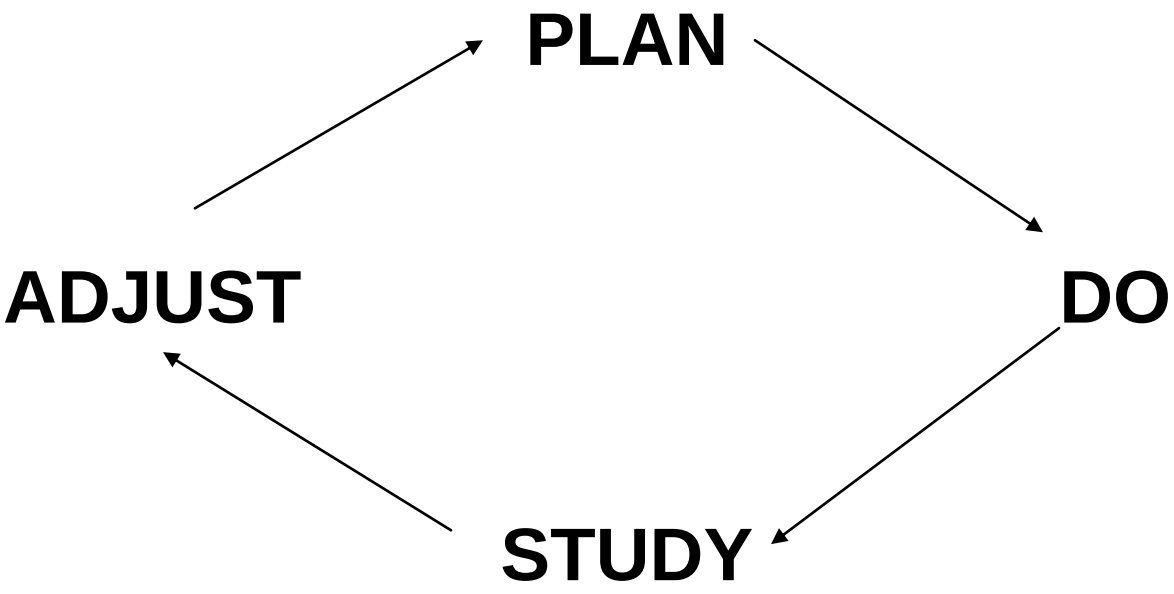
A Beginner's Guide to Student Learning Assessment

(CliffsNotes™ Version)



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Introduction

Assessment can be defined as the process of determining the quality and quantity of student learning in order to make improvements (Bordon and Zak, 2001). The process of assessment is comprised of four sequential steps and is as follows:

1) Plan
2) Do
3) Study
4) Adjust

Plan

The first (and most critical) step in assessing student learning is to identify the three to five most important knowledge, skills and behaviors a student should know/demonstrate once they complete the academic and/or occupational program of study.

- Knowledge refers to what cognitive "book smarts" a student should possess.
- Skills refer to the students' psychomotor abilities necessary to perform the required job duties. Skills refer to the students' ability to physically manipulate some type of tool or instrument.
- Behaviors deal with those soft skills required to be an employable worker.

Once it is determined what the students should learn, the instructor must articulate these three to five knowledge, skills and behaviors as program objectives. Program objectives tell our customers (students, parents, employers and other stakeholders) the three to five major things a student will be able to do and know upon graduation. Not only are program objectives our "contract" with the stakeholders, they also drive what is taught in the classroom and how it is taught.

After identifying and documenting the program objectives, course objectives and courses are developed that support accomplishment of these program objectives. If a course or course objective does not support the learning outcomes identified in the three to five program objectives, consideration must be made as to whether or not that course or course objective should be part of the curriculum. It is critical that program objectives be well thought out since all aspects of the learning environment are based on these objectives. (Please see ***Writing Appropriate Program and Course Objectives*** for more information on what is considered a well-written objective.) Every course objective stated in the program syllabi should support one or more of the program objectives.

Individual course lesson plans are then developed. Individual course lesson plans focus on addressing the stated course objectives. The stated course objectives support one of more of the program objectives. Initially, this portion of the "Plan" stage is the most time consuming portion of the Plan→Do→Study→Adjust Cycle of Student Learning Assessment.

