



TRAINING MODULE SERIES:
STUDENT-CENTERED LEARNING (SCL)
APPROACHES FOR INNOVATIVE TEACHING

Module 6: Assessment in Student-Centered Learning (SCL)

Muhammad Kamarul Kabilan, Ahmad Zamri Khairani
& Lim Hooi Lian



Centre for Development of Academic Excellence (CDAE), USM

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2012

Training Module Series: Student-Centered Learning (SCL) Approaches for Innovative Teaching

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MODULE 6: ASSESSMENT IN STUDENT-CENTERED LEARNING (SCL)

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Preface

Students are expected to achieve 21st century skills, which inculcate life & career skills, learning & innovation and information & communication technology (ICT) skills. Consequently, it has become the unwavering responsibility of educators to ensure that these skills are sowed in students especially at higher education institutions (HEIs). As such new methods of teaching and learning (T&L) have been continuously identified to devise techniques which are relevant and suitable for the students of the net generation. Parallel to that perspective, Student-Centered Learning (SCL) has been promoted as a new approach in T&L to support the rapidly changing educational environment. The Centre for Development of Academic Excellence (CDAE) has published the Training Module Series: Student-Centered Learning (SCL) Approaches for Innovative Teaching which consists of Modules 1 to 6 that will provide the basis for a training programme for academic staffs to enhance their pedagogical knowledge and skills. The modules were authored by an array of experts in the area of T&L, who have provided an overview of SCL in terms of definition, methodology and application.

Module 1: Introduction serves as a foreword to the concept of SCL by: (1) introducing the vision and mission of the National Higher Education Strategic Plan 2 (NHESP 2) regarding T&L through the soft power approach at the regional and global levels; (2) describing the 21st century skills that are needed for today's society and (3) specifying the outcomes of T&L in the classroom. Module 2: Philosophy of Student-Centered Learning (SCL) provides an overview of SCL and introduces the underlying philosophies that support the student-centered approach to teaching. The content of this module also describes the key benefits of SCL for students and lecturers and student-centered pedagogy (i.e. characteristics of the learners and the nature of the learning environment in the student-centered setting).

Module 3: Learning Taxonomies revolves around the learning taxonomies used in T&L that are based on Anderson and Krathwohl's (2001) revised version of Bloom's Taxonomy and Buckwalter's Taxonomy for the Health and Medical Sciences (1981). This module illustrates the basic principles of the learning taxonomies used in education and the classification of educational objectives (i.e. three domains: cognitive, affective and psychomotor). Module 4: The Constructivist Lecturer provides detailed methods that will assist the reader to become a constructivist lecturer via the application of constructivist approaches in T&L.

Module 5: Approaches to Student-Centered Learning (SCL) aims to offer teachers in higher education a variety of student-centered educational approaches. These learning approaches are presented in a straightforward manner, with opportunities for self-assessment and reflection to allow for the selection of the most appropriate SCL approach.

Module 6: Assessment in Student Centered Learning is a compilation of six individual units that includes the detailed description of assessment for the SCL approach which consists of definition, methodology and principles. This module also describes issues, benefits and challenges of implementing assessment and best practices for assessing students in the in the SCL.

On the whole, the modules are projected to be beneficial to the reader in terms of T&L, upon the understanding and consequently the application of the SCL concept. Each module in this series will definitely aid in the improvement of the T&L environment in USM and thus is recommended for all the academic staff of Universiti Sains Malaysia (USM).

Professor Abd Karim Alias

Director

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UNIT 1

INTRODUCTION TO ASSESSMENT

Muhammad Kamarul Kabilan, Ahmad Zamri Khairani & Lim Hooi Lian

Module Outcomes

At the end of the unit, users should be able to:

1. Describe and differentiate assessment, measurement, evaluation and testing;
 2. Give examples of assessment procedures that provide useful information for decision making;
 3. List the importance of assessment in the classroom; and
 4. Identify issues in assessment.
- 

1 Introduction

Successful teaching requires teachers to gather meaningful information and make decisions based on the gathered information. In fact, as documented by Shavelson and Stern (1981), teachers make one decision about students every 2–3 minutes. These decisions include:

1. What learning objectives do I need to cover today?
2. What kinds of activities are suitable for this chapter?
3. Is my teaching going well?

In order to answer these questions and eventually make meaningful and purposeful decisions about teaching, teachers need to have useful information. This information should be acquired using sound assessment procedures and practices. For example, to make a decision about the learning objectives that the teacher needs to cover for a specified lesson, s(he) needs to review both the curriculum and the lesson plan. This kind of assessment procedure enables the teacher to have a clear idea of what and how to teach. Assessment-related activities are so important that researchers estimate teachers may spend up to one-half of their time in the classroom focused on this issue (Stiggins, Conklin, & Associates, 1992).

2 What is Assessment?

In education, the terms assessment, measurement, evaluation and testing mean very different things, yet they are often used interchangeably by different stakeholders (teachers, parents, schools, educational authorities, researchers and students) (Figure 1). The following definition serves to explain the distinction between the terms.

2.1 Assessment

- Assessment is a broad term that includes measurement, evaluation and testing.
- It is defined as a process of gathering information for making decisions to facilitate teaching and learning.
- Examples of assessment practices include tests, surveys, inventory observations and interviews.
- Assessment occurs at various levels through various procedures. For example:
 1. Lecturers assess students' understanding at the end of each session using quizzes.
 2. Lecturers assess students' ability to complete a prespecified task on the 12th week of a semester.
 3. Lecturers assess students' grasp of knowledge using the end-of-semester examination.

- Assessment procedures also differ in terms of difficulty. Assessment of spelling ability is rather straightforward compared to assessment of understanding of a passage or a novel. The latter requires more thorough assessment procedures to obtain accurate information.

2.2 Measurement

- Measurement refers to the process of assigning numbers to certain constructs or attributes. The number is usually called a score, which describes the degree to which a student is acquiring the attribute.
- Construct refers to complex concepts that make an entity. For example, English proficiency is a construct that incorporates reading, comprehension, listening and writing abilities.
- Two types of construct exist: physical and psychological.
- Physical constructs are observable, such as height or weight of a man, length or width of a book or how hot or cold something is. Standard instruments such as rulers, scales or thermometers are designed to ensure that the score for a physical construct is not only accurate but also reliable from one instrument to another.
- Psychological constructs include intelligence, reading ability, mathematical ability, reasoning ability and achievement or motivation level. These psychological constructs are unobservable. Therefore, measurement of these construct is neither easy nor straightforward because no standard instruments are available. The score for one's spelling ability is very much related to the test being used. Different tests may give different results and therefore result in a different understanding of the student's ability to spell.
- To ensure that the measurement is precise, the quality of the test used should be at an acceptable level, which is usually determined using appropriate validity and reliability tools. Issues of validity and reliability of the test are often discussed in tandem with the scores obtained from the measurement of particular attributes.
- Whether the measurement is straightforward or not, one important feature is that the score obtained from a good measurement must reflect the achievement and ability of the student. For example, if Ali is better than Ah Seng in algebra, then Ali should obtain better score in an algebraic test.
- Not all assessment procedures yield measurements. For example, when a lecturer selects students for field practice based on their gender and not based on their ability to read or write.

2.3 Evaluation

- During the evaluation process, a value judgment is usually made about a student's performance. It is the basis for the course of action that should be taken next.
- For instance, when a group of students scores higher than 90% on a calculus test, the students are considered to be exceptionally good at calculus. Thus, they may be encouraged to take part in a mathematics competition at the national level. They may also be assigned to help their friends improve their calculus performances.
- To conduct a good evaluation, lecturers need to assess and measure several times to determine the true performance of the students. Lecturers need to gather multiple scores and various information to judge the worth of a student's performance. This is important because value judgment is subjective. One might argue that a score of 90% might be enough to qualify a student for a national-level competition, whereas others might require a higher score.
- Evaluation is not necessarily based on scores. Lecturers often evaluate a student's performance by making systematic observations. For example, lecturers usually evaluate students' projects using a checklist without assigning numbers to any of the criteria. In such a case, lecturers need to integrate both their knowledge and experience to decide on the quality of the project and subsequently grade the students' work. As such, subjectivity and inconsistency will influence the evaluation process.
- In addition to student performance, lecturers need to evaluate other things, such as curriculum, peer performance, learning materials and strategic planning. While the use of test scores may reduce subjectivity and inconsistency, lecturers' knowledge and experience still prevail as important aspects of evaluation.

2.4 Testing

- A test is simply a tool or instrument used to describe and understand an attribute, whereas testing can be defined as the processes, procedures or practices of using a test.
- An example of a test is a paper-and-pencil test used in school to describe the learning outcomes that have been achieved by the students. This kind of test is called an achievement test. However, there are many other types of test. For example, a survey is a test that describes the attributes from the perspective of a group (or sample). A questionnaire to measure the motivation level of students is another kind of test. A systematic procedure such as checklist is also considered to be a test.
- In testing, a student's score is usually obtained by summing the points earned by the student on each item.

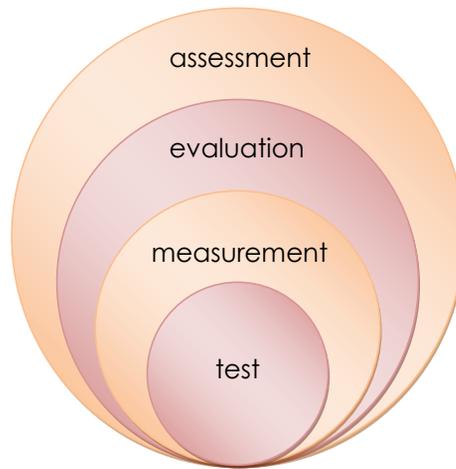


Figure 1. The connection between assessment, evaluation, measurement and tests

Figure 1 depicts the connections between the major concepts related to assessments that are briefly discussed above. Understanding the links between these concepts are important for educators to distinguish between them and to use them appropriately in the planning and delivering of their lessons or courses. Within these four major concepts, there are other terms, notions and definitions that educators need to know, comprehend and be able to apply in their teaching-learning activities and engagements. These terms will be discussed accordingly in the other units.

3 The Importance of Assessment in Education

In general, assessment is an essential part of teaching and learning because it determines whether or not the goals of education were achieved. More specifically, when assessment works, it improves learning and teaching and establishes a quality learning environment.

3.1 Assessment is essential for learning

- According to Pellegrino, Chudowsky, & Glaser (2001), one of the most important roles of assessment is to provide informative feedback to students during teaching and learning.
- Feedback enables students to constantly evaluate their learning, especially their level of understanding.
- Therefore, it is important that assessment is done consistently and continuously during teaching and learning so that it provides information about the students' level of understanding.

- It also is important to plan assessments so that students will be able to monitor their learning strategies and practice their acquired knowledge, skills and abilities.

3.2 Assessment is critical for effective teaching

- Ken Bain (2004) cited the following two important characteristics of the best college teachers:
 1. They begin with questions about students' learning objectives; and
 2. They systematically assess their own teaching and make appropriate adjustments.
- The following self-evaluation may provide information about how teachers assess their teaching, make essential changes and thus improve teaching:
 1. What are the students' needs?
 2. Are the students learning well?
 3. What approaches are most suitable?
 4. What changes should I make to help the students?
 5. In what direction should I go next?

3.3 Assessment is needed for a quality learning environment

- One of the key aspects of a quality learning environment is student-centred teaching, in which lecturers emphasize not only what the students learn but, more importantly, how they learn.
- As such, teaching and assessing are intertwined (Huba & Freed 2000). They are performed continuously and are interrelated in order to provide guidance about how to acquire knowledge, skills and abilities. Students are allowed to make mistakes and they learn from the mistakes.

4 Issues of Assessment

- It is widely accepted that assessment, particularly testing, produces anxiety. While testing motivates most students, some may experience anxiety and therefore their true performance is affected.
- Results from testing often are used to group or label students. Grouping is a major concern in education because it shapes how others perceive students. For example, when students are grouped as below average, it affects how teachers perceive them (i.e., they have lower expectations of the students). The students may not receive the same opportunities as others in various school programs. More importantly, labelling may have negative effects on how students view themselves.

- Inappropriate interpretation of test scores may result in unwarranted generalizations. Below average students might develop a low sense of worth (such as low confidence level, low motivation level to learn and low-self esteem) due to their low test scores.
- Even though testing and to a certain extent assessment, pose some negative consequences, their absence is considered more harmful. Without testing, decisions about important issues in teaching and learning would be meaningless and illogical. Furthermore, it would be difficult to encourage students to improve without demonstrating their strengths and weaknesses. In addition, rewards or motivation would be less based on merit and performance and instead would be based on other weak criteria or even favouritism of students.

TASKS

1. Decide whether the following are true or false. Explain your answer.
 - To measure an important construct, we need a test.
 - Any information obtained from the student is an assessment.
 - To evaluate a particular group of students, one must assess them.
 - To test a student, one needs to measure the student.
2. Discuss the following:
 - How can lecturers counter the negative effects of assessment?
 - Why is the absence of assessment considered to be more harmful than using assessment?

SELF-REFLECTION

Reflect on a specific lesson or course that you have taught and make a list of decisions you have made. Explain the kind of assessments you made to obtain information for making each decision and how good the information you used was.

Case Study

An English Language lecturer wants to evaluate the existing course curriculum. She wants to know what kind of learning objectives need to be given more emphasis so that she can try to reduce the less important ones. Describe the kind of information she needs to obtain from her students.

Further Reading

Bain, K. (2004). What the best college teachers do. Cambridge, MA: Harvard University Press.

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Pellegrino, J. W., Chudowsky, N., & Glaser, R. (2001). Knowing what students know: The science and design of educational assessment. Washington, DC: National Academy Press.



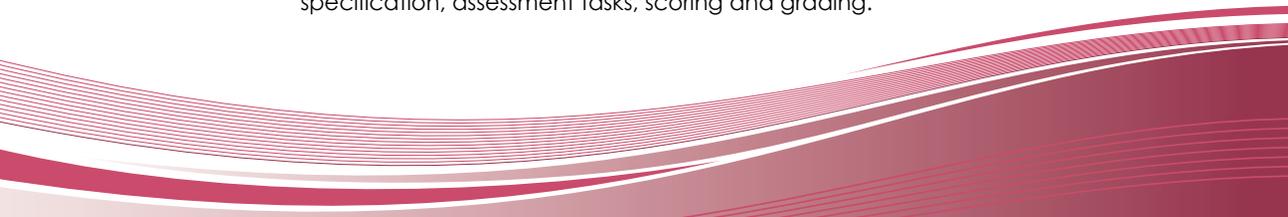
UNIT 2

UNDERSTANDING THE PRINCIPLES OF ASSESSMENT FOR STUDENT-CENTERED LEARNING (SCL)

Lim Hooi Lian, Muhammad Kamarul Kabilan & Ahmad Zamri Khairani

Module Outcomes

At the end of this unit, users should be able to:

1. Describe the concept and importance of learning outcomes;
 2. Classify the three domains of learning outcomes based on Bloom's Taxonomy, Revised Bloom's Taxonomy, Krathwohl's Taxonomy, Simpson's Taxonomy and Solo's Taxonomy;
 3. Prepare a table of specification based on the format given;
 4. Create assessment tasks based on the three main steps given;
 5. Design different types of scoring instruments based on the six steps given;
 6. Explain different types of grading and the way to assign a grade; and
 7. Describe the relationships among learning outcomes, the table of specification, assessment tasks, scoring and grading.
- 

1 Introduction

The traditional method of assessment focused on the teacher's input and on assessment in terms of how well the students absorbed the content taught. This approach to assessment is referred to as the teacher-centered approach. Traditionally, a course description referred mainly to the content of the course that would be covered in class. Hence, the planning and designing for the course began with the content of the course. That is, teachers decided on the content of the course that they intended to teach, planned how to teach the content and then assessed the content that had been taught. This type of approach had been criticised, as it can be difficult for teachers to identify precisely what the students have to be able to do in order to pass the course (Gosling and Moon, 2001). Thus, international trends in education have shifted from the traditional way of assessment (i.e., the teacher-centered approach) to the modern way of assessment (i.e., student-centered approach). The student-centered method of assessment focuses more on what the students are expected to be able to do at the end of the course. Hence, this approach is commonly referred to as an outcome-based approach. Intended learning outcomes (commonly shortened to learning outcomes) are used to express what students should be able to do at the end of the learning period.

