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Introduction

Assessment is an opportunity for Miami Dade College to determine if students know what we want them to know and if they are able to do what we want them to do, but more importantly, it’s a great opportunity to see if there are ways to improve student learning. Learning outcomes assessment is about improving the learning experience. It’s a relatively simple concept although executing the concept can be challenging. The purpose of the MDC Assessment Resource is to assist faculty and administrators in implementing program learning outcomes assessment plans and using results to improve teaching and learning. The resource emphasizes the assessment of learning outcomes at the program level, while supporting the College’s Strategic Plan Value of establishing and maintaining a “culture of inquiry and evidence that is characterized by the commitment of faculty, staff and students to accountability for learning excellence through the achievement of measureable learning outcomes, innovative assessment methods and data-driven decisions that foster adaptability in programs and services.”

Miami Dade College has established an excellent foundation and reputation for assessment through its College-wide Student Learning Outcomes Assessment (CSLOA) initiative and the efforts of the Learning Outcomes Coordinating Council (LOCC) and the Learning Outcomes Assessment Team (LOAT). Consequently, Miami Dade College has received national recognition and continues to build upon its successful assessment model.

Learning Outcomes Homepage: www.mdc.edu/learningoutcomes/
Principles of Good Practice for Assessing Student Learning

The core value behind the American Association for Higher Education’s principles of good practice for assessing student learning is the importance of improving student learning. Implicit in the principles is a vision of education that entails high expectations for all students, active forms of learning, coherent curricula, and effective out-of-class opportunities. The principles are:

- The assessment of student learning begins with educational values.
- Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time.
- Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.
- Assessment requires attention to outcomes but also and equally to the experiences that lead to those outcomes.
- Assessment works best when it is ongoing, not episodic.
- Assessment fosters wider improvement when representatives from across the educational community are involved.
- Assessment makes a difference when it begins with issues of use and illuminates questions that people really care about.
- Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change.
- Through assessment, educators meet responsibilities to students and to the public.

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http://www.academicprograms.calpoly.edu/pdfs/assess/nine_principles_good_practice.pdf
Learning outcomes at the program level describe the intended educational outcomes in terms of specific abilities, knowledge, values, and attitudes that we expect students to obtain as a result of completing a particular program of study. Before program assessment can begin, key faculty, such as the convener, assessment teams, and structures must be identified. One or more persons may lead the program assessment process, but it is crucial for faculty to share ownership for planning, implementing, and carrying out the assessment process, in addition to reviewing the results and implementing improvements. MDC uses a cyclical process for developing a program level assessment process, but this process is a fluid one.
Step 1: Identify Program Learning Outcomes

Identifying program learning outcomes requires engagement among faculty college-wide. Faculty within the program should meet to discuss the expected learning outcomes for the students who complete a particular program of study. The learning outcomes of a program describe the intended educational outcomes in terms of specific abilities, knowledge, values, and attitudes that faculty want students who have completed a program to possess.

The essential steps in developing the program learning outcomes are:

1. Describe the ideal student in the program, focusing on skills and values. While developing this description, consider the answers to these questions: What does the student know? What can the student do?

2. Consider the most significant skills and values naturally aligned with the College-wide Student Learning Outcomes.

3. Review documents that describe the program, such as the purpose statement from the Annual Effectiveness Report and College literature. Review standards offered by professional organizations in the field and accrediting agencies (if applicable).

4. Review course competencies for each course within the program. Rank the course competencies by deciding which competencies faculty find most important. Review syllabi, course assignments, and tests to assist in determining the rankings of the course competencies.

5. Synthesize the information compiled and collectively identify major skills and values that surface as a result of this process.

Once faculty have accomplished the steps for developing the program learning outcomes, it is time to write the outcomes.

Steps for Writing Measurable Learning Outcomes:

1. The **Subject** of the learning outcome statement is the student or learner:
   - The **student** will...
   - **Students** will...
   - **Students** can...

2. The **Verb** in the learning outcome statement is connected to specific cognitive, psychomotor (behavioral), or affective (attitude) domains. Selecting the appropriate verb for the outcome is extremely important. Generally, more complex forms of action verbs (higher stages/levels of Bloom’s Taxonomy) should be associated with outcomes written for the program level because students should be able to demonstrate these skills, knowledge, values, or attitudes by the end of the program. When applying Webb’s Depth of Knowledge (DOK), the depth of knowledge is not determined by the verb, but the context in which the verb is used and the depth of thinking that is required to complete the assignment. Faculty can review the resource links to learn more about Bloom’s
Taxonomy and Webb’s Depth of Knowledge. The table below illustrates what faculty may consider when selecting a verb from Bloom’s Taxonomy.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Learning Stage/Level</th>
<th>Verb</th>
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<tbody>
<tr>
<td>Cognitive</td>
<td>Evaluation</td>
<td>Appraise</td>
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<tr>
<td>Psychomotor/Behavioral</td>
<td>Precision</td>
<td>Reproduce</td>
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<tr>
<td>Affective/Attitude</td>
<td>Value</td>
<td>Justify</td>
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When selecting the action verb, use a concrete verb. A common misstep is the use of understand. How would you measure that a student understands? In order to observe or evaluate a student’s understanding, the student needs to perform some type of action, so instead of using the word, understand, select a verb that allows you to measure understanding. A concrete verb also makes it clear to students what they are expected to do.