The next focus of the "Plan" stage should be to construct various measurement tools (written tests and exams, practical tests and exams, papers, surveys, etc.) that will accurately and fairly assess whether or not students are accomplishing the stated course and program objectives. It is a common mistake in education to use only one test to measure whether or not students "know" the material. **Triangulation** refers to the use of three (3) different evaluation tools to determine whether or not a single program objective has been met. Having at least three different measures to assess the degree of achievement of a single program objective is much more valid and reliable than using only one or two measures. Although measurement tools need to be fair, they also need to be discriminatory as to differentiate what students are meeting the course and program objectives versus those who are not.

In summary, during the "Plan" portion of the Plan→Do→Study→Adjust Cycle:

- Document expected student learning outcomes (program objectives) based on input from shareholders.
- Align curriculum (course objectives and course lesson plans (including textbooks, homework assignments, tests and exams, teaching strategies, field trips, guest speakers, etc.) with expected learning outcomes (program objectives).

Do

The "Do" portion is the implementation portion of the Plan→Do→Study→Adjust Cycle. This is where the "rubber meets the road". In short, this is where the teaching, learning and evaluation of learning occur based on the course and program objectives.

Formative and summative assessments should be frequently occurring in the form of written tests and exams, practical tests and exams, papers, surveys, focus groups, classroom assessment techniques (CATs), etc. Formative assessments occur before and during the teaching/learning process while summative assessments occur at the end of the semester. Determine and implement measurement tools to verify what students have actually learned. A conscious effort needs to be made to determine how specific measurement tools assess certain course and program objectives so that the instructor can exactly pinpoint where students are meeting expectations and where improvements need to be made.

Study

The "Study" portion of the Plan→Do→Study→Adjust Cycle involves formally evaluating whether or not the course and program objectives have been accomplished to the level of the stated criterion (see ***Writing Appropriate Program and Course Objectives*** for more information on Criterion (Accuracy)). This is when the instructor identifies strengths and weaknesses in the individual courses as they pertain to how well the learning that is occurring in the courses is supporting the accomplishment of the program objectives. Sometimes an instructor will identify that a program objective was not accomplished to the satisfaction of the stated criterion based on the formative

and/or summative assessment data. The instructor can then work backwards and identify what individual course or courses (and associated course objectives) may have contributed to the "problem" or assessment deficit. Although the instructor may consider this a "problem" that certain program and course objectives were not met, this also allows the instructor the opportunity to address the learning deficit and make adjustment in future semesters to rectify the situation. Langford (1995) labeled this a problemtunity. The problem or noted deficit gives the instructor the opportunity to improve future teaching/learning…problemtunity.

Adjust

Based on the formative and summative assessment data, the instructor will make no more than two or three adjustments to the curriculum with the goal of improving student learning so as to better meet the stated program objectives. This is the instructor's opportunity to focus on what is and what is not working in the program and then make changes based on the data. Changes to an academic and/or occupation program must be data-driven. Once the instructor decides what specific changes s/he will make to improve student learning, a "Plan" on how to implement those changes needs to be constructed. This may entail changing lesson plans, revisiting the different measurement tools to see if they are really measuring what you think they are measuring (called validity), etc.

Once the "Plan" is in place, the instructor then implements this new plan via the "Do" portion of the cycle. Formative and summative assessment data is again collected during the learning/teaching process and studied. "Study" of this information will lead to further adjustments to the curriculum. This Plan→Do→Study→Adjust Cycle continues with the goal of continuous improvement of student academic achievement. The ability to make data-driven changes to improve student learning academic year after academic year is referred to as "closing the loop". Assessment results are continuously used to drive positive change. Adjustments made to the program based on the yearly study of data keeps the process of improving student learning a living, breathing, ongoing process.

Writing Appropriate Program and Course Objectives

Well-written program and course objectives have the following three components:

1) Performance
2) Condition
3) Criteria (sometimes referred to as accuracy)

Performance

Performance refers to what measurable knowledge, skill and/or behavior the student will demonstrate in order to indicate to the instructor that learning has taken place. The observable performance must be stated as a measurable verb. For example, an

objective that states a student will “understand” or “appreciate” a specific topic is not measurable and should be rejected as an observable program and/or course objective. Measurable action verbs such as “install a radiator”, “design an exercise program” and “identify and list the differences between…” are appropriate, observable and measurable verbs.