2 What is a Learning Outcome?

The distinction between learning outcomes and learning objectives is not universally recognised and many scholars may find that the term 'learning outcomes' describes what they have already understood to be meant by the term 'learning objectives'. Some scholars state that learning outcomes are a subset or type of learning objective. This is because learning objectives may not lead to a learning outcome or 'end product' of a unit of instruction. In contrast, learning outcomes should focus on what the student should know and realistically be able to do by the end of a lesson or class.

There is currently no precise agreement about the definition of the term 'learning outcome'. A survey of the literature on learning outcomes reveals a number of similar definitions, none of which differ significantly from each other. From these definitions, it is clear that:

- Learning outcomes focus on what the successful student is expected to be able to do at the end of the course;
- Learning outcomes focus on what exactly students should acquire in terms of knowledge, skills and/or attitudes when they successfully complete some learning; and
- Learning outcomes are concerned with the achievements of the student rather than the intentions of the teacher.

For example, a teacher might state that at the end of his/her course, students will be able to:

- Use the model to construct mathematical problem solving tasks; and
- Design a theoretical framework for research based on the theory constructivism.

Learning outcomes often represent discrete units of instruction in a course, but each may have several sub-outcomes. Learning outcomes need not be attained by specific instruction in a lesson; instead they may be woven throughout the course. For example, an instructor might ask his/her students to use creativity skills and work effectively in teams to design a new hair style or use problem solving skills to solve algebra tasks.

2.1 The importance of learning outcomes

Learning outcomes are the most important section of a course outline because:

- By reading the learning outcomes, a professional in the field should be able to identify what knowledge, skills and attitudes the students will learn after taking a course;
- They define the type and depth of learning students are expected to achieve;
- They provide an objective benchmark for formative, summative and prior learning assessment; and
- They clearly communicate expectations to students.

2.2 Classifying learning outcomes

Learning outcomes for a course should fit within the course goals and aims. The verbs used must match the level of the learning outcome. That is, the learning outcome should be stated as measurable or observable behaviours (e.g., list, recite, build design and comment). Vague verbs or unobservable verbs, such as know, understand or appreciate, are not easily measurable. The checklist at the back of this chapter (Appendix 1) can be used as a reminder of all of the important points about the construction of learning outcomes.

Learning outcomes can be classified into three possible categories (domains):

1. Thinking, knowledge (cognitive domain),
2. Doing, skills (psychomotor domain); and
3. Feeling, attitudes (affective domain).

Some units of learning may occur in more than one domain at the same time. Each of these categories has different possible levels of learning, which range from simple recall or observation to the complex evaluation or organisation of information.

2.2.1 Cognitive domain

The cognitive domain refers to the intellectual capability that involves mental skills or knowledge. Bloom (1956) devised a classification of the cognitive domain that consists of six successive levels arranged in a hierarchy. The six levels are knowledge, understanding, comprehension, application, analysis and synthesis and evaluation. Bloom's Taxonomy is frequently used for writing learning outcomes because it provides a list of verbs. However, the list of verbs is limited (Kennedy, 2008). Furthermore, the original cognitive domains classified instructional learning outcomes based only on verbs. However, instructional learning outcomes consist of two main components: behaviour (verbs) and instructional content (nouns). Thus, many attempts have been made to extend Bloom's original list of verbs. In recent years Anderson & Krathwohl (2001) revised the cognitive domain in Bloom's Taxonomy. The revised cognitive domain consists of two major dimensions: the knowledge dimension and the cognitive process dimension.

A Knowledge dimension

This dimension resembles the subcategories of the knowledge category in the original Bloom's Taxonomy. It contains four categories: factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge (Table 1). (Anderson & Krathwohl, 2001; Pang & Lajjum, 2008).

Table 1. Knowledge dimension

Level	Subcategory
A. Factual Knowledge Knowledge of discrete, isolated and specific content elements	Aa. Knowledge of terminology
	Ab. Knowledge of specific details and elements
B. Conceptual Knowledge Knowledge of organising basic elements to form a larger functioning structure	Ba. Knowledge of classifications and categories
	Bb. Knowledge of principles and generalisations
	Bc. Knowledge of theories, models, and structures
C. Procedural Knowledge Knowledge of procedure/method for doing something	Ca. Knowledge of subject-specific skills and algorithms
	Cb. Knowledge of subject-specific techniques and methods
	Cc. Knowledge of criteria for determining when to use appropriate procedures
D. Metacognitive Knowledge 'Knowledge about cognition in general as well as awareness of and knowledge about one's own cognition' (Anderson & Krathwohl, 2002, p. 55)	Da. Strategic knowledge
	Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge
	Dc. Self-knowledge

The cognitive process dimension is a comprehensive set of classifications of cognitive processes that consists of six levels: remembering, understanding, applying, analysing, evaluating and creating (Table 2) (Anderson & Krathwohl, 2001; Krathwohl, 2002; Pang & Lajjum, 2008).

Table 2. Cognitive process dimension

<p>1. Remember: Recognising and recalling relevant knowledge from long-term memory</p> <p>1.1 Recognising 1.2 Recalling</p>
<p>2. Understanding: Determining the meaning from instructional messages, which could be in the form of oral, written and graphic communication</p> <p>2.1 Interpreting 2.2 Exemplifying 2.3 Classifying 2.4 Summarising 2.5 Inferring 2.6 Comparing 2.7 Explaining</p>
<p>3. Apply: Executing and implementing a procedure/method in a particular situation</p> <p>3.1 Executing 3.2 Implementing</p>
<p>4. Analyse: Breaking material into smaller parts and detecting the relation/similarities/differences between parts</p> <p>4.1 Differentiating 4.2 Organising 4.3 Attributing</p>
<p>5. Evaluate: Judging a particular phenomenon based on criteria and standards</p> <p>5.1 Checking 5.2 Critiquing</p>
<p>6. Create: Generating, planning, and producing elements to form a coherent whole or a new product</p> <p>6.1 Generating 6.2 Planning 6.3 Producing</p>

2.2.1.1 The Taxonomy Table

The knowledge dimension and cognitive process dimension form a very useful table called the Taxonomy Table (Table 3). Hanna (2007) described the Bloom's revised taxonomy by Anderson & Krathwohl (2001) as 'a framework for aligning learning objectives, curriculum and assessment that match the complexity of learning while addressing important aspects of subject matter-specific instruction' (p. 3). The Taxonomy Table is useful in helping teachers to classify instructional learning outcomes clearly. In turn, it helps them examine the relative emphasis of the outcomes, curriculum alignment and missed educational opportunities (Krathwohl, 2002).

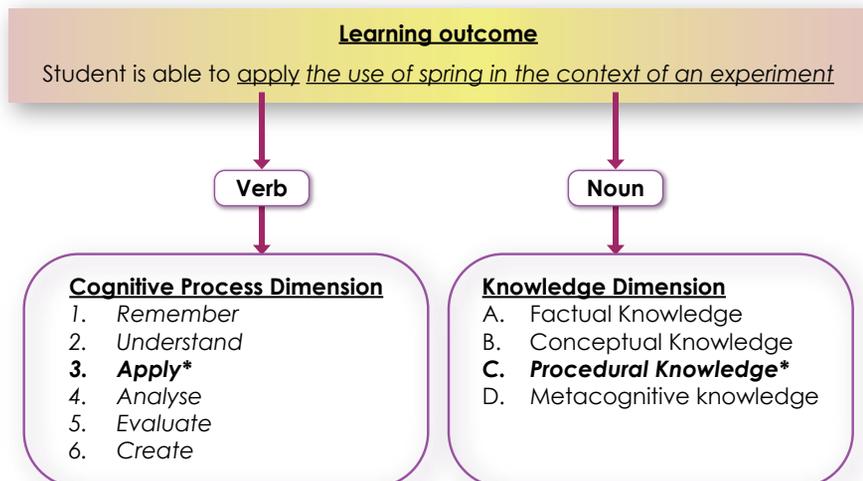
Table 3. Taxonomy Table

The Knowledge Dimension	The Cognitive Process Dimension					
Factual Knowledge	Remember	Understand	Apply	Analyse	Evaluate	Create
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

Adapted from Anderson & Krathwohl (2001), p. 28.

How to classify learning outcomes based on the Taxonomy Table

To classify a learning outcome in the revised cognitive domain, it is important to examine two important elements: nouns and verbs (Anderson & Krathwohl, 2001). Nouns represent the knowledge dimension, whereas verbs represent the cognitive process dimension. Look at the example below:



The verb 'apply' represents the third category in the cognitive process dimension, whereas the noun phrase 'the use of spring in the context of an experiment' represents the third category in the knowledge dimension. Hence, this outcome is placed in the cell corresponding to the intersection of *Apply* and *Procedural Knowledge* in Table 3. More examples of classification of instructional learning outcomes based on the Taxonomy Table are shown in Table 4.

Table 4. Examples of classified instructional learning outcomes based on the Taxonomy Table

The Knowledge Dimension	The Cognitive Process Dimension					
	Remember	Understand	Apply	Analyse	Evaluate	Create
Factual knowledge	<u>Identify</u> that the cell is the basic unit of living things	<u>Give example</u> of the three states of matter	<u>Apply</u> the properties of metals	<u>Distinguish</u> between an animal cell and a plant cell	<u>Choose</u> a suitable tool for measuring mass	<u>Draw</u> an animal cell
Conceptual knowledge	<u>Identify</u> the rules of the Pythagorean theorem	<u>Give example</u> of the Theory of Evolution	<u>Apply</u> the Theory of Bandura in the situation	<u>Distinguish</u> between Bloom's Taxonomy and Krathwohl's taxonomy.	<u>Choose</u> a suitable theory to estimate business costs	<u>Generate</u> an equation for the curve
Procedural knowledge	<u>Recall</u> what is the qualitative method	<u>Compare</u> the qualitative method to the quantitative method	<u>Implement</u> interviewing techniques in data collection	<u>Differentiate</u> <u>between</u> the qualitative method and the quantitative method.	<u>Evaluate</u> the effectiveness of interviewing techniques	<u>Plan</u> a research project using the qualitative method
Metacognitive knowledge	<u>Recall</u> your personal strengths and personal weaknesses	<u>Compare</u> personal strengths between your friend and you	<u>Implement</u> your personal strengths in the given task	<u>Organise</u> your personal strengths in a hierarchy	<u>Critique</u> your personal weaknesses	<u>Write</u> an essay regarding your personal weaknesses

2.2.2 Affective domain

The affective domain encompasses behaviours characterized by feeling, values or emotions that can be positive or negative (Sax, 1997). For example, students' attitudes, values, interests and feelings are within this domain (Popham, 2000). In 1964, Krathwohl, Bloom and Masia developed an affective taxonomy called Krathwohl's taxonomy (Sax, 1997). It is a useful framework for organising assessment of affective educational objectives (Hopkins, 1998). Table 5 shows the five levels in Krathwohl's taxonomy (Pang & Lajium, 2008; Sax, 1997).

Table 5. Affective domain

Level	Description	Examples of Learning Outcome
1. Receiving awareness	<ul style="list-style-type: none"> Perceive stimulus Students' sensitivity to a particular stimulus Student is willing to receive or attend to the existence of certain stimuli 	<ul style="list-style-type: none"> Show sensitivity to a social problem Accept the differences of race and culture
2. Responding	<ul style="list-style-type: none"> Do something about the stimulus Action is involved Student is not only willing to receive, but is actively attending 	<ul style="list-style-type: none"> Carry out a task voluntarily Take part in group discussion in class
3. Valuing	<ul style="list-style-type: none"> Committed to stimulus Attachment of value to a particular stimulus Student is not just responding actively, but he/she recognises the values, knows the meaning of the activity and shows commitment 	<ul style="list-style-type: none"> Appreciate the contribution of scientist Show commitment in social development
4. Organisation	<ul style="list-style-type: none"> Form value system Organisation of values into system Student knows the interrelationships among values and is able to establish a dominant value 	<ul style="list-style-type: none"> Form self-philosophy according to interest, belief and ability
5. Characterisation	<ul style="list-style-type: none"> Total philosophy Internally consistent system of values Unchangeable behaviour or consistent philosophy 	<ul style="list-style-type: none"> Having good health attitude Show good personality

2.2.3 Psychomotor domain

The psychomotor domain (Simpson, 1972) encompasses physical movement, coordination and use of motor skills (Table 6). Examples include jumping and playing badminton. Simpson (1972) divided the psychomotor domain into a hierarchy with seven levels: perception, set, guided response, mechanism, complex over response, adaptation and origination (Bemis & Schrceder, 1969; Pang & Lajjum 2008; Simpson, 1966).

Table 6. Psychomotor domain

Level	Description	Examples of Learning Outcome
1. Perception	<ul style="list-style-type: none"> • Awareness via sense organs • The ability to use sensory cues (auditory, visual, tactile, taste, smell and kinaesthetic) to guide motor activity 	<ul style="list-style-type: none"> • Adjust the heat of stove by smell and taste of food • Report to police when you witness an accident
2. Set	<ul style="list-style-type: none"> • Readiness for action • It includes mental, physical and emotional sets 	<ul style="list-style-type: none"> • Show willingness to learn a new topic • Warm up body before badminton practice
3. Guided response	<ul style="list-style-type: none"> • Tutored behaviour • The preliminary stages in learning a complex skill • Includes imitation and trial and error 	<ul style="list-style-type: none"> • Perform basic breathing skill in swimming as demonstrated • Dance by following demonstration on television
4. Mechanism	<ul style="list-style-type: none"> • Habit • Intermediate stage in learning a complex skill • The action can be performed with some confidence and proficiency 	<ul style="list-style-type: none"> • Drive a car • Play the piano
5. Complex over response	<ul style="list-style-type: none"> • Coordinate more than one motor skill • Involves complex movement patterns • Indicated by a quick, accurate, and highly coordinated performance requiring a minimum of energy • Includes performing without hesitation, and automatic performance 	<ul style="list-style-type: none"> • Type a letter quickly and accurately • Operate a computer system <p>Note: similar to mechanism, but with adverbs or adjectives to indicate better performance</p>
6. Adaptation	<ul style="list-style-type: none"> • Adaptation of well-developed movement pattern to meet special requirements 	<ul style="list-style-type: none"> • Adapt badminton skills in football • Adapt swimming skills in pool to sea
7. Origination	<ul style="list-style-type: none"> • Creation of new movement patterns to meet special requirements • Emphasize creativity based upon highly developed skills 	<ul style="list-style-type: none"> • Develop a new gymnastic routine • Develop new dance

2.2.4 The SOLO Model

The SOLO (Structure of the Observed Learning Outcome) model provides a systematic way of describing how a student's performance grows in complexity when mastering tasks. It can be used in two ways:

1. To assess the learning outcomes attained by each student; and
2. To set learning outcomes appropriate to where a student should be at a particular stage of their program.

It is relatively easy to apply the SOLO model to categorise students' responses. Table 7 shows four different levels of responses to a science question.

