validity		This is the degree to which a test actually assesses the content areas that it was intended to measure.

English Term	Khmer Translation	Meaning
Criterion-referenced Testing		Criterion-referenced tests compare a person's knowledge or skills against a predetermined standard, learning goal, performance level, or other criterion.
Diagnostic Evaluation		Diagnostic evaluation means to diagnose or discover students' difficulties while learning and assess the problem accurately.
Dichotomous Scoring		A scoring approach in which the response to an item or task is always scored as either correct or incorrect, regardless of the task's inherent complexity or any indication of partial knowledge or understanding in the response.
Difficulty Index		This is a measure of a question's level of difficulty used in Item Analysis.
Discrimination Index		This is a measure of a question's ability to distinguish between high and low achieving students.
Essay Question		This is an examination question that requires an answer in the form of one or more sentences, paragraph, or short composition.
Evaluation		A process that focuses on making a judgment about values, numbers or performance of someone or something.
Extended Response Essay		An extended response essay question is an open-ended question that begins with some type of prompt. These questions allow students to write a response that arrives at a conclusion based on their specific knowledge of the topic.
Formative Evaluation		The goal of formative assessment is to monitor student learning to provide ongoing feedback that can be used by teachers to improve their teaching.
General Objective		A General Objective is an instructional objective that defines performance standards in terms of thinking skills that may not be observable using such words as 'know' and 'understand.'
Global Scoring Method (also known as Holistic Scoring)		Global scoring is a method of scoring essay questions in which the teacher provides an examinee with a single global score regarding the quality of examinee work (i.e., performance) as a whole. This scoring method is in contrast to Analytical Scoring, which breaks a score down into component parts based on discrete performance criteria.

English Term	Khmer Translation	Meaning
Halo Effect		The halo effect is a type of cognitive bias in which our overall impression of a person influences how we feel and think about their character. This bias particularly comes into play when correcting Essay Questions where nice handwriting and good grammar may sway a teacher to give higher marks than a student deserves.
Instructional Objective		An instructional objective is a statement that will describe what the learner will be able to do after completing the instruction.
Inter-rater Reliability		inter-rater reliability is the degree of agreement among independent observers or scorers who rate, code, or assess the same phenomenon or question.
Item Analysis		Item analysis is a process which examines student responses to individual test items (questions) in order to assess the quality of those items and of the test as a whole.
Matching Question		This is a kind of objective question in which students pair items in a prompts column to items in the answers column.
Mean		A mean scale score is the average performance of a group of students on an assessment.
Multiple Choice Question		Multiple choice questions are commonly used objective questions which provide respondents with multiple answer options of which only ONE is correct.
Norm-referenced Testing		Norm-referenced tests are designed to compare and rank test takers in relation to one another. They provide information on whether pupils performed better or worse than a hypothetical average student.
Normal Distribution		A Normal Distribution is **a probability distribution of scores that is symmetric about the mean**, showing that data near the mean are more frequent in occurrence than data far from the mean.
Objective Questions		Objective test questions are those that require a specific answer. An objective question usually has only one potential correct answer (although there may be some room for answers that are close), and they leave no room for different opinions or disagreements between scorers.

English Term	Khmer Translation	Meaning
Percentile		A percentile is a measure used in statistics indicating the value below which a given percentage of observations in a group of observations fall. ... For example, if a score is at the 86th percentile, where 86 is the percentile rank, it is equal to the value below which 86% of the observations may be found.
Predictive Validity		Predictive validity refers to how likely it is for test scores to predict future job performance or success in life.
Question Bank		A question bank is a collection of analyzed questions that is stored for repeated use.
Question Clue		A word or phrase in a question that unintentionally helps a student to answer the question correctly without really understanding the information tested.
Reliability		Reliability refers to the degree to which scores from a particular test are consistent from one use of the test to the next.
Restricted Response Essay		This is a kind of open-ended question that limits the content and response to be given by a student when answering the question.
Short Answer Question		Short Answer Questions are generally open-ended questions that require students to construct a very specific response where there is only one correct answer.
Specific Objective		A Specific Objective is an instructional objective that defines performance standards in terms of thinking skills that must be 'observable' using such as words as 'state,' 'explain,' 'solve,' and other observable behaviors.
Subjective Question		Subjective questions are open-ended questions that require answers in the form of lengthy written explanations and where the scoring of answers may vary between scorers.
Summative Evaluation		Summative evaluation involves making final judgments about a student's degree of learning at the end of a course or academic program.
Table of Specifications		A table of specifications (TOS) is a chart that teachers and test developers use in item writing. It ensures that the test de-

English Term	Khmer Translation	Meaning
		veloped assesses the content taught and the appropriate learning levels at which the content was taught (e.g., remember-ing, understanding, etc.).
True False Question		A true or false question is an objective question that consists of a statement that requires students to indicate whether it is true or false.