Condition

Condition refers to what tools, material or equipment will be used to accomplish the performance. If a student will frame a house based on a certain set of blue prints, the condition would state, “Given a set of blue prints, the student will frame the exterior wall…” In many instances, a condition is not stated. For example, program and course objectives for many of the general education/liberal arts related classes will not state a condition. It is taken for granted that the student’s performance is based on a certain amount of classroom instruction on a specific topic.

Criterion (Accuracy)

Criterion refers to what level of accuracy is acceptable to the instructor and indicates that the performance meets some level of minimum expectations. In short, criterion refers to what is considered a “passing” score. How will accomplishment of the performance be judged. A common criterion stated in many Mesalands Community College course objectives is “the student will be able to accomplish the following with an accuracy of at least 70%.” A criterion could also identify time constraints or number of misspelling. If a criterion is not stated, it is taken for granted that an accuracy of 100% is required to meet the performance. For example, many technical skills are evaluated as either “pass or fail”. The skill must be demonstrated perfectly with no mistakes what-so-ever. If not, the student “fails” that portion of the skill. Typically, this type of grading uses a “yes/no” type checklist for the numerous steps involved in performing the skill.

Examples of appropriate objectives:

- Develop a business brochure using computer graphics that is of marketing quality.

  Performance: Develop brochure.
  Condition: Using computer.
  Criterion: Marketing quality.

- Using a skinfold caliper, the student will demonstrate the ability to measure seven of the nine standardized skinfold sites within $\pm$ 2 mm of the instructor’s readings.

  Performance: Measure.
  Condition: Using skinfold caliper.
  Criterion: Within $\pm$ 2 mm of instructor’s readings.

Examples of objectives that needs work:

- Proficiency in mathematics courses.
- Demonstrate computer software and research skills.
- An understanding of the theories of motors, generators and mechanical systems of wind turbines.

Writing Program and Course Objectives Using Bloom's Taxonomy

Bloom's Taxonomy was proposed in 1959 and describes the different levels of cognitive learning, i.e., book smarts. In short, Bloom stated that lower levels of learning must occur first before higher levels of learning can take place. The lower levels of learning (knowledge, comprehension and application) are the foundation upon which higher levels of learning (analysis, synthesis and evaluation) are built. Knowledge is the foundation of all cognitive learning and without it the other categories of cognitive learning can not be established. Lower level and introductory course objectives typically focus on the first three types of cognitive learning (knowledge, comprehension and application) while upper division course objectives focus on the last three types of cognitive learning (analysis, synthesis and evaluation which are collectively referred to as "problem solving").

CATEGORY	**DESCRIPTION**
Knowledge	Ability to recall previously learned material, facts, terms, basic concepts and answers.
Comprehension	Demonstrate an understanding of facts and ideas by organizing, comparing, translating, interpreting, describing and stating main ideas.
Application	Ability to use learned material in new situations. Solve problems by applying previously gained knowledge.
Analysis	Ability to separate material into component parts and show relationships between parts.
Synthesis	Ability to put together separate ideas to form new solutions, establish new relationships.
Evaluation	Ability to judge the value of material against stated criteria.

Bloom's Taxonomy can be a useful tool when writing program and course objectives. Below is a list of performance-related verbs frequently used when assessing the six types of cognitive learning. These verbs should be used as the performance portion of a well-written objective (as in performance, condition, criteria).