Table 7. SOLO classification of responses

Question: Why does it get dark at night?		
Levels	Descriptions	Examples of Responses
Unistructural	Student shows concrete, reductive understanding of the topic. Simple and obvious connections are made but broader significance is not understood. <i>Student gives a simple cause and effect explanation focused on a simple understanding of the phenomenon.</i>	<i>Because the sun goes to the other side of the world</i>
Multistructural	Student can understand several components but the understanding of each remains discreet. A number of connections are made but the significance of the whole is not determined. Ideas and concepts around an issue are disorganised and are not tied together. <i>The response replicates the same simplistic quality of cognition but increases the number of causes identified.</i>	<i>Because the Earth is spinning and the sun is going around the Earth</i>
Relational	Student can indicate a connection between facts and theory, action and purpose. Student shows understanding of several components that are integrated conceptually showing understanding of how the parts contribute to the whole. He/she can apply the concept to familiar problems or work situations. <i>The response identifies the relationship of light and night with a second phenomenon of rotation.</i>	<i>Generally, when the sun goes around the Earth, some parts of the Earth get dark (or becomes night) for 12 hours while the other parts get light (or becomes daytime) for 12 hours..</i>

(see next page)

(continued)

Levels	Descriptions	Examples of Responses
Extended abstract	<p>Student conceptualises at a level extending beyond what has been dealt with in the actual teaching. Understanding is transferable and generalisable to different areas.</p> <p><i>The response extends the relationship to the shape and axis of the planet as part of a generalised explanation for the phenomenon.</i></p>	<p><i>The Earth is spherical in shape and rotates about its north-south axis. As it rotates, at any one time the half of the Earth's sphere facing the sun will be in light while the opposite half will be in shadow. As the Earth is rotating continuously, a point on the earth's surface will pass alternately through the lighted half and the shaded half.</i></p>

Source: 'Cognitive Processes in asTtle: The SOLO Taxonomy' by Hattie & Brown (2004), p. 16.

The levels of the SOLO model can be used to construct a series of four levels relating to a single text, with each item measuring one level of the SOLO taxonomy. Consider the following superitem (Table 8) that has four items, one at each level of the taxonomy:

Table 8. A superitem constructed according to SOLO

Concert Hall	
The first row of the Mega Mall concert hall has 10 seats. Each row thereafter has 2 more seats than the row in front of it.	
Levels	Descriptions
Unistructural	
How many seats are in row 2 in the Mega Mall concert hall?	The item requires that the student identify the next term in the sequence by referring directly to the information given.
Multistructural	
How many seats are in row 13 and 18 in the concert hall?	The item requires that the given information be handled serially. The student identifies the recursive relationship between the terms to solve the specific cases.
Relational	
a. How many seats are in rows in the concert hall?	The item requires that the student integrate all of the given information to make a generalisation by forming an algebraic expression and linear equation. The student has to apply the rule to solve the related situation.
b. Write a linear equation to find the number of seats for any row. Lets represents the number of seats and represents the number of rows.	
c. If the last row has 406 seats, try to use the linear equation to find the number of rows in the hall.	
Extended Abstract	
The manager planned to prepare 1000–15000 seats in 100 rows for a musical concert. Will he make it? If yes, explain your answer. If no, try to suggest a new linear equation in order to help the manager.	The item requires that the student extend his/her understanding of linear relationships by evaluating the relevance and applicability of the linear equation in the related situation and by forming an appropriate alternative solution for it.

3 Assessment

3.1 Table of Specification

In assessment literature, the table of specification sometimes is referred to as the test blueprint, master chart, matrix of content and behaviours, prescription, recipe, road map, test specifications or formal specifications (Bloom, Hastings, & Madaus, 1971; Carey, 1988; Gredler, 1999; Kubiszyn & Borich, 2003; Linn & Grunland, 2000; Mehrens & Lehman, 1973. Oosterhof, 2002). A table of specification describes both the content the assessment should cover and the performance expected of the student in relation to the content. In other words, it consists of a two-way chart or grid relating learning outcomes to the instructional content. The columns of the chart list the learning outcomes at different levels of cognitive complexity; the rows list the key concepts or content to be measured.

Teachers often use instructional objectives to guide instruction and test item construction. However, this tactic too often results in test items measuring lower thinking levels such as memorisation and comprehension skills. In order to measure students' achievement at the higher levels of comprehension, application, analysis, synthesis and evaluation, teachers should prepare and make use of the table of specification. A table of specification identifies not only the content areas to be covered but also the learning outcomes at each level of the cognitive, affective and psychomotor domains. Teachers can be assured that they are measuring students' learning outcomes across a wide range of content and readings as well as cognitive processes requiring higher order thinking. Kubiszyn & Borich (2003) suggested that teachers should use a table so that they won't forget the details. Table 9 provides an example of a table of specification using only a list of learning outcomes. This type of table is useful when the domain to be assessed is very small and consists of only a few specific learning outcomes.

Table 9. Table of specification using only a list of learning outcomes

Learning outcomes (Constructed-Response Test: CRT)	Number of items
a. Explain the concept and purpose of the constructed-response test	
b. Differentiate the functions of short answer items and essay items	
c. Explain the main guidelines for constructing short answer items	
d. Explain the main guidelines for constructing essay items	
e. Develop essay items for a subject area	
f. Develop short answer items for a subject area	
g. Illustrate the advantages and disadvantages of using a CRT	
	Total

Table 10 shows the table of specification using only a list of content domains. It is possible, but not desirable, to plan the table by listing only content domains and the number of items that will cover each topic. This type of table is not encouraged, as the test developer should consider the full range of thinking skills that students are expected to learn.

Table 10. Table of specification using only a list of content domains

Content domains (Constructed-Response Test: CRT)	Number of items
a. Concept and purpose	
b. Guidelines to construct short answer items	
c. Guidelines to construct essay items	
d. Strengths and limitations	
	Total

Table 11 shows the table of specification containing both content domains and Bloom's Taxonomy levels. It is a two-way chart that relates the learning outcomes to the content domains, thus specifying the nature of the test items and assessment tasks. The assignment of items to each cell is not strictly a matter of following the percentages. Some cells may be left blank because items in those levels are inappropriate. However, some cells may receive a number of items because they correspond to more important learning outcomes and consequently the tasks or items for those cells may have greater emphasis in teaching.

Table 11. Table of specification containing content domains and Bloom's Taxonomy levels

Content domain	Number of items (Bloom's Taxonomy levels)			
	Comprehension	Application	Analysis	Total
Constructed-Response Test (CRT):				
a. Concept and purpose	3			3
b. Guidelines to construct short answer items	3	2		5
c. Guidelines to construct essay items	3	2		5
d. Strengths and limitations			2	2
Total	9	4	2	

According to Nitko (1996), there are four elements of a complete table specification, as shown in Table 12: content domain, types of thinking skills, learning outcomes to be assessed and the number of tasks for each learning outcome. This type of table allows the test developer to view the assessment as a whole and to maintain the balance or emphasis of content coverage and complexity of performance to match the teaching; moreover, the assessment will not be too easy or too hard for the students.

Table 12. Table of specification containing content domains and learning outcomes

Content domain	Number of items (learning outcomes based on Bloom's Taxonomy levels)							
	Knowledge	Comprehension	No. item	Application	No. item	Analysis	No. Item	Total
Constructed-Response Test (CRT):								
a. Concept and purpose		Explain the concept and purpose of CRT	1					3
		Differentiate the functions of short answer item and essay item	2					
b. Guidelines to construct short answer items		Explain the main guidelines to construct short answer items	3	Develop short answer items for a subject area	2			5
c. Guidelines to construct essay items		Explain the main guidelines to construct essay items	3	Develop essay items for a subject area	2			5
d. Strengths and limitations						Illustrate the advantages and disadvantages of using a CRT	2	2
Total			9		4		2	

3.2 Content validity of assessment results

One of the most important criteria used to determine the validity of the assessment results is content validity. The validity of assessment results very much depends on how well the assessment samples the learning outcomes. To create valid assessments, the tasks included on the assessment should reflect the important content and learning outcomes specified in the course outline. A table of specification is a useful tool in this regard. Each task should be reviewed to ensure that from the content perspective it is relevant, important, stated accurately, has an accurate key or scoring rubric and represents something that is meaningful to learn. When evaluating the assessment method in relation to representativeness and relevance, a few questions should be asked:

- Does the assessment content emphasise what has been taught?
- Is the content of the assessment important and significant to a student's learning or to a student's life skills?

- Do the assessment tasks accurately represent the learning outcome specified in the course outline?
- Are the assessment tasks in line with the current thinking about what should be taught and how it should be assessed?

3.3 Constructing assessment tasks

The following step-by-step design process may be helpful in constructing SCL assessment tasks.

1. Identify the learning outcomes

Identify the expected learning outcomes. In identifying the learning outcomes to be assessed, three questions must be answered:

- a. Which important learning outcomes will I assess?
- b. On what content standard will the task focus?
- c. Do the learning outcomes imply assessing a process, a product or both?

2. Identify the method of assessment

Identify the types of assessment process and product that are expected from students. As an example of a process, a biology experiment test may require students to follow correct procedures for working in the laboratory. A mathematics task may ask students to solve the problem using different methods rather than coming up with a single solution. Sometimes students will be asked to create a product such as an essay, report, project or model web page. However, sometimes both a product and a process are equally important for obtaining a correct result (e.g., correct procedures when conducting a science experiment).

3. Create a meaningful task

It is crucial to create a task, simulation or problem situation that will allow students to demonstrate the knowledge, skills and attitudes that they have acquired. Ideas for these tasks may come from books, newspapers or current research findings. The tasks should centre on issues, concepts or problems that are important to the content domain to be assessed. The following suggestions will help identify appropriate ideas when creating a task:

- a. The task should require self-regulated learning. The tasks should require considerable mental effort and place high demands on the persistence of the students. The students should be challenged by the task so that they need to use cognitive strategies to arrive at alternative solutions. However, do not make the task so demanding or strange that it becomes frustrating for the students.

- b. The task should yield multiple solutions. The task should involve more than one solution. The solutions cannot be seen from any one vantage point. It should involve justification, argument, critique, judgment and interpretation.
 - c. The task should require the application of knowledge and skills. The task should require students to apply the knowledge and skills they learned or acquired outside of the classroom. Choose some problems or task situations that are similar and some that are in a new format.
4. Construct clear task directions

Make sure the students understand what they are expected to do. Task wording and directions should depend on the educational maturity of the students. Make sure the time limits and the length limit of the responses are also clearly stated. When students misinterpret the task, the teacher cannot validly interpret their assessment results in the same way as for other students who interpreted the task correctly.

3.4 Scoring

In general, SCL assessment requires four types of accomplishments from students:

1. Products: drawings, projects, essays, mind maps, models, etc.
2. Observable performance: oral presentations, use of equipment in lab, following a recipe, typing, dancing, singing, etc.
3. Cognitive processes: criticising an issue, applying and analysing information, developing a theory
4. Social skills: cooperation, working effectively in a team, recognition skills, etc.

There are two scoring instruments that can be used to score these four types of accomplishments: checklist and scoring rubric.

3.4.1 Checklist

A checklist consists of a list of traits, characteristics or activities that can be scored as either present or absent. It is best suited for assessing performance types that can be divided into a series of discrete steps or procedures, such as using a microscope properly, making an audio tape recording or baking. Each checklist item is scored as yes or no, present or absent or on a 1 or 0 point basis (Figure 1). A checklist can contain descriptions of possible inappropriate steps (errors) as well as appropriate steps so that the teachers can review the students' errors when they remediate students (Nitko, 1996). Checklists can also be used to score students' products, such as drawings, mind maps or a new recipe. Students can use a checklist to evaluate their own work. The completed checklist can be used as the basis for discussion with peers, teachers or parents.

No opportunity to observe	Observed	
<input type="checkbox"/>	<input type="checkbox"/>	Wipes slide with lens paper
<input type="checkbox"/>	<input type="checkbox"/>	Places drop or two of culture on slide
<input type="checkbox"/>	<input type="checkbox"/>	Adds a few drops of water
<input type="checkbox"/>	<input type="checkbox"/>	Places slide on stage
<input type="checkbox"/>	<input type="checkbox"/>	Turns to low power
<input type="checkbox"/>	<input type="checkbox"/>	Looks through eye piece with one
<input type="checkbox"/>	<input type="checkbox"/>	Adjusts mirror
<input type="checkbox"/>	<input type="checkbox"/>	Turns to high power
<input type="checkbox"/>	<input type="checkbox"/>	Adjusts for maximum enlargement and resolution

Figure 1. Example of a checklist to assess proper use of a microscope

Source: 'Educational Testing and measurement: Classroom application and practice' by T. Kubiszyn and G. Borich (2003), p. 166.

3.4.2 Scoring rubric

A scoring rubric can be defined as a scoring guide or scheme that consists of specific performance criteria or standards that assist teachers in assessing student work. There are two types of scoring rubric: holistic and analytic. In holistic scoring, a single grade is given to a student based on the overall judgment of his/her performance. In analytic scoring, a student's performance is scored separately for different parts or characteristics of the performance and then these partial scores are added to obtain a total score.

Holistic rubrics allow a teacher to view the students' product or performance as a whole. The rubric describes the criteria for achieving different levels of performance; typically four to six levels are described in some detail, with a number 0 to 5 assigned to each level. However, this type of scoring rubric has little diagnostic value and limited feedback is provided to the student because the teacher assigns a value for the student's performance based on an overall sense. A template and example of holistic scoring rubrics are presented in Figures 2 and 3.

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of the task are included in the response.
4	Demonstrates considerable understanding of the problem. All requirements of the task are included.
3	Demonstrates partial understanding of the problem. Most requirements of the task are included.
2	Demonstrates little understanding of the problem. Many requirements of the task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Figure 2. Template for a holistic rubric

Source: 'Designing Scoring Rubrics for Your Classroom' by Craig A. Mertler (2001), Practical Assessment, Research & Evaluation, 7(25). Available online: <http://www.pareonline.net/getvn.asp?v=7&n=25>

Math Performance Task – Scoring Rubric Data Analysis

Score	Description
4	Makes accurate estimations. Uses appropriate mathematical operations with no mistakes. Draws logical conclusions supported by graph. Sound explanations of thinking.
3	Makes good estimations. Uses appropriate mathematical operations with few mistakes. Draws logical conclusions supported by graph. Good explanations of thinking.
2	Attempts estimations, although many are inaccurate. Uses inappropriate mathematical operations, but with no mistakes. Draws conclusions not supported by graph. Offers little explanation.
1	Makes inaccurate estimations. Uses inappropriate mathematical operations. Draws no conclusions related to graph. Offers no explanations of thinking.
0	No response/task not attempted.

Figure 3. Sample holistic rubric

Source: 'Designing Scoring Rubrics for Your Classroom' by Craig A. Mertler (2001), Practical Assessment, Research & Evaluation, 7(25). Available online: <http://www.pareonline.net/getvn.asp?v=7&n=25>

Analytic rubrics require the identification of different categories or characteristics of performance that are rated separately. For example, a language essay might be rated in terms of ideas, sentence fluency, contents and organisation. Separate scores for categories such as these provide the students with specific feedback about the strengths and weaknesses of their performance with respect to each of the individual scoring criteria (something that does not happen when using holistic rubrics). However, the use of analytic rubrics can cause the scoring process to be substantially slower, as the teacher must examine the product several times, mainly when assessing several different categories or characteristics individually. Thus, both their construction and application can be quite time consuming compared with holistic scoring. A template and example of analytic scoring rubrics are presented in Figures 4 and 5.

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Criterion #1	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criterion #2	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criterion #3	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criterion #4	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Total Score = _____					

Figure 4. Template for an analytic rubric

Source: 'Designing Scoring Rubrics for Your Classroom' by Craig A. Mertler (2001), Practical Assessment, Research & Evaluation, 7(25). Available online: <http://www.pareonline.net/getvn.asp?v=7&n=25>

Performance Task – Scoring Rubric Population Sampling					
	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Sampling Technique	Inappropriate sampling technique used	Appropriate technique used to select sample; major errors in execution	Appropriate technique used to select sample; minor errors in execution	Appropriate technique used to select sample; no errors in procedures	
Survey/ Interview Questions	Inappropriate questions asked to gather needed information	Few pertinent questions asked; data on sample is inadequate	Most pertinent questions asked; data on sample is adequate	All pertinent questions asked; data on sample is complete	
Statistical Analyses	No attempt at summarising collected data	Attempts analysis of data, but inappropriate procedures	Proper analytical procedures used, but analysis incomplete	All proper analytical procedures used to summarise data	
Communication of Results	Communication of results is incomplete, unorganized and difficult to follow	Communicates some important information; not organised well enough to support decision	Communicates most of important information; shows support for decision	Communication of results is very thorough; shows insight into how data predicted outcome	
Total Score = _____					

Figure 5. Sample analytic rubric

Source: 'Designing Scoring Rubrics for Your Classroom' by Craig A. Mertler (2001), Practical Assessment, Research & Evaluation, 7(25). Available online: <http://www.pareonline.net/getvn.asp?v=7&n=25>

3.4.3 How to design scoring rubrics

The procedures for designing scoring rubrics were compiled from various sources (Mertler, 2001). A step-by-step process is presented below:

Step 1: Re-examine the learning outcomes to be addressed by the task. This allows the scoring rubric developer to match the scoring guide with the desired learning outcomes. It is the best guide for determining what criteria are most significant in the list of intended learning outcomes.

Step 2: Identify specific observable behaviours that are clearly visible to an observer. Specify the observable behaviours (skills, knowledge and attitude) that will be looked for when students demonstrate in their product, process or performance.

Step 3: For holistic rubrics, write thorough the descriptions for excellent work and poor work and incorporate each criterion into the description. Describe the highest and lowest levels of performance, combining the descriptors for all criteria.

For analytic rubrics, write thorough the descriptions for excellent work and poor work for each individual criterion. Describe the highest and lowest levels of performance using the descriptors for each criterion separately.

Step 4: For holistic rubrics, complete the rubric by describing other levels on the continuum that range from excellent to poor work for the collective criteria. Write descriptions for all intermediate levels of performance.

For analytic rubrics, complete the rubric by describing other levels on the continuum that range from excellent to poor work for each criterion. Write descriptions for all intermediate levels of performance for each criterion separately.

Step 5: Collect samples of student work that exemplify each level. These will help the process of scoring in the future by serving as benchmarks.

Step 6: Revise the rubric as necessary. Use the scoring rubric to assess the performance of several students. Be prepared to reflect on the effectiveness of the rubric and revise it prior to its next implementation.

3.4.4 Grading and reporting

Grading and reporting become a matter of summarising the results of assessments and representing them in an understandable form. Several types of grading and reporting systems are described below:

1. The common use of the letter grade system is to assign a single letter grade (e.g., A, B, C, D, E, F) for each course. In some cases a single number (e.g., 5, 4, 3, 2, 1 or 70, 80, 90, 100) is used instead of a letter, but the grading system is essentially the same.
2. A two-category system (e.g., satisfactory-unsatisfactory, pass-fail) allows students to take courses taught under a pure mastery learning approach. For example, students are expected to demonstrate mastery of all course objectives before receiving credit for a course; a simple pass is needed to indicate mastery.
3. Checklists of objectives provide more informative progress reports. This would include ratings of progress towards the major objectives in each subject matter area. The following statements for reading illustrate the nature of such reports:
 - a. Reads a variety of texts fluently and confidently;
 - b. Mentally interacts with the message;
 - c. Assesses strengths in reading and sets goals for future growth;
 - d. Reads for a variety of purposes, including to gather information, to follow directions, to give a response and to understand information; and
 - e. Values reading as a means of learning and enjoyment.

The symbols used to rate student on each of these major objectives vary considerably, such as O (outstanding), S (satisfactory) and N (needs improvement).

4. Portfolios of student work can be effective means of showing student progress, illustrating strengths and identifying areas where greater effort is needed. The comments on the entries can help students gain a better understanding of expectations and standards of excellence.

When assigning letter grades, two questions should be considered:

1. What should be included in a letter grade?

If letter grades are to be valid indicators of achievement, they must be based on valid measures of achievement. This involves consideration of the main content and the intended learning outcomes and development of tasks that assess the outcomes directly. The nature and the objectives of the course should be considered when determining the rating of various measure of achievement in the letter grade. For instance, a grade in a science course might be determined largely by assessment of laboratory performance.

2. What frame of reference should be used in grading?

Assigning grades on a relative basis involves comparing a student's performance with that of a reference group. The grade is determined by the student's relative ranking in the total group. The grade is influenced by both the student's performance and the performance of the group. One will score better in a low-achieving group than in a high-achieving group. Moreover, high-achieving students may receive a lower grade in a more challenging and advanced course compared with a less demanding course.

Assigning grades on an absolute basis involves comparing a student's performance to a specified standard set by the lecturer. These standards may be focused on the mastery to be achieved by the students. Use of an absolute level of achievement as a basis for grading requires that: a) the domain and learning outcomes to be assessed are clearly defined, b) the standards of performance are clearly defined and justified and c) the measures of student achievement are based on certain pre-determined criteria.

The creation of learning outcomes, a table of specification and scoring rubrics is clearly summarised and represented in Figure 6 (and refer to the example in Appendix 2).

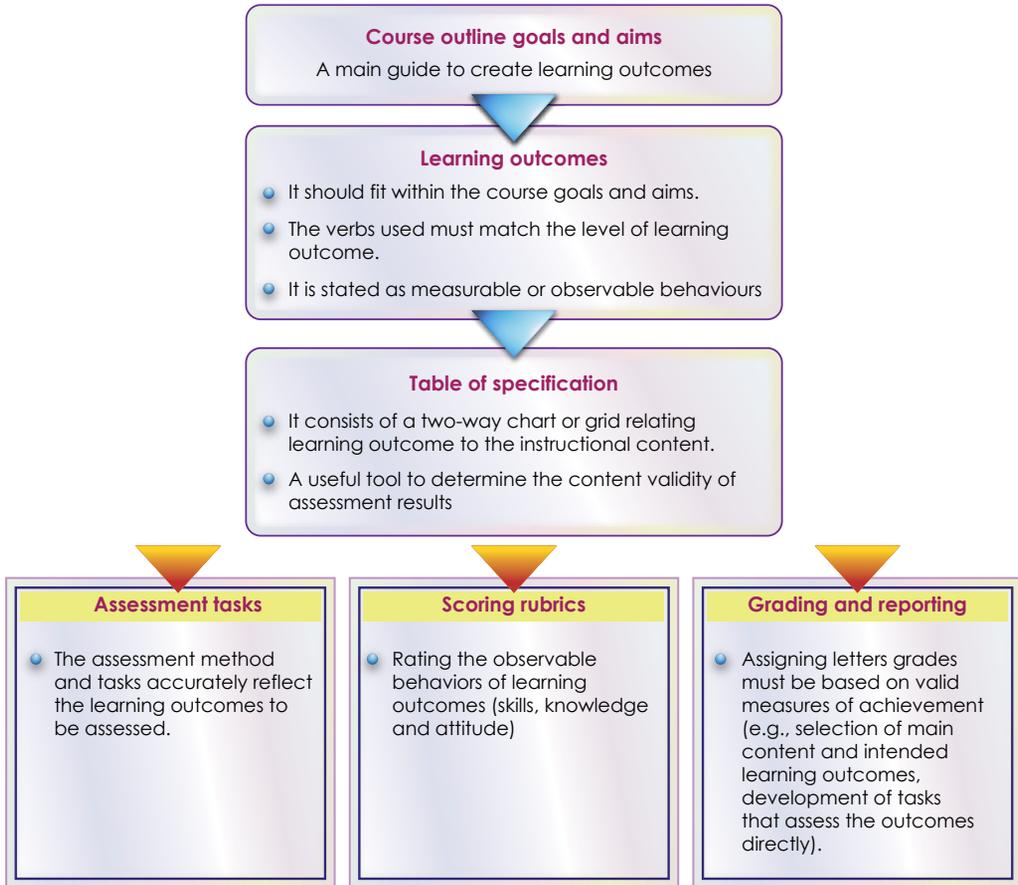


Figure 6. Relationship between learning outcomes, the table of specification, assessment tasks, scoring rubrics and grading and reporting

4 Conclusions

This unit introduced the major issues related to the principles of assessment in the SCL environment. It is important to understand that in the international educational settings, the trends have shifted from the teacher-centered approach to the student-centered approach. The new way of assessment focuses on what the students are expected to be able to do at the end of the course. Also, the concept of 'learning outcomes' has become crucial in outlining the learning as planned and designed by instructors. Effective and clear learning outcomes should focus on what the successful student is expected to be able to do in terms of knowledge, skills and/or attitude. Effective learning outcomes should also be concerned with the achievements of the student rather than the intentions of the teacher.

- In addition to learning outcomes, the table of specification is another important aspect of assessment. It describes both the content the assessment should cover and the performance expected of the student in relation to the content. In other words, it consists of a two-way chart or grid relating learning outcomes to the instructional content. Educators should take into account that in order to create valid assessments, assessments tasks should reflect the important content and learning outcomes specified in the course outline and the table of specification would be a useful tool to outline and emphasise the content and learning outcomes. A scoring rubric is equally important in any educational assessment process. It can be used to, among others, identify specific observable behaviours that are clearly visible and, report thorough descriptions for the excellent (or weak) students' work. Finally, grading and reporting are basically the act of summarising the results of assessment and representing them in an understandable form, which would further enhance the students' learning process as well as enriching the educator's own teaching approaches and methods.

TASKS

1. Write one to three learning outcomes for a topic you plan to teach. Explain how each learning outcome meets the two criteria of being student centered and performance based.
2. Based on question (1), make a two-way chart (table of specification) that includes: i) content domain, ii) types of thinking skills, iii) learning outcomes to be assessed and iv) the number of task for each learning outcome.
3. Create one to two performance tasks that would be used to assess the learning outcome in questions (1) appropriately.
4. Prepare a scoring rubric for a performance task in question (3).

SELF-REFLECTION

1. Write a short essay describing your scoring experience. Was the scoring rubric adequate? Were there any reliability problems in using it? Why yes or why not? Make suggestions for improving the scoring rubric based on what you learned from this unit.
2. Do you have any experience with preparing a table of specification? Which formats of the table of specification are applicable to your teaching situation? Explain.
3. Reflect on a specific lesson you have taught or would like to teach. List three to five learning outcomes for that lesson. Next to each learning outcome, identify how you will assess it.

Case Study

1. A lecturer plans to prepare two tables of specification. One is for a year-end examination (paper and pencil test) and the other is for an oral presentation. Do you think the formats of these two tables of specifications should be the same? Explain your reasons.
2. Some lecturers complain that SCL assessments are not worth the trouble because they take too much time to prepare and score. Write an essay either supporting or refuting this statement. Refer to this unit to support your argument.

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Appendix 1

Checklist for writing learning outcomes

Use the following checklist to help you as you write learning outcomes.

When writing learning outcomes, I need to:

1. Focus on outcomes, not processes
 2. Start each outcome with an action verb
 3. Use only one action verb per learning outcome
 4. Avoid vague verbs such as *know* and *understand*
 5. Check that the verbs used reflect the level of learning required
 6. Ensure that outcomes are observable and measurable
 7. Write the outcomes in terms of what the student does, not what the instructor does
 8. Check that the outcomes reflect knowledge, skills or attitudes required in the workplace
 9. Check that there are appropriate numbers of outcomes (no more than three per major topic)
 10. Check that the outcomes fit within course goals
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Source: 'Writing learning outcomes' by Learning Resources Unit (2003). Available online: <https://helpdesk.bcit.ca/fsr/teach/courseprep/htoutcomes.pdf>.

Appendix 2

Table 1. Table of specification for an assignment task

Content domain	Knowledge	Comprehension	Application	Analysis
(Survey method)				
Sampling technique			Apply Sampling technique appropriately	
Data collection			Apply appropriate methods to collect data	
Statistical analysis				Analyse and summarise data accurately

ASSIGNMENT TASKS

For this assignment, you are to propose a survey research topic. Specifically, you need to:

- a. Identify a topic that is of some relevance to the local area and explain why that topic is important enough to be considered. Also explain why the survey method is an appropriate methodology for analysing that topic.
- b. Lists the research question(s) you hope to answer, delineate your sample design, describe your data collection and data analysis and interpret your collected data.

Table 2. Assignment task: Scoring rubric population sampling

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4
Sampling technique	Inappropriate sampling technique used	Appropriate technique used to select sample; major errors in execution	Appropriate technique used to select sample; minor errors in execution	Appropriate technique used to select sample; no errors in procedures
Survey/ Interview questions	Inappropriate questions asked to gather needed information	Few pertinent questions asked; data are inadequate	Most pertinent questions asked; data are adequate	All pertinent questions asked; data are complete
Statistical analyses	No attempt at summarising collected data	Attempts analysis of data, but inappropriate procedures used	Proper analytical procedures used, but analysis incomplete	All proper analytical procedures used to summarize data
Communication of results	Communication of results is incomplete, disorganised and difficult to follow	Communicates some important information; not organised well enough to support decision	Communicates most of important information; shows support for decision	Communication of results is very thorough; shows insight into how data predicted outcome

Source: 'Designing scoring rubrics for your classroom', by Mertler, C. A. (2001).
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UNIT 3



STUDENT-CENTERED LEARNING AND ASSESSMENT PRACTICE

Ahmad Zamri Khairani, Muhammad Kamarul Kabilan & Lim Hooi Lian



Module Outcomes

At the end of this unit, users should be able to:

1. Describe characteristics of Student-Centered Learning-related (SCL-related) assessments;
 2. Compare and contrast teacher-centered and SCL-related assessment;
 3. List principles of SCL-related assessments;
 4. Differentiate between selected response assessment, constructed response, and performance assessment;
 5. Plan a SCL-related assessment; and
 6. Determine the challenges in implementing SCL-related assessment.
- 

1 Introduction

Teacher-centered and student-centered approaches are two widely accepted orientations towards teaching.

- The teacher-centered approach (also known as the content-oriented approach) focuses on the teacher (the expert) transmitting knowledge to students (the novices). It emphasizes teachers as the focus and the learning environment is strongly related to what the teacher does.
- In contrast, SCL (also known as flexible learning, experiential learning or self-directed learning) emphasizes students' learning (i.e., what students do to achieve the pre-specified learning outcomes). This definition put the focus on what students do rather than on what the teacher does. SCL is considered better than teacher-centered learning because it helps students develop better study skills and understanding of the material.

2 SCL Assessment

While lecturers may utilize various SCL strategies to enhance student learning, the assessment practices are still designed under the teacher-centered approach. Lecturers decide what, how and when to assess. Lecturers determine what to assess based on their perspective of what is important for the student. In other words, the idea that the 'lecturer knows best' is still widely used. Similarly, it is the lecturers who decide the kind of assessment suitable to gauge students' understanding. Two of the most widely cited types of assessment are summative and formative assessment. They represent two contrasting ends of assessment. However, in practice many course assessments fall between these two paradigms.

2.1 Summative Assessment

Summative assessment (also known as terminal assessment) is based on the assumption that the true picture of what each student has achieved is best measured when they have already worked through the course. Carrying out assessment before students complete the course is considered unfair to the students for the following reasons:

- It does not allow them to develop to their full potential; and
- It may well disadvantage last minute students who only getting their act together as they near the end of a programme of instruction.

Examples of summative assessments include the end-of-semester examination or the final year project report.

2.2 Formative Assessment

The premise for formative assessment (also known as continuous assessment) is that the best and fairest way to assess students' performance is to assess each stage of

learning soon after it has been completed or in some cases, while the learning is being carried out. Formative assessments include oral assessments, quizzes, observations or short tests. It is argued that this type of assessment is more useful and fairer to the students because of the following:

- It provides students with ongoing feedback, which helps them to become more self-critical;
- It encourages the students to attempt to master content as they actually work through a course or course unit rather than leaving the real learning process to the very end; and
- It allows students to demonstrate their ability and development on an ongoing basis.