CATEGORY	**PERFORMANCE ACTION VERBS**
Knowledge	Count, Define, Describe, Draw, Find, Identify, Label, List, Match, Name, Quote, Recall, Recite, Recognize, Sequence, Show, State, Tell, Write
Comprehension	Conclude, Demonstrate, Discuss, Explain, Generalize, Identify, Illustrate, Interpret, Paraphrase, Predict, Put into Your Own Words, Report, Restate, Review, Summarize, Tell
Application	Apply, Calculate, Change, Choose, Compute, Dramatize, Interview, Modify, Prepare, Produce, Put into Practice, Role-Play, Select, Show, Transfer, Use
Analysis	Analyze, Characterize, Classify, Compare, Contrast, Debate, Deduce, Diagram, Differentiate, Discriminate, Distinguish, Examine, Outline, Relate, Research, Separate
Synthesis	Compare, Compose, Construct, Create, Design, Develop, Hypothesize, Integrate, Invent, Make, Organize, Perform, Plan, Produce, Propose, Report, Rewrite
Evaluation	Appraise, Argue, Assess, Choose, Conclude, Critic, Criticize, Decide, Defend, Estimate, Evaluate, Judge, Justify, Predict, Prioritize, Prove, Rank, Rate, Select

The following are examples of **course** objectives that use Bloom's performance-related verbs and the associated category of cognitive learning (in parenthesis).

- List at least five reasons for terminating a graded exercise test (GXT). (Knowledge)

- Compare the characteristics of a muscular endurance, hypertrophy, and muscular strength resistance training program. (Comprehension)

- Administer the Modified Sit and Reach Low Back Flexibility Test and establish a flexibility fitness category. (Application)

- Utilize the American College of Sports Medicine (ACSM) Metabolic Equations to calculate VO2max given the appropriate data. (Application)

- Given the appropriate data from a sub-maximal GXT, graphically estimate VO2max. (Analysis)
- Develop an overall physical fitness program to address the measured deficits given various case scenarios. (Synthesis)

The following are examples of **program** objectives that use Bloom's performance-related verbs and the associated category of cognitive learning (in parenthesis).

- The student will be able to assess an apparently healthy individual's physical fitness and health status based on industry standards. (Analysis)

- The student will be able to prescribe and properly and adequately implement an appropriate, periodized, goal-oriented exercise program based on industry standards. (Synthesis)

- The student will demonstrate a high degree of readiness to take and successfully pass the National Strength and Conditioning Association Certified Personal Trainer (NSCA-CPT) and American College of Sports Medicine certified Personal Trainer (ACSM-cPT) certification exams by successfully completing curricular assignments and written and practical examinations based on the NSCA's *"Job Analysis Task List"* and the ACSM's *"Knowledge, Skills and Abilities".* (Synthesis)

- The student will be able to develop a business plan to start a sole proprietorship, small business as an independently contracted personal fitness trainer. (Synthesis)

- The student will demonstrate appropriate work-related behaviors as identified by the Secretary's Commission on Achieving Necessary Skills (SCANS) and professional ethical behaviors as they relate to the field of personal fitness training. (Comprehension)

Aligning Program and Course Objectives

(The Author's Viewpoint)

During the 2004 evaluation visit of Mesalands Community College, the Higher Learning Commission (HLC) indicated that program objectives and course objectives were not adequately aligned with one another. The HLC stated that course objectives did not supported program objectives and that course objectives often exceeded the program objectives identified in the Catalog. In short, program objectives tended to be un-

measureable and it wasn't clear whether assessment of the program objectives had taken place.

In order to address this situation, lead instructors/directors of the various programs at MCC will be asked to revisit the following:

1) Determine whether or not program objectives (as listed in the catalog) are measureable and well-written. (See **Writing Appropriate Program and Course Objectives**).
2) Rewrite program objectives (with the assistance of the SLAC Team) if necessary.
3) Identify <u>all</u> course objectives in each of the classes and include them in the written syllabi. Course objectives should not be limited to a minimum of two identified objectives per class. The course syllabi are MCC's contract with the student and should be specific and comprehensive as to what the student will learn in the class.
4) Align the program objectives with the various courses (and related course objectives) in which those objectives are presented, learned and/or measured.
5) Identify the measurement tools (written and practical tests and exams, research papers, projects, surveys, etc.) used to assess whether or not the program (and course) objectives have been met.

Below is an example of how program directors/lead instructors can document alignment of course and program objectives. This example is taken directly from the author's **Student Learning Assessment Summary (**when employed at Central New Mexico (CNM) Community College in Albuquerque (see below)).