Thus, the student who works consistently well but is not very good at sitting examinations is not placed at a disadvantage compared to test-wise but less competent students.

The formative type of assessment approach augurs well with current trends in tertiary education that encourage:

- Assessment as an integral part of the learning process; and
- Shifting from assessment of the product (content) to assessment of the process of attaining the product.

3 How is SCL Assessment Described?

SCL assessment can be described as follows:

- It is a technique that involves or engages the student in examining their own learning, which includes:
 1. Examining their own progress;
 2. Identifying their learning needs; and
 3. Re-evaluating their own understanding;
- The primary focus is on learning;
- It utilizes authentic assessments and self-reflection;
- The environment is cooperative, collaborative and supportive; and
- Teaching and assessing are intertwined.

4 The Advantages of SCL Assessment (Huba & Freed, 2000)

SCL assessment offers a number of advantages, including:

- It promotes high expectations of both students and lecturers;
- It takes into consideration a variety of talents and learning preferences;
- It promotes coherence in learning;
- It provides the opportunity to integrate past learning experiences to foster ongoing knowledge;

- It gives students the opportunity to be involved actively in both the learning as well as the teaching;
- Lecturers provide adequate time for assessment tasks;
- It provides the opportunity for immediate feedback; and
- It fosters collaboration among students and between students and the lecturer.

5 Goals of SCL Assessment

In short, in SCL assessment, we are shifting from the question of 'is this the correct answer?' to the following:

- Are students able to demonstrate the knowledge, skills and abilities as required by the course outcomes?
- Are students able to solve problems, think critically and demonstrate reasoning ability?
- Are students able to evaluate information gathered?
- Are students able to communicate clearly and provide meaningful argument?

6 Teacher-Centered vs. SCL Assessment

It is commonly agreed that the ultimate goal of assessment is to determine grades that communicate students' progress to parents and other stakeholders. Nevertheless, as highlighted by Pedersen & Liu (2003), in SCL-related assessment, 'learning first, grade second' should apply. Table 1 shows a general comparison between traditional teacher-centered and SCL-related assessment.

Table 1. Teacher-centered vs. SCL-related assessment

Teacher-centered Assessment	SCL-related Assessment
Summative assessment	Formative assessment
Assessment is separated from teaching	Teaching and assessing are incorporated in teaching using formative assessment
Assessment is used to monitor learning progress	Assessment is used to promote, diagnose, and monitor learning
Emphasis is on right answers	Emphasis is on the process of how students get the answers; Students learn from mistakes during the process
Focus is on a single domain of student's learning	Interdisciplinary and holistic investigation of student's performance
Individualistic	Based on team work
Students are viewed as learners	Both lecturers and students learn together

One important observation is that it is possible to incorporate both traditional and SCL-related assessment in terms of student involvement (Table 2). Some suggestions on how students can actively participate in the assessment stage are provided by Brown, Rust and Gibbs (1994).

Table 2. SCL-related assessment

Stage	Student Involvement
Setting the assessment task	<ul style="list-style-type: none"> • Choosing and setting the assessment task • Choosing and setting the assessment criteria
Completing the assessment task	<ul style="list-style-type: none"> • Provide comments • Suggest grades/cut scores

While the approach may look very different from that of traditional practice, lecturers may include students in a more manageable manner that are straight forward and engages the learners directly and actively. For example, letting students choose their own topic rather than assigning them one can be considered a SCL-related assessment.

SCL-related assessment provides a better platform for getting students involved in their own learning. It takes into account multiple learning styles and allows students to learn in the way that suits them. This enables students to excel in their areas of strength while strengthening areas in which their skills may be lacking.

7 Principles of SCL-related Assessment (Stiggins, 1997)

Literature shows that various SCL-related assessments are available. However, the following principles are common to all.

7.1 Assessments require clear thinking and effective communication

- Assessment developers and users must be clear thinkers and must be capable of communicating effectively with test takers as well as other stakeholders.

7.2 Classroom assessment is the key

- Teachers direct the assessments that determine what students learn and how those students feel about the learning.
- Nearly all of the assessment events that take place in students' lives happen at the behest of their teachers.

7.3 Students are assessment users

- Students are the most important users of assessment and assessment results. Parents, policymakers and others are secondary users.

7.4 Clear and appropriate learning targets are essential

- The quality of any assessment depends on the appropriateness of the learning target to be assessed.

- Types of learning targets include the following:
 1. Knowledge target: mastering and understanding content rather than memorizing facts;
 2. Reasoning target: to be able to use the information to reason and solve certain kinds of problems;
 3. Skill: the ability to demonstrate certain kinds of skills or behaviours, such as being involved in group discussions, giving an oral presentation, conducting lab work, etc.;
 4. Product target: to be able to produce products such as a term paper, journal, project or prototype; and
 5. Dispositional targets: a broad and complex target that goes beyond academics and that includes self-satisfaction and actualization attitudes towards something (i.e., a sense of academic self-confidence or interest in something that motivationally predisposes a person to do or not do something).

7.5 High quality assessment is a must

- Sound assessments must satisfy four specific quality standards:
 1. Clear targets;
 2. Focused purpose;
 3. Proper method; and
 4. Accurate assessment free of bias and distortion.

7.6 Understand the personal implications

- Assessment is an interpersonal activity that has two important principals:
 1. Both students and educators are people: Sometimes we like each other and sometimes we don't.
 2. Assessment is very complex in that it virtually always is accompanied by personal anecdotes and personal consequences.

7.7 Assessment as teaching and learning

- Assessments and instruction can and need to be one and the same, if and when we want them to be.

8 Planning a SCL Assessment

Assessment is an integral part of all courses, but the central question is whether it is really measuring the learning that both lecturers and students want to achieve. Effective assessments should integrate teaching, learning, motivation and of course grading for students. As such, a carefully planned assessment will ensure that these important aspects are considered when executing the assessment. Five suggestions for planning a SCL-related assessment are as follows.

8.1 Tell students what you want them to learn

Sharing an explicit statement of the learning objectives with students is an example of effective assessment practices. For example, a lecturer might say: 'By the end of the course, I want my students to be able to differentiate between assessment, evaluation, measurement and testing'. Measureable and explicit verbs, such as define, argue, solve, list and identify in place of difficult-to-measure verbs such as understand, grasp or know should be used.

8.2 Select the most appropriate assessment methods

Choose assessment methods that elicit from your students the kind of learning that you want to measure. For example, if you wanted your students to solve problems, you may want students to demonstrate their ability to come up with the solution and explain the process by which they came up with a particular solution. In addition, you may want to encourage students to come up with alternative solutions. Note that putting too much emphasis on getting the right answers can take away from the goals. It is also important to teach students how to complete the task. For example, if writing a lab report is new to first-year students, lecturers need to spend some time teaching them how to write one. If this is not taught, the students may never complete the assignment in the manner required by the lecturer.

It is also important to choose assessment methods that are both interesting and challenging to the students. The type of assignments and tests that a lecturer administers will influence students' motivation. Consider creative kinds of assignments without getting carried away by something too ambitious that does not meet the needs of the course outline.

Use of peer involvement is another good approach. The strongest single source of influence on cognitive and affective development (in college) is the student's peer group. Astin's (1996) study strongly suggests that the peer group is powerful because it has the capacity to involve the student more intensely in the educational experience" (Astin, 1996:126). Assignments that involve collaborative effort between students provide the opportunity for students to practice what they have learned through communication with other students. Peer involvement also enhances other skills, such as communication and interaction skills. Furthermore, when well managed, collaborative work can increase students' sense of their own control and power in the classroom (Perry, Menec, & Struthers, 1996). In contrast, when poorly managed, collaborative assignments can decrease students' sense of control and they can increase students' anxiety and anger. Students need to understand why they are participating in a group project so that the motivation to work together to solve differences of opinion will carry them further in whatever they are learning.

8.3 Construct the assessment framework

The assessment framework serves two important purposes:

- It enables lecturers to see whether all activities, assignments and/or tests fit both their teaching goals as well as the students' learning outcomes; and

- It enables lecturers to see whether the workload of activities, assignment and/or tests is manageable for the students.

The assessment framework needs to be explicitly stated in the course outline. Examples of how to embed the assessment framework in the development of a course outline can be accessed from the following website: http://cte.uwaterloo.ca/teaching_resources/tips/course_design_heuristic.html

8.4 Collaborate with students to set and achieve goals

It is important for lecturers to have clear and explicit goals of their courses. It is equally important to acknowledge students' learning goals. Both parties need to understand each goal in order to be on the same wavelength. If this does not occur, students may not be able to complete the activities and assignments planned by the lecturer.

Collaboration with students to set and achieve goals can be complicated. The following questions provide guidelines on how to obtain input from students regarding course objectives:

- Recall the most enjoyable course they had taken previously.
- What assessment methods were used in that course?
- Are the methods suitable for this class' learning goals?
- If not, what kinds of assessment methods do they think will work for them?

Past experiences provide great guidance for choosing the best possible method of assessment for a given course. Deciding whether past assessment methods are suitable or if changes are necessary is an important step. For the latter, addressing questions such as what to change, why are the changes needed or how can the change be made are necessary.

In the above example, the input from the students will help the lecturer decide the kind of assessment that is appropriate for the course. However, the input can also be minimal. For example, the lecturer can allow students to choose between one of two assignments while still determining the content of each assignment. Lecturers can also allow students to decide the weight of the assessment (e.g., 20% or 30% of the course grade). The degree of input can vary across courses, but the collaboration will motivate students to complete the activities or assignments and thus create a successful learning environment for them.

8.5 Make activity, assignment and test instructions clear to students

If we want students to learn from activities, assignments and tests, then it is essential to provide clear instructions to the students. Inform the students of the worth (e.g., point value) of each question. Providing examples and giving clarifications when students ask questions will provide them with a better understanding of how to complete the assessment. It is also useful to ask the students to submit the first draft

of their assignments prior to the final submission to ensure students are on the right direction.

Unclear instructions will cause students to draw on their previous learning to complete the assessment and this information sometimes will differ from that being taught in the present course. Assessing learning when students define the activities, assignments or tests in different ways, is not only invalid, but it also can have a detrimental effect on the interpretation of the results and even lead to favouritism.

9 Assessment Options

Three assessment options are available to lecturers: the selected response assessment, the constructed response assessment and the performance assessment.

9.1 Selected response assessment

The selected response assessment is the least related to SCL. In fact, it is considered more suitable for teacher-centered learning. In this type of assessment, students select from given responses of one or two words. Multiple-choice, true/false, matching and fill-in-the-blank are assessments that fall under this category. In the selected response assessment, the goals are to determine whether the students are able to select the correct answer (the product). It does not emphasize how the student got the correct answer (the process), which is fundamental to SCL. Nevertheless, selected assessment can be used as a tool in SCL. For example, multiple-choice assessments are suitable for use in peer tutoring.

9.2 Constructed response assessment

Constructed response assessments require students to create their own written response (e.g., short answer or essay). Constructed response assessments are more aligned towards SCL because students gain understanding of the material when they construct their own knowledge of a certain concept. In addition, constructed response assessments such as essays are useful for assessing higher level thinking skills. However, this type of tool assesses only a limited amount of a student's learning. In addition, this method places too much emphasis on writing ability and it is not a holistic assessment of the student's knowledge, skills and ability.

9.3 Performance assessment

Performance assessments are very much related to SCL. This type of assessment requires demonstration of students' skills or knowledge to perform activities called 'tasks'. It can take the form of individual or group written and oral presentations to showcase the product of the task. Examples of performance assessments include group discussions, problem solving and research reports. Nevertheless, the essay is considered to be the most widely used performance assessment. What distinguishes performance assessments from other assessment methods is that they require students

to demonstrate the application of knowledge to a particular context. Through observation or analysis of a student's response, the teacher can determine what the student knows, what the student does not know and what misconceptions the student holds with respect to the purpose of the assessment.

9.3.1 Guidelines for developing a performance assessment

The selected performance assessment should reflect a valued activity. Performance assessments should allow students the opportunity to display their skills and knowledge in response to 'real' situations. Activities such as research reports and presentations, problem solving and case studies encourage students to develop and display their knowledge and skills.

The completion of performance assessments also should provide a valuable learning experience for the students. Performance assessments require more time to administer than do other forms of assessment. As such, it is expected that performance assessment will enhance both students' knowledge of the intended content as well as the lecturer's understanding of what students know and can do.

The statement of goals and objectives should be clearly aligned with the measurable outcomes of the performance activity. This is perhaps the most important aspect of the assessment on which lecturers should focus. When designing a task, lecturers need to match the task to specific learning objectives and the task should not examine extraneous or unintended variables.

The following questions will help lecturers follow the guidelines:

- Is the knowledge required in the completion of the task consistent with the purpose?
- Will lack of this knowledge interfere or prevent the students from completing the task for reasons that are not consistent with the task's purpose?

If the answer to these two questions is 'yes', then changes may need to be made to the task or a new task may need to be selected.

Another important guideline is that performance assessments should be fair and free from bias. Lecturers need to construct performance tasks that are free from a particular group of stereotypes. The task also should not give advantage to a particular group.

9.3.2 Guidelines for administering performance assessments

When administering an assessment, the task directions should be clear and concise. If the task is presented in written form, then the reading level of the students should be considered carefully. Students should be given the opportunity to ask for clarification of questions before completing the task.

Appropriate tools also need to be available, as students may need them to complete the task. Such tools may include access to internet, related tools or literature reviews. As such, lecturers need to take into consideration the kind of tools needed before administering the task.

Scoring rubrics should be discussed with the students before they complete the assessment activity. In general, scoring rubrics include the criteria used to evaluate students' responses to performance assessments. Discussion regarding the criteria will enable students to have a better understanding of what is expected from the task.

10 Challenges of SCL Assessment

SCL assessment is not without challenges for both lecturers and students. The three main challenges are as follows.

1. The biggest challenge with SCL-related assessment is time. An enormous amount of planning and materials are needed to gain accurate feedback from students. As such, it is easier for teachers to focus on what's best for the students rather what the students think is best for them.
2. In terms of implementation, students as well as parents and other stakeholders may not favour the approach. It is difficult to shift from the dualistic views of right and wrong answers to the concept that all answers are acceptable.
3. Questions may be raised regarding the effectiveness of implementing ongoing formative assessment in large undergraduates lecture classes.

TASKS

1. Identify types of performance assessment other than the essay. In what ways do these performance assessments differ from the essay?
2. We often think about performance assessment for students but what of performance assessment for lecturers? How are lecturers to be judged in terms of their quality and excellence?

SELF-REFLECTION

Having read through this unit, reflect on the following:

1. Is my course assessment SCL-related?
2. What changes would you like to make in your assessment and how best can the changes be made?
3. What else do you need to know about SCL-related assessment?

Further Reading

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UNIT 4



TYPES OF STUDENT-CENTERED LEARNING ASSESSMENT

Ahmad Zamri Khairani, Lim Hooi Lian & Muhammad Kamarul Kabilan



Module Outcomes

At the end of this unit, users should be able to:

1. Describe and give examples of types of SCL-related assessment;
 2. Determine whether the assessments found in this module are suitable for their course; and
 3. Develop several SCL-related assessments for their course.
- 

1

Introduction

There are many types of SCL-related assessment and each has its strengths and deficiencies relative to credible and dependable information. This is because it is virtually impossible for a single assessment tool to adequately assess all aspects of a student's performance. Nevertheless, common goals for every assessment are to accurately determine whether students have learned the materials or information taught and to reveal whether they have complete mastery of the content with no misunderstandings. It is important to acknowledge that using multiple types of assessment will enable lecturers to obtain the most accurate information to evaluate the level of students' learning.

2

Types of SCL Assessment

Not all of the assessments described below were developed specifically for SCL; instead, some have been modified from traditional teacher-centered assessments to incorporate students' involvement:

- Peer tutoring;
- Oral presentation;
- Observation;
- Article writings;
- Demonstration;
- Worksheets
- Journal Writing
- Case Study
- Research Projects
- Problem Solving

3

Peer Tutoring

In peer tutoring, students are taught by peers who have been trained and are supervised by lecturers. A student works in a pair with another student. Peer tutoring functions to supplement, but not replace, the teacher-directed instruction in the classroom. Advantages of peer tutoring include the following:

- Greater opportunities for students to practise what they have learned by talking about what they are learning, reading out loud and writing;
- Students receive feedback and error correction immediately and more frequently;
- Students are engaged in active learning;
- Allows for a faster pace, as students are more frequently responding to academic material than they do in a large-group setting;
- Allows students to be matched based on their learning style; and
- Provides opportunities to practice communication and interaction skills.

The procedure for peer tutoring is as follows:

- Selection of pairs: Rather than pairing friends, a pair of high and low achievers will work better. Change pair after about 8–10 sessions.
- Decide when to employ peer tutoring: This should be based on the aim of the lesson as well as the ability of their peers to contribute to learning.
- Conduct training so that students know exactly what to expect. Encourage the tutor-tutee model of training.
- Prepare clear and simple materials such as worksheets and articles. Lecturers provide answers to the materials.
- Develop an error correction procedure. For example, if the tutee answers correctly, then move to the next item. If not, repeat the item until he/she gets it right.
- Develop a system to request help when students get stuck on an item. Note that the sooner the students get help with a question or the confusion is clarified, the faster they can move on to the next question.
- The lecturer's role is to monitor students while they tutor each other. Typically, peer tutoring sessions are best when they last 15–20 minutes and then the pairs can switch roles.
- Provide each student with a checklist of items to look for within the assignment. Tell each student to read over the other student's assignment and then point out one thing he or she would change. He or she also needs to tell the partner the reason for the change.

4 Oral Presentation

Oral assessments come in a variety of forms, from individual speeches to group projects. This type of assessment involves explaining something to an audience and the assessment is made based on the quality of the information presented as well as the method of presenting it. An oral presentation is similar to giving a speech, but it usually requires the presenter to use visual aids rather than simply spoken words. The prime purpose of assigning an oral presentation is to get students to learn something new and then be able to teach their classmates. As such, everybody can learn the new knowledge or skills as they watch the presenter. The advantages of oral presentation as an assessment tool include:

- It adds variety to the classroom and provides an opportunity for students to learn from each other instead of always learning from the lecturer;
- It allows for immediate feedback from the audience; and
- It is flexible and easily adaptable.

However, poor presentations can result in misunderstanding and wrong responses from fellow students. In addition oral presentation is highly influenced by both verbal and non-verbal communication.

4.1

Procedure

- Provide the students with a list of what is expected of them. The list should include use of an introduction, body and conclusion.
- Have the students write out what they will say with a pencil on notebook paper. Allow them to use their papers while they are giving their oral presentation.
- Get the students to work in groups so that they can work collaborate and provide feedbacks to each other.
- Allow students to develop at their own pace. Focus on each student's strengths and weaknesses. Give critiques fairly and when necessary.

4.2

Assessment of Oral Presentations

Oral presentations can be assessed using the following criteria:

- Quality of the content: The presenter must be able to explain the topic thoroughly and show a deep understanding of the topic.
- Quality of the presentation elements: The speaker speaks clearly, uses strong words and stays focused on the topic.
- Other qualities: Creativity, technology used.

Assessment of oral presentations is usually aided by the use of a scoring rubric (i.e., a set of criteria and standards that is used to assess performance). Table 1 shows an example of a scoring rubric for an oral presentation.

Table 1: Example of a Scoring Rubric for an Oral Presentation

Criteria/Mark	1	2	3	4	Total
Organization	No sequence of information	Student jumps around	Information is presented in a logical sequence	Information is presented in a logical and interesting sequence	
Subject Knowledge	No grasp of information Cannot answer questions	Uncomfortable with information Only able to answer rudimentary questions	Able to answer but fails to elaborate	Demonstrates full knowledge about the subject Able to answer all questions with explanations	
Graphics	Uses superfluous graphics or no graphics	Occasionally uses graphics that rarely support the text and presentation	Graphics relate to the text and presentation	Graphics explain the presentation well	
Body Language	No eye contact No gestures Reads from the text	Uses body language occasionally Reads from the text	Maintains eye contact and other gestures most of the time Frequently refers to the text	Maintains eye contact Shows some gestures Seldom returns to the text	
Elocution	Student mumbles, Incorrect pronunciation Speaks too slowly	Voice is low Noticeable incorrect pronunciation	Voice is clear Most terms are pronounced correctly	Clear voice Correct and precise pronunciation of terms	
				Total Points	

5 Peer Observation

Observation is a skill often used to provide students with feedback to improve performance. Observation is widely used to illustrate complex assessment concepts in psychomotor domains because they are easier to visualize compared with the cognitive domain. In order to obtain useful information, it is necessary to record the observation. Students and their peers can assess others using observation. They can use a checklist to record the number of times a behaviour occurs. One example is keeping basketball game play statistics. Observation also works well when the teacher wishes to monitor how students work together in groups or individually. The procedure for peer observation is as follows:

- Give clear instructions about the specific behaviour to be observed to both the observer and the assessor.
- Employ an easy-to-use instrument such as a checklist or rating scale. Use of a complex instrument, such as written analysis, is not recommended.
- When using peer assessment, it is best to have the assessor conduct only the assessment. To perform both observation and recording is not recommended.
- Have a post-observation discussion between peers and the teacher so that constructive feedback can be provided.
- The lecturer's role is to roam around the classroom, occasionally giving guidance and encouragement as the students work. He/she also observes how students are performing and decides whether or not modifications need to be made to the assignment.

6 Worksheets

Like teachers, lecturers can also use worksheets as formative assessments. The primary purpose is for the lecturer to gauge the students' understanding of the materials covered. As such, unlike assignments, worksheets will not contribute to the students' grade. For teachers, student-centered worksheets provide the basis for evaluating whether the work is too easy for the students or whether they do not comprehend the information well enough. Thus, the teachers can make modifications as needed. Other advantages of worksheets include:

- Students feel less pressured when completing a worksheet than when taking an examination. These sheets can be assigned as homework or seatwork and can be given right after a particular lesson. It is also one way of evaluating how much information students have absorbed after SCL-related activities.
- As the name suggests, worksheets are just sheets of papers and therefore are handy and easy to use.

Within the context of SCL, journal writing refers to the recording of a variety of events, such as topics of personal interest, observations and the imagination. There are many forms of journal writing. Several that are related to SCL-learning are briefly described as follows:

- Learning journals: A learning journal is typically hand written or created using recording devices (such as a tape recorder or MP3) to record thoughts, reflections, feelings and personal opinions. The process of maintaining a journal helps students become more organised and focused on the areas they are studying.
- Diaries: A notebook or booklet of blank pages in which students can record their thoughts can be called a diary. Diary writing usually involves the unstructured, chronological recording of the events of a person's life as they are perceived.
- Interactive reading log: An interactive reading log encourages students to critically reflect on materials and summarise it in their own words. The reflection is particularly meaningful or provocative.
- Electronic journaling: The advance of computer technology has changed the way in which students record their reflections. Blogs, webpages and social networks are examples of journaling in electronic form. Any journaling technique can be carried out fully or partially in an electronic form.

The following is an example of a journal entry relating to a volunteer program:

"My perception of life has changed since I started this volunteer program. The Food Run has shown me reality and the other sides of life. Through the Food Recycling Program, I get to experience teamwork, charity and suffering. Working together and talking to other volunteers and cafeteria workers allow me to form a team with others and at the same time, allow me to develop friendships. Charity is seen through the donation of time of the volunteers and the food given to the soup kitchen. I am so glad that there are so many people willing to donate their time to help others."

(Retrieved on 12th November 2011 from
<http://www.psych.uncc.edu/cdfernal/3480jnl.htm.l>)

The principle of journal writing is that students write to learn. Writing journals can be an effective assessment tool, especially for language lecturers. Journals, such as diaries, can be used for a variety of purposes, including assessment of:

- Grammar skills;
- Reading comprehension;
- Composition skills; and
- Critical thinking (through assessment of free writing).

7.1 Procedure

The procedure for assigning journal writing is as follows:

- Journals can be used throughout the day, at different times of the day and for different purposes.
- Decide what type of journal you want your students to use. Think about the purpose of the journal and how you will use it.
- Prepare the kind of journal materials that you want students to use, whether it will be a loose-leaf notebook or a folder. Individual pages should be contained in it to prevent them from being lost.
- Discuss the kind of content or entries you want to see in the journal. Work together with the students to write a sample entry. Students can copy the class response in their own journal or write one of their own.
- Schedule time for regular journal use, at which time all students will be engaged in the act of writing; this enables individuals to generate ideas and record observations and emotions.
- Do not grade journal entries; only finished pieces should be used for grading and for providing comments on the writing. Offer suggestions, constructive remarks, questions and encouragement whenever possible.

7.2 Challenges

One of the main challenges with writing journals is that some students use them simply as a way to record the day's events. They slip into the routine of writing diary entries without reflection or real purpose. Regular evaluation may reduce this challenge. Inexperienced writers, such as college students, may also experience writing blocks. Cortright (2000) proposed several approaches to minimise this challenge:

- writing quickly;
- allowing words to fall freely from the subconscious;
- dating journal entries;
- using different writing or recording techniques to enhance a feeling of creativity; and
- setting aside time that is devoted only to journal or diary writing.

8 Case Study

Cases studies often are actual scenarios that are purposely used for teaching and learning. Case studies are suitable for most curricula where students would benefit from the application of learned facts to a real world situation. A case study often is complex and the solutions are vague. Some characteristics of good case studies include:

- Is aligned to the course's learning outcomes;
- Entails difficult choices;
- Has emotional power;
- Is open-ended, allowing multiple interpretations and solutions; and
- Entails value conflicts.

In a case study, students analyse and discuss a particular case to find the best solution. Case study has a very strong tradition in business and law. Through case studies, students become actively engaged in the materials to identify the underlying issues, dilemmas and conflicts. Advantages of a case study include:

- Develops analytic and problem solving skills;
- Allows for exploration of solutions to complex issues; and
- Allows student to apply new knowledge and skills.

Higher order thinking skills as well as past knowledge are needed because the solution may be ambiguous. As such, it is critical to align case studies with course content. For example, students in physics class may investigate the effect of establishing a radioactive-processing plant in the country.

8.1 Procedure

The procedure for conducting a case study is as follows:

- Familiarise students with the case through careful introduction so that they will understand the case better.
- Introduce key facts about the case before discussion.
- Make sure that the cases are complete so that students can identify the underlying issues.
- Lecturers can float around to ask questions designed to ensure that discussion focuses on the ways to identify the best solution to the case.

8.2 Assessment of a Case Study

The quality of case study can be assessed in terms of:

- The quality of research being adopted;
- Issues in written material;
- Organization of arguments;
- The feasibility of the solutions presented; and
- Evidence of consideration of all case factors.

8.3 Challenges

This type of assessment faces certain challenges, including:

- Students may not see relevance to their own situation;
- Insufficient information can lead to inappropriate results; and
- It is not suitable for subjects that have general principles or theories, such as Mathematics.

Research projects are very effective for both developing research and language skills. In a research project, students engage in intensive reading for specific purposes (e.g., to identify information, put together ideas and communicate with others). Students are encouraged to read a variety of reference materials and resources to gather useful information.

Conducting a research project entails the following:

- Discuss the project with students to identify the topic, determine the purpose of the research and identify what students know and what they don't know about the topic.
- Proceed with the formulation of research questions that will guide the research. Research questions can be divided among groups, pairs or even individuals.

Gather information using a variety of reference materials. Lecturers can provide guidance about several important student needs, such as maintaining main ideas; locating specific facts and details; interpreting information such as pictures, charts, maps and graphs; clarifying facts or figures; facilitating conflicting opinions; summarizing and paraphrasing information in their own words; and recording main ideas and interesting details.

- Record and analyse students' findings to ensure that questions have been addressed
- Report the research using an oral or written report, demonstration or presentation.

The adequacy of a research report can be evaluated using the following criteria:

- The ability to access and use a variety of reference materials for information;
- The use of language to convey meaning to others; and
- The ability to organize main arguments and provide supporting details.

Problem solving is based on three important principles: (1) knowing the issues; (2) considering all possible factors; and (3) finding a solution. It allows for finding the best possible solution rather than the easiest solution or the first accepted solution. The nature of problem solving makes it suitable to use to help students understand complex issues, planning for the future or proposing strategic planning. Some people argue that problem solving also is useful for developing critical thinking as it challenges pre-conceived thinking or values. Two of the most highly cited types of problem solving are reflective problem solving and creative problem solving. In reflective problem solving, students take into consideration multiple factors when making complex decisions. Creative problem solving focuses less on the solution but more on brainstorming (i.e., gathering a list of possible solutions from group members). The focus is generating ideas in place of solving the existing problem.

10.1 Reflective Problem Solving

Reflective problem solving involves the following steps:

- Define the problem: Define the problem by listing characteristics of the problem and by providing evidence of it, such as symptoms, things affected and resources related to the problem.
- Analyse the problem: Use the evidence to explain why the problem exists.
- Establish criteria for a solution: What are the objectives of trying to solve the problem? What are the criteria for a solution that must be met?
- Propose a solution: Select a solution that meets both the objectives as well as the criteria.

10.2 Creative Problem Solving

The steps involved in creative problem solving are:

- Orientation: Similar to defining the problem; the group generates evidence as well as headings to provide a clear picture of the problem.
- Preparation and analysis: Similar to analysing the problem; group discusses similarities and differences among the headings and focuses on the root cause of the problem.
- Brainstorm: Generate as many solutions as possible; all ideas are considered acceptable.
- Incubation: Leave the problem for a period of time to develop distance and rethinking.
- Synthesis and verification: Establish criteria for a good solution and then review the brainstormed solutions that are aligned with the criteria.

TASKS

1. Identify a principle or rule in a subject that you teach. Describe generally the condition under which it is appropriate to apply the principle in order to solve a problem or explain a phenomenon. Then, prepare an assessment that is suitable to assess your students' ability to solve the problem or explain the phenomena.
2. Identify a unit in your course outline. Prepare at least three specific learning outcomes for the unit. Next, craft a SCL-related assessment from this module to assess ALL three learning outcomes.
3. Discuss portfolio (or e-portfolio) and identify the benefits and challenges of implementing portfolios in assessment in SCL. Note that portfolio (or e-portfolio) was not discussed here in this unit. Do you think there is a huge difference when portfolio is compared to other forms of assessments discussed in this unit? Explain your answer after discussing with your peers.

SELF-REFLECTION

Reflect on the assignments for your course(s). How are the assignments related to SCL? Explain what you can do to make the assignments more student-centered.

Further Reading

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UNIT 5

WHAT DOES RESEARCH SAY ABOUT STUDENT-CENTERED LEARNING (SCL) AND ASSESSMENT?

Muhammad Kamarul Kabilan, Lim Hooi Lian & Ahmad Zamri Khairani

Module Outcomes

At the end of this unit, users should be able to:

1. Identify and comprehend the issues, benefits and challenges of implementing assessment in the SCL environment; and
 2. Create, develop and implement effective assessments in the SCL environment based on these issues, benefits and challenges.
- 

1 Introduction

SCL is widely researched by educationists and those who are interested and involved in various areas of studies, both at the school and the higher education levels. However, the role of assessment in SCL is just beginning to get the attention it deserves and needs. At the university level, the current trend focuses on 'what students should demonstrate – and a shared sense of ownership in the learning outcomes' (Kieke, Moroz, & Gort, 2007, p. 107). This means that assessment is centered on students and what they are able to do, focusing on the students' knowledge, skills and creativity. These are driven mostly by students' active involvement in identifying and attaining the learning outcomes.