The first column identifies the five program objectives a student will learn upon graduation from the Fitness Technician Program. (Note: the Fitness Technician Program is an academic program preparing individuals for gainful employment as personal fitness trainers.) These are the same program objectives that are listed in the CNM Course Catalog).

The second column identifies those measurement tools (written and practical tests and exams, research papers, projects, surveys, etc.) used to assess whether or not the program objectives have been met.

The third column lists the courses in which those program objectives are presented, learned and measured.

FITNESS TECHNICIAN (FITT)
STUDENT LEARNING ASSESSMENT
SUMMARY:

The FITT Student Learning Assessment Plan is in its tenth year and is addressed via the Plan-Do-Study-Adjust (PDSA) Cycle that begins every fall term and ends with the completion of the following summer term. This academic cycle follows one FITT cohort from first term through graduation. All Program Objectives are measured with multiple tools with the final results reported using rubrics.

PROGRAM OBJECTIVES	MEASUREMENT TOOLS	COURSES IN WHICH PROGRAM OBJECTIVE[1] IS PRESENTED &/OR MEASURED:
1) The student will be able to assess an apparently healthy individual's physical fitness and health status based on industry standards.	• Pre/Post-Test • Pre-Certification Exam • Comprehensive Case Scenario Exam • Certification Exam • Business Plan • Sports Safety Results • Comprehensive Practical Exam • Kinesiology Practical Exam • FITT Field Experience Surveys • Alumni Focus Group • Employer Focus Group • Periodized Program Design	• FITT 1503 • FITT 2492 • FITT 1010 • FITT 1071 • FITT 1570 • FITT 1072 • FITT 1572 • FITT 1575 • FITT 1098

[1] All program (and course) objectives are based on the following industry standards: 1) the *"Job Analysis Task List"* of the National Strength and Conditioning Association Certified Personal Trainer certification exam; 2) the *"Knowledge, Skills and Abilities"* of the American College of Sports Medicine Health/Fitness Instructor certification exam; 3) the *"Basic Exercise Standards & Guidelines"* of the Aerobics & Fitness Association of America Primary Certification for group fitness leaders.

2)	The student will be able to prescribe and properly and adequately implement an appropriate, periodized, goal-oriented exercise program based on industry standards.	• Pre/Post-Test • Pre-Certification Exam • Comprehensive Case Scenario Exam • Certification Exam • Comprehensive Practical Exam • Kinesiology Practical Exam • FITT Field Experience Surveys • Alumni Focus Group • Employer Focus Group • Periodized Program Design	• FITT 2492 • FITT 1010 • FITT 1071 • FITT 1570 • FITT 1072 • FITT 1572 • FITT 1575 • FITT 1098
3)	The student will demonstrate a high degree of readiness to take and successfully pass the National Strength and Conditioning Association Certified Personal Trainer (NSCA-CPT) and American College of Sports Medicine certified Personal Trainer (ACSM-cPT) certification exams by successfully completing curricular assignments and written and practical examinations based on the NSCA's *"Job Analysis Task List"* and the ACSM's *"Knowledge, Skills and Abilities".*	• Pre/Post-Test • Pre-Certification Exam • Comprehensive Case Scenario Exam • Certification Exam • Business Plan • Sports Safety Results • Comprehensive Practical Exam • Kinesiology Practical Exam • Periodized Program Design	• FITT 1503 • FITT 2492 • FITT 1010 • FITT 1071 • FITT 1570 • FITT 1072 • FITT 1572 • FITT 1575

4)	The student will be able to develop a business plan to start a sole proprietorship, small business as an independently contracted personal fitness trainer.	• Pre/Post-Test • Pre-Certification Exam • Certification Exam • Business Plan	• FITT 1071 • FITT 1572
5)	The student will demonstrate appropriate work-related behaviors as identified by the Secretary's Commission on Achieving Necessary Skills (SCANS) and professional ethical behaviors as they relate to the field of personal fitness training.	• Business Plan • Mock Interview • Comprehensive Practical Exam • Kinesiology Practical Exam • FITT Field Experience Surveys • Alumni Focus Group • Employer Focus Group • Business Plan	• FITT 2492 • FITT 1071 • FITT 1072 • FITT 1572 • FITT 1098