This unit explores the issues, benefits and challenges of implementing assessment in the SCL environment. The traditional form of assessment is very much teacher oriented. This means that all assessment activities to assess and evaluate students' performance and abilities are initiated and heavily engaged in, by the teachers, from the development of testing instruments to the evaluation of the students' overall performance. Knowing and understanding the benefits and challenges of assessment will enable practitioners to be better prepared in engaging learners in a more self-directed and self-initiated assessment. These are the key characteristics of the SCL environment.

2 Issues of Assessment in SCL

In their study of teachers' beliefs about SCL, Pedersen and Liu (2003) found that practitioners face numerous key issues. Some of the issues that are very much relevant to the overall effectiveness of assessment in SCL are examined in Table 1.

Table 1. Issues pertaining to assessment in SCL

Issues	How does this issue influence assessment in SCL?
A lack of a common definition for the term 'student-centered learning' (SCL)	Without proper understanding of SCL, practitioners will have difficulties in developing and creating assessment procedures, learning activities, teaching methods, and tools that are effective and engage students in active learning and self-assessment.
Understanding practitioners' roles in SCL	In carrying out assessment in SCL, practitioners must know and fully understand their roles so that they are able to facilitate learning and assist students in assessing their overall progress, as well as their knowledge, skills, and abilities. Their roles are not to tell or inform students of what to do but to ask pertinent questions that will lead students to take charge of their own learning.
How to integrate collaborative learning and assessment tasks	Collaborative learning and assessment tasks can develop skills in working together that students will need throughout their lives; however, practitioners need to plan meaningful assessment tasks so that the students will gain such skills. Knowing how to integrate collaborative learning and assessment tasks would be extremely helpful towards the successful implementation of assessment in SCL.

One issue that was strongly emphasized by Rust (2002) is the idea of an assessment system that 'assesses explicitly against each individual learning outcome' (p. 155). Recent research has focused on the use of information and communication technology (ICT) and technology for assessment purposes directly and/or educational initiatives that are aimed at forging continuous assessment. The integration of ICT and technology into education has been influential in charting new ways of assessing students' learning and progress. For example, with the integration of information technologies, students can be provided with quality learning experiences and it can be used to create authentic tasks for assessment (McLoughlin & Luca, 2002). In assessing students using ICT or technology, it was found that continuous assessment contributes to students' learning progress over time and it could 'diagnose students' critical thinking skills at the beginning of the semester as well as track the development of those skills throughout the semester' (Weasenforth, Biesenbach-Lucas, & Meloni, 2002, p. 72).

Please read the following articles, which are available on the Internet, to understand many other issues related to assessment in SCL:

1. Teachers' beliefs about issues in the implementation of a student centered learning environment (Pedersen & Liu, 2003)
2. Student centered learning: What does it mean to students and lecturers (O'Neill & McMahon, 2005).

(Note: the above references are listed in the reference list).

TASK 1

What are other issues that you think are important and need to be addressed if you are to implement an effective assessment in the SCL environment? Please fill in the blanks in Table 2.

Table 2. Important issues for effective assessment in the SCL environment

Issues	How does this issue influence assessment in SCL?

Case Study

You are teaching a tutorial class which consists of 20 students. You want to divide the students into five groups and ask them to present their ideas of ways to solve a community's problem related to littering. What are the issues of assessment in SCL that you need to consider to evaluate their presentation?

SELF-REFLECTION

Based on your experience as an educator, do the above issues (highlighted in Tables 1 and 2) critically hinder you from carrying out effective assessment in the SCL environment? How? Why is this so?

3 Benefits of Assessment in SCL

Literature and research indicate many benefits and advantages of implementing assessment practices in SCL environment. Table 3 lists some of these benefits.

Table 3. Several benefits of SCL assessment to students

	Benefits/Advantages	Note
1	Takes into account students' diverse learning needs*	
2	Increases students' retention of knowledge and skills*	
3	Requires active engagement of students	Read Karen Timberlake's article for a detailed explanation of how students can be actively engaged in learning.
4	Advocates experiential learning	Read more on Kolb's Experiential Learning Theory. There are many articles and write-ups on this theory on the Internet.

(See next page)

(continued)

	Benefits/Advantages	Note
5	Enhances students' problem solving skills*	
6	Enhances students' confidence level*	
7	Develops necessary workplace skills	Examples of skills include team-building, working with others, tolerance and respect of others' views/opinions, sense of responsibility, and asking questions
8	Enhances students' interpersonal skills*	
9	Encourages lifelong learning *	
10	Facilitates students' creative and critical thinking skills*	
11	Increases students' understanding and comprehension of subject matter or content	Read ' <i>Student-centered learning – toolkit for students, staff and higher education institutions</i> ' (p. 8) for information about the 'Learning Pyramid'.
12	Allows students to learn what is relevant and meaningful to them	See O'Neill & McMahon (2005).
13	Enhances students' research skills	The research skills actually help students become part of an academic community (see The European Students' Union)

*What are your opinions and views of these items? You may write them in the 'Note' space.

Apart from students, SCL assessment would also benefit educators in numerous ways. Table 4 highlights some of the benefits for educators (The European Students' Union, 2010).

Table 4. Some benefits of SCL assessment to educators

	Benefits/Advantages	Note
1	A more interesting and challenging role for educators	Contrary to the fallacy that designing SCL assessments is easy, it is actually daunting and challenging to design and develop truly meaningful and engaging learning materials and assessment activities.
2	A solution to tackling diversity of students	An assessment that eases educators' responsibilities more effectively, particularly in giving grades that truly reflect the students' abilities and efforts.
3	SCL enables educators to review and develop their courses and teaching methods in the form of continuous self-improvement.*	

**What are your opinions and views of these items? You may write them in the 'Note' space.*

For further understanding of this topic, please read the following materials and articles:

1. Timberlake, K. Using students centered learning strategies in the chemistry classroom. www.karentimberlake.com/student-centered_classroom.htm
2. http://en.wikipedia.org/wiki/David_A._Kolb
3. The European Students' Union (2010). Student-centered learning – toolkit for students, staff and higher education institutions. Brussels. [www.esib.org/documents/publications/SCL-toolkit ESU EI.pdf](http://www.esib.org/documents/publications/SCL-toolkit_ESU_EI.pdf)

TASK 2

Figure 1 represents the 'Learning Pyramid'. Identify the learning elements (given in the box below) in the pyramid and predict the average student retention rates (%) of each learning element. How are these elements related to assessment in the SCL environment?

Elements of learning

- LECTURE
- DEMONSTRATION
- PRACTICE DOING
- READING
- TEACH OTHERS
- AUDIO VISUAL
- DISCUSSION

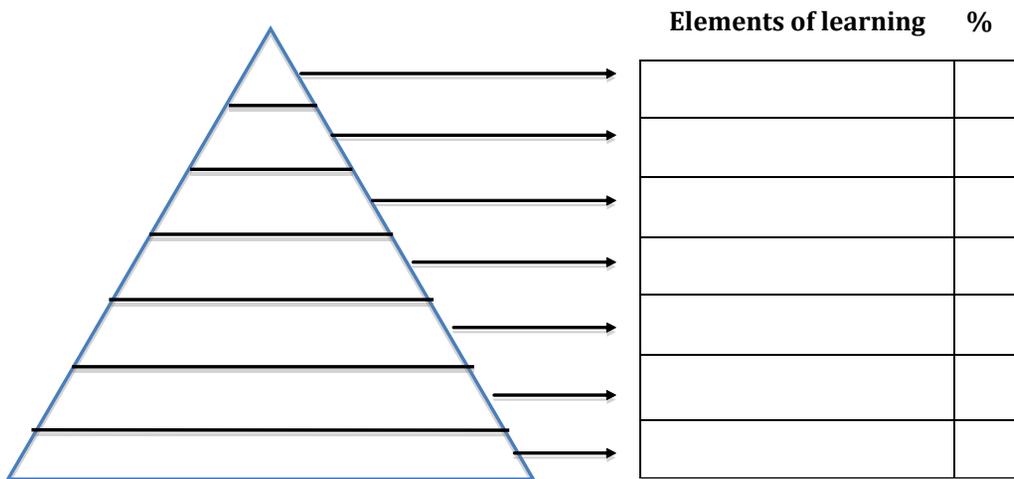


Figure 1. The Learning Pyramid
Adapted from: National Training Laboratories, Bethel, Maine, US.

TASK 3

What are the other benefits or advantages for students (based on your experience or reading) of carrying out assessment in the SCL environment? Provide explanations or examples, where appropriate.

	Benefits/Advantages	Notes/Examples
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

TASK 4

What are other benefits or advantages for educators (based on your experience or reading) of carrying out assessment in the SCL environment? Provide explanations or examples, where appropriate.

	Benefits/Advantages	Notes/Examples
1		
2		
3		
4		
5		

Case Study

A lecturer at the School of Biology wants to facilitate the active engagement of students in their learning and cater to students' diverse learning needs. What kind(s) of assessment method(s) should he/she employ? Please explain.

SELF-REFLECTION

Have you ever assigned a task that is student-centered and that successfully facilitated students' learning? Why was that particular assessment successful? What are the characteristics of the task that contributed to the students' learning?

If you have never assigned such tasks, what are the key characteristics of a task that you believe would critically contribute to students' learning?

4 Challenges of Assessment in SCL

In a conference paper, Thompson and Licklider (2010) noted that the real challenge and one of the biggest ones, in SCL assessment is designing and developing a challenging assessment task/activity. According to them, creating appropriate challenges for students requires educators to 'make the connections necessary for continuous construction of knowledge and the ability to access what has been learned in the future'. In addition, the assessment task or activity needs to be authentic, meaningful and relevant and engage students in real learning that transcends various skills as well as the pre-determined learning outcomes or objectives.

These challenges are not only pertinent to the teachers but also to the students and institutions involved. Students must understand the concept of assessment in an SCL environment. Hence, it is a challenge for the institution to provide such understanding through various activities and professional courses and training. It is also the responsibility of the institution to ensure that its teaching faculty members are aware and well versed with assessment in an SCL environment and that they (i.e., the educators) are able to impart that knowledge to their students by designing and developing authentic, meaningful and engaging assessment tasks or activities.

Understanding the meaning of authentic assessment is critical and the following resources may prove helpful:

1. http://wik.ed.uiuc.edu/index.php/Authentic_Assessment
2. <http://jfmuller.faculty.noctrl.edu/toolbox/tasks.htm>

TASK 5

What other challenges do students (based on your experience or reading of literature) face in completing an SCL assessment? Provide explanation or examples, where appropriate.

	Challenges for Students	Notes/Examples
1		
2		
3		
4		
5		

TASK 6

What other challenges do educators (based on your experience or reading of literature) face in designing, planning and carrying out an SCL assessment? Provide explanation or examples, where appropriate.

	Challenges for Educators	Notes/Examples
1		
2		
3		
4		
5		

TASK 7

What other challenges do educational institutions (including administrators) (based on your experience or reading of literature) face in ensuring a learning environment that is based on SCL assessment? Provide explanation or examples, where appropriate.

	Challenges for Institutions	Notes/Examples
1		
2		
3		
4		
5		

Case Study

As the leader of an educational institution, you wish to implement an educational project called The SCL Assessment Initiative (TSAI). The aim of TSAI is to ensure that all the stakeholders in your institution are aware of the importance of the SCL form of assessment. What would be your main concerns? How would you resolve those concerns?

SELF-REFLECTION

Describe an authentic, meaningful and engaging assessment task or activity that you have planned, designed and carried out. How do you know that the task was authentic, meaningful and engaging? What are the key principles that you used to develop such a task?

If you have not developed an authentic, meaningful and engaging assessment task or activity, develop one that your current students will appreciate. Think about the key principles that are need.

5 Conclusions

Research in the field of assessment, especially in the SCL environment, indicates that there are many considerations, issues and challenges that await those who wish to practice assessment in the SCL learning environment. These issues need to be properly addressed so that the planning, designing, developing and implementing of such assessments will meaningfully contribute to students' learning. Implementing assessments in the SCL environment requires understanding from all relevant parties, including educators, students and the educational institution, each of which has its own roles and responsibilities. Failure on the part of any of the three parties to comprehend and be aware of the concept of assessment in SCL and how it works best will be a major stumbling block to successful authentic learning.

Further Reading

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O'Neill, G., & McMahon, G. (2005). Student centered learning: What does it mean to students and lecturers. In O'Neill, G., Moore, S., McMullin, B (Eds.) *Emerging issues in the practice of university learning and teaching* (28–34). Dublin: AISHE. Available online: http://www.aishe.org/readings/2005-1/oneill-mcmahon-Tues_19th_Oct_SCL.html

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Timberlake, K. (undated) Using students centered learning strategies in the chemistry classroom. www.karentimberlake.com/studen-centered_classroom.htm.

Weasenforth, D., Biesenbach-Lucas, S., & Meloni, C. (2002). Realizing constructivist objectives through collaborative technologies: Threaded discussions. *Language Learning & Technology*, 6(3), 58-86.



UNIT 6

BEST PRACTICES IN ASSESSING STUDENTS IN THE STUDENT-CENTERED LEARNING (SCL) ENVIRONMENT

Lim Hooi Lian, Ahmad Zamri Khairani & Muhammad Kamarul Kabilan

Module Outcomes

At the end of this unit, users should be able to:

1. Identify the five keys of best practice for assessing students in SCL;
 2. Describe the significance of each key practice in assessing students in SCL.
- 

1 Introduction

Assessment is a main element in all education reform efforts. Assessment practices can have a powerful impact on what is taught to students and what is learned by students. The role of assessment in a traditional view is to evaluate how well students have learned what teachers have taught. In the best practice of assessing students in SCL, assessment has a much broader role than simply judging how well the students have learned what had been taught by educators. In this unit, we outline what we consider to be the five keys of best practice of assessing students in SCL (American Association for Higher Education Principles, 1996; Japanese Language and Culture 9Y Guide to Implementation, 2008; Arter, 2009).

2 Five Keys of Best Practice of Assessing Students in the SCL Environment



Key 1: Have Clear and Appropriate Purposes of Assessment

Assessment works best when the purpose is clear. Assessment is a goal-oriented process. It entails comparing educational performance with educational purposes and expectations. Assessment as a process pushes a course towards clarity about where to aim and what standards to apply; assessment also prompts attention to where and how course goals will be taught and learned (American Association for Higher Education Principles, 1996) (Refer example in Appendix 1).

Assessment is generally divided into two categories: assessment for learning (formative assessment or continuous assessment) and assessment of learning (summative assessment or terminal assessment). Any assessment method can serve both formative and/or summative purposes depending on how the results are used. Hence, educators need to understand who will be assessed and how the information from the assessment will be used. For the purpose of discussion, it is important to be aware of these terms. Assessment of learning or summative assessment, most often is designed to be summarized in a performance grade and shared with students, parents and others who have a right to know. Thus, it usually occurs at the end of a period of instruction, such as a unit, course, program or term.

Assessment for learning or formative assessment, encompasses a range of formal and informal assessment procedures employed by the educator during the learning process. It is characterized by the ongoing exchange of information about learning between the student and the self, peers, the teacher and parent(s). It provides information about student progress, thereby allowing the educator to make course adjustments, such as modifying teaching and learning activities in order to meet the learning needs of students. In other words, assessments become formative when the information is used to adapt teaching and learning to meet

students' needs. Assessment for learning provides thorough and descriptive feedback about the student's performance. As a result of receiving feedback and comments focused on the learning outcomes, students will have a clearer understanding of what they need to do to improve their future learning. It is possible to use the same test for both assessment of learning and assessment for learning. It is up to the educator to determine the purpose and use of the results of assessment (Japanese Language and Culture 9Y Guide to Implementation, 2008). Meaningful assessment has a purpose and provides clear and useful information. For example, it may identify misunderstandings in student learning and provide corrective feedback and direction for further instructions (Japanese Language and Culture 9Y Guide to Implementation, 2008).

Assessment practices in the SCL environment should occur in a context that allows students to demonstrate their learning abilities by performing meaningful tasks. Meaningful assessments help students by engaging their attention and encouraging them to share their work, ideas and thinking about the learning processes. Thus, students need to take an active part in assessment in order to develop their self-assessment and peer assessment skills. In short, the ultimate goal of assessment practices in the SCL environment is to develop independent lifelong learners who regularly monitor and assess their own progress.

The questions you must answer as you identify clear and appropriate purposes of assessment include:

- Is it clear who will use the assessment results?
- Is it clear how the assessment results will be used?



Key 2: Have Clear Intended Learning Outcomes

General and specific outcomes identify expectations for student performance across a course. These outcomes should be used to articulate the evidence and criteria for learning. Thus, educators should have clear intended learning outcomes for students. They need to select learning outcomes focused on the most important knowledge or skills that students need to know and be able to do. Educators should have a comprehensive plan over time for assessing learning outcomes. When outcomes are clustered around a 'big idea' or concept, they can be used as the basis for articulating expectations, selecting the assessment method and developing activities.

In order to ensure that valid inferences can be made based on the assessment results, educators should plan assessment activities that require students to demonstrate what they understand and can do in relation to the selected learning outcomes. Unit 2 discusses in detail the concept and classification of learning outcomes. The questions you must answer as you identify the clear intended learning outcomes to be assessed include:

- Are the students' learning outcomes stated clearly?
- Are the learning outcomes focused on the most important content and skills that students need to know and be able to do?
- Is the match between the stated learning outcomes and what is on the assessment clear?



Key 3: Use a Variety of Assessment Methods

The most accurate profile of student performance is based on the information gathered from assessing student's learning outcomes in a variety of contexts. Thus, when choosing assessment methods it is important to offer variety to learners so that they can demonstrate their learning and develop a well-rounded set of abilities by the time they graduate. According to Dunn (1999), the choice of assessment methods should be aligned with the overall aims of the course and may include the development of disciplinary skills and knowledge such as:

- Thinking critically and making judgments: developing arguments, reflecting, evaluating, assessing, judging;
- Solving problems and developing plans: identifying problems, posing problems, defining problems, analysing data, reviewing, designing experiments, planning, applying information;
- Performing procedures and demonstrating techniques: computation, taking readings, using equipment, following laboratory procedures, following protocols, carrying out instructions;
- Managing and developing oneself: working cooperatively, working independently, learning independently, being self-directed, managing time, managing tasks organising;
- Accessing and managing information: researching, investigating, interpreting organising information, reviewing and paraphrasing information, collecting data, searching and managing information sources, observing and interpreting;
- Demonstrating knowledge and understanding: recalling, describing, reporting, recounting, recognizing, identifying, relating and interrelating;
- Designing, creating, performing: Imagining, visualising, designing, producing, creating, innovating, performing; and
- Communicating: one- and two-way communication, communication within a group, verbal, written and non-verbal communication, arguing, describing, advocating, interviewing, negotiating, presenting; using specific written forms.

When educators use a variety of assessment for learning and assessment of learning methods consistently, they are able to accurately communicate student performance in relation to the course of study. For example, some learning outcomes of communication skills can only be evaluated through a performance assessment that provides students with a meaningful real-world context, thus observation of personal communication is an essential assessment method (Japanese Language and Culture 9Y Guide to Implementation, 2008) (Refer example in Appendix 1). The following statement from the American Association for Higher Education Principles (1996) about nine principles of good practice for assessing student learning is extremely useful in this regard:

"Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated and revealed in performance over time. Learning is a complex process. It entails not only what students know but what they can do with what they know; it involves not only knowledge and abilities but values, attitudes and habits of mind that affect both academic success and performance beyond the classroom. Assessment should reflect these understandings by employing a diverse array of methods, including those that call for actual performance, using them over time so as to reveal change, growth and increasing degrees of integration. Such an approach aims for a more complete and accurate picture of learning and therefore firmer bases for improving our students' educational experience."

(American Association for Higher Education Principles, 1996, p. 1)

The questions that a lecturer must ask when choosing a variety of assessment methods to be used for a class include:

- Do the various assessment methods serve the intended purpose of assessment?
- Will students be able to use the results of the assessment methods to reflect on their learning?



Key 4: Include Student Involvement

Assessment practice in the SCL environment involves students in the assessment process. It leads students to a deeper understanding of what they are expected to know and do. It allows them to become effective users of assessment information. Students can become proficient users of student-centered assessment activities such as self-assessment and peer assessment.

Self-assessment and peer assessment are key activities to involve students in taking more responsibility for their own learning. Students learn to be reflective and responsive, to think about their own or others' efforts, to evaluate the quality of their or others' work and learning, to be constructive in assessment and to provide specific information that makes a difference. While the benefits may not initially be noticeable to students, this process offers a means of enhancing the learning experience and helps them to learn important skills that they will be able to use as lifelong learners.

By integrating self-assessment and peer assessment activities into the assessment process, the assessment system shifts from the educator as judge or evaluator to the educator as a facilitator. It benefits the educator by saving time once the educator is comfortable with self-assessment and peer assessment and students see it as a natural part of their learning process.

When introducing these activities, students need to be made aware of the benefits to them (i.e., students need to see the value for themselves). They need to be given information and they need to practise to gain confidence in these activities in order to become more competent. Table 1 lists details about personal reflection, self-assessment and peer assessment in the SCL environment, (Japanese Language and Culture 9Y Guide to Implementation, 2008; TQA Manual - Introduction and Contents, 2011).

Table 1. Personal reflection, self-assessment and peer assessment

Assessment practice in the SCL environment	Description	Benefits
<p>1. Personal reflection and self-assessment</p>	<p>It can be structured by the educator or the students. Students are requested to include personal responses about the learning process.</p> <p>Students are requested to:</p> <ul style="list-style-type: none"> • Reflect on what they have learned and how they learned it; • Monitor and regulate their learning while they are learning; • See their strengths and weaknesses as well as areas that need work; • Evaluate the quality of their work, skills, and knowledge; and • Set goals for future learning and plan ways to achieve these goals. <p>In assessing student outcomes, Marzano, Pickering & McTighe (1993) offered the following writing probes and questions that help students reflect on their own learning:</p> <p>Reflecting on Content</p> <ol style="list-style-type: none"> 1. Describe the extent to which you understand the Information discussed in class. 2. What are you confident about? 3. What are you confused about? 4. What do you find particularly interesting and thought provoking? <p>Reflecting on Information Processing Describe how effective you were in gathering information for your work or project.</p> <p>Reflecting on Communication Describe how effective you were in communicating your conclusions to your work group.</p> <p>Reflecting on Collaboration and Cooperation Describe how well you worked with your group throughout your team project.</p>	<p>It encourages students to honestly and thoughtfully assess their own and others' work and to take ownership of it.</p> <p>Students can develop lifelong evaluation skills both about their own and others' work.</p> <p>They can take their first steps towards independent and autonomous learning by developing assessment strategies based on their evaluations.</p> <p>They learn directly by constructively critiquing their own and others' work in parallel.</p> <p>It offers students the opportunity to share with each other their insights about learning.</p>
<p>2. Peer assessment</p>	<ol style="list-style-type: none"> 1. Students are involved in monitoring and making judgments about the aspects of their peers' work. 2. It allows students to examine one another's work as it relates to specific criteria and to offer comments, encouragement, and suggestions for improvement. 3. Students need to understand the criteria and focus on a particular aspect of their peers' work. Students should be coached on giving descriptive and constructive feedback so they avoid using broad terms such as 'good' or 'bad'. 	<p>Capabilities that can be developed in students by self-reflection, peer, and self-assessment include:</p> <ul style="list-style-type: none"> • Increase understanding of own learning style; • Giving and receiving feedback; • Increase awareness of personal sensitivities when receiving feedback; • Open mindedness through offering criticisms, suggestions, and predictions; and • Ability to justify a position.

The questions you must answer as you involve students in the assessment process include:

- Can the students involved in the assessment process use the results to identify specific strengths and weaknesses effectively?
- Is the assessment designed so that students can use the results to set meaningful goals for their future learning?
- Is there a mechanism in place for students to track their own progress on learning targets and to participate in communicating their status to others?



Key 5: Assessment Methods Match Intended Learning Targets

Educators need to understand what assessment methods are available. They need to choose assessment methods that match intended learning targets and serve intended purposes. Educators must ensure that:

- The method(s) chosen is/are capable of accurately reflecting the learning outcomes to be assessed;
- The relative importance of each learning outcome on the assessment matches the relative importance given to it during instruction; and
- The tasks or questions and scoring rubrics constructed adhere to guidelines and procedures of quality.

The questions you must answer as you identify assessment methods that match intended learning targets include:

- Will the assessment method(s) chosen accurately reflect the learning outcomes to be assessed?
- Has the assessment developer translated the learning outcomes into assessments that will yield accurate results?
- Do the assessment tasks and scoring rubrics adhere to guidelines and procedures of quality?

This unit introduced the major issues related to the best practices in assessing students in the SCL environment. Its major points are as follows:

- In the best practice of assessing students in the SCL environment, assessment has a much broader role than judging how well the students have learned what had been taught by educators.
- Assessment works best when the purpose is clear. Assessment is a goal-oriented process. It entails comparing educational performance with educational purposes and expectations.
- General and specific outcomes identify expectations for student performance across the course. These outcomes should be used to articulate evidence and criteria for learning. Educators should have clear intended learning outcomes for students.
- The most accurate profile of student performance is based on the information gathered from assessing students' learning outcomes in a variety of contexts. Thus, when choosing assessment methods it is important to offer variety to learners so that they can demonstrate their learning and develop a well-rounded set of abilities by the time they graduate.
- Assessment practice in the SCL environment involves students in the assessment process. It leads students to a deeper understanding of what they are expected to know and do. It allows them to become effective users of assessment information.
- Educators need to understand what assessment methods are available. They need to choose assessment methods that match intended learning targets and serve intended purposes.

TASKS

1. Discuss the advantages and disadvantages of implementing self-assessment.
2. Describe a few issues facing self-assessment and peer assessment.
3. How can statements of learning outcomes help you to select the assessment method? Give examples to support your answer.
4. Why is it important to involve students in assessment? Give five reasons.

SELF-REFLECTION

1. Do you have experience with implementing self- or peer assessment in your class? Try to craft a self or peer assessment task for a topic of your course.
2. Based on your teaching experience, what are the challenges to practice the five keys of best practice of assessing student in the SCL environment?

Case Study

A lecturer is facing the problem of deciding on methods of assessment for his course. Write an essay to give him some important guidelines.

Further Reading

American Association for Higher Education (1996). 9 Principles of Good Practice for Assessing Student Learning. Retrieved November 2, 2011, from

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Arter, J. (2009). Classroom assessment for student learning (CASL): Perspective on the JCSEE student evaluation standards. Retrieved September 5, 2011, from

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<http://www.brookes.ac.uk/services/ocslid/resources/methods.html>

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<http://mams.rmit.edu.au/71ra0k9io8yzz.pdf>

TQA Manual - Introduction and Contents (2011). Peer and self-assessment in student work. Retrieved November 2, 2011, from

<http://admin.exeter.ac.uk/academic/tls/tqa/Part%205/5Dpeerassess1.pdf>

Appendix 1

Best Practices in Assessing Student in the SCL Environment using e-Assessment

Buzzetto-More and Alade (2006) discussed the curriculum mission, goals and outcomes of the development of assessment in the SCL environment. They also evaluated the design and implementation of an e-assessment program at a mid-sized business department of a higher education institution located on the rural Eastern Shore of Maryland in the United States.

Table 1. Department of Business Management & Accounting core curriculum mission, goals and outcomes

MISSION & GOALS	EXPECTED STUDENT LEARNING OUTCOMES
<p>MISSION The mission of the Department of Business, Management and Accounting at the University of Maryland Eastern Shore is to deliver high-quality undergraduate management education to students majoring in business administration, accounting, and business education, as well as to provide core management courses to other majors throughout the University. This mission is supported by the intellectual contributions of faculty, in that these scholarly activities contribute to instructional effectiveness.</p> <p>Goal I To produce graduate students who can demonstrate a basic understanding of managerial and accounting procedures, professional practices, and issues and problems related to business and the regional and global economy.</p> <p>Goal II To produce graduate students who have oral, written, interpersonal, technological and presentational skills to succeed in today's global business environment.</p> <p>Goal III To build upon the University's solid liberal arts grounding to foster the students' ability to integrate critical, theoretical, ethical and global perspectives into business practice.</p>	<p>Through a variety of experiences, graduates will be able to:</p> <ul style="list-style-type: none"> • Describe major business theories and principles; • Relate group dynamics and organisational understanding to cooperative business practice; and • Explain the basic tenets of accounting, marketing and management. <p>Apply the proper mechanics, organisation, format, style and professional language to communicate effectively in business writing;</p> <ul style="list-style-type: none"> • Employ the proper verbal, non-verbal, and presentation skills in order to communicate professionally and persuasively; • Effectively utilize technology to augment business practice: including the acquisition, analysis and communication of ideas; and the management, organisation and examination of information; <ul style="list-style-type: none"> • Identify and describe legal and ethical issues impacting business practices; • Discuss the global nature of business; and • Analyse information and synthesise concepts in order to develop and communicate ideas.

Table 2. Disciplinary skills and knowledge to be assessed and methods of assessment

Disciplinary skills and knowledge	Description	Method
Knowledge and comprehension of students	To measure student knowledge and comprehension of key business concepts	Online testing via the WebCT course management system
Communications skills	The written and oral presentation abilities of business students are skill-based competencies that are crucial to the future career success of today's business graduates.	Professional presentations Business writing The technology used in examining written and presentational communications (using the WebCT course management system and Tegrity)
Writing skill	<p>Online diagnostic testing of student writing is administered at two junctures during business communications.</p> <p>It is used to assess student progress toward enhancing their strengths and rectifying their weaknesses.</p> <p>A business-writing portfolio is assigned and collected digitally. The written portfolio is assessed using a common rubric.</p> <p>A writing competency exam is administered following the completion of the course, and passage of the exam is a requisite to graduation.</p>	<p>Diagnostic testing</p> <p>Portfolio</p> <p>Examination</p>
Oral skills	Student presentations are recorded on video at random. The video recordings will serve as a source of reference for the instructor to evaluate the students' presentations in a detailed manner, as well as to give further input to the students to improve their performance.	Presentation

(See next page)

(continued)

	<p>The Tegrity system is used in random sections of business communications to record student presentations using a webcam synched with instructor assessment conducted through a rubric on the instructor's tablet computer.</p>	
Critical thinking skills	<p>The ability for students to analyse situations, evaluate and make judgments, and formulate solutions are critical-thinking skills, all of which are required for case analysis; a common rubric in WebCT is used for assessment.</p>	Case studies
Application of knowledge and skills in authentic anchored scenarios	<p>Requires critical thinking as well as the application of knowledge and skills in authentic anchored scenarios.</p> <p>Students in the department consistently rank nationally in competitive network simulations and the department considers these simulations to be an integral part of the student learning process.</p> <p>Simulations are done in several courses and are scaffolded throughout the curriculum, where each simulation builds on knowledge and skills built in previous simulations.</p>	Simulations
Project-based learning activities	<p>These serve as effective means of assessing learning outcome achievement by providing students with flexible opportunities to demonstrate the acquisition of skills and abilities.</p> <p>An electronic portfolio has been adopted within the business education teacher education program using the TK20 portfolio assessment system.</p>	Student portfolios