3. The **Object** of the learning outcome statement is the skill, content knowledge, or value being addressed as part of the course, program, or unit. For example, one object of a program learning outcome statement for the Associate in Science degree in Electronics and Computer Engineering Technology might be a student’s ability to **design analog electrical circuits**.

These three steps are combined to form the learning outcome, for example:

\[
\text{Subject} + \verb + \text{Object} = \text{Learning Outcome}
\]

**Example program learning outcomes:**

Students will:
- Design analog electrical circuits. (Electronics & Computer Engineering Technology)
- Describe the functions of the major divisions of a modern business. (Financial Management)
- Describe techniques used in recording initial family contact information, completing funeral arrangements, and conducting funeral or memorial service (Funeral Services)

**Resources**

- Appendix A: Writing Learning Outcomes Worksheet
- Florida Curriculum Framework: FLDOE Career and Technical Edu. Programs
- Webb’s Depth of Knowledge: DOK Levels
- Old Dominion University: Bloom’s Taxonomy
- Verbs: List of Appropriate Action Verbs
- Verbs: Course Competency Guidelines: Verb List (Pgs. 5-7)

**Step 2A: Select and Design Assessment Measures**

Faculty within the program determine how to assess the outcomes and what targets and benchmarks they will use to determine success. Prior to implementing the assessment measure, faculty should think about what they want to find out from the assessment process, for example, does the program meet or exceed standards; does the program do a good job at what it sets out to do; and how can the program experience be improved (Volkwein, 1996).

When selecting appropriate measures, faculty determine what evidence will assure that students are achieving the skills, knowledge, and values important to the program. This moves the assessment process from a focus on intended results identified in the program learning outcomes to the level of achieved results. Many measures can evaluate the outcomes for learning, but it is
recommended not to depend on a single measure to provide data about what and how well students are learning. Just as students learn in different ways, students respond differently with various evaluation methods. Using varied measures over time more accurately supports change and an increase in learning. Varied measures include output and progress measures. *(Adapted from Kent State University)*

Examples of output measures are: number of students who complete degree, number of students graduating on time, graduation rates, and job placement. Examples of progress measures are: successfully completed credit hours, retention, persistence, and attrition. By using varied measures, a program can be more decisive about analyzing and summarizing the assessment results.

Assessment measures are categorized as direct and indirect. Direct measures gather evidence, based on student performance, which demonstrates the learning itself. Indirect measures gather insight about the learning or secondary evidence of student mastery.

**Examples of Direct Measures include:**
- Tests of most any type
- Capstone course assignments/projects
- Pre-test/post-test assessment
- Case Studies
- Course-embedded questions and assignments
- Portfolios
- Essays
- Research projects
- Video and audio taped presentations

**Examples of Indirect Measures include:**
- Alumni Surveys
- Employer Surveys
- Graduating Seniors and Graduates Surveys
- Student Satisfaction Surveys
- Focus groups
- Interviews (faculty members, graduating students, alumni)
- Curriculum mapping
- Syllabus analysis
- Course progression and subsequent success
- Transfer students’ success in subsequent courses
- Job placement rates
- External/Expert review

Faculty primarily utilize direct measures at the course and program levels, but faculty can also use indirect measures to supplement their direct measures. After designing the measure(s), determine what standards or levels of performance are expected from students in the program course sequence. Faculty determine if there are existing measures within the program that can be used or tweaked in addition to designing measures that reflect the significance of the learning outcome. By using the strategy of selecting an existing assignment, activity, or test, faculty eliminate the need to create additional measures. Some of the high-impact practices identified by Liberal Education and America’s Promise (LEAP) initiative are capstone projects and collaborative assignments, which several MDC faculty already incorporate.
Step 2B: Develop Criteria for Success

Once the program has selected the type of measure it plans to use, faculty decide what criteria will be used to determine student success and mastery of the outcome the measure is assessing. Developing criteria for success is an integral part of the process, and some of the most popular measures developed by MDC faculty require the use of a rubric or test blueprint. This section provides an overview of rubric construction and test blueprinting.

Rubric Construction

A rubric is not an assessment measure, but it is included as part of Step 2 of the MDC assessment resource because several of the measures developed by MDC faculty, such as capstone assignments, case studies, evaluation portfolios, essays, research projects, and presentations, are assessed by a rubric. To effectively assess these types of measures, it is important to understand how to construct a rubric and the common types of rubrics. A rubric is a scoring guide or scale that facilitates reliable judgments about student work and is a primary instrument used to assess many forms of authentic direct measures. Rubrics help faculty set anchor points along a consistent standard so they can define reasonable and appropriate expectations for students and consistently judge how well students have met the expectations. Rubrics can also be very useful in communicating expectations to students about how to demonstrate attainment of learning outcomes when provided in advance of instruction and/or the assignment. There are many rubrics available online, so faculty do not have to “reinvent the wheel.” Faculty may collaboratively develop rubrics within the program or modify existing rubrics. Many good examples can be found on the Internet.

Common types of rubrics are analytic, holistic, and checklist. An analytic rubric provides specific feedback about several dimensions or categories; whereas, a holistic rubric provides a single rating or score based on an overall impression of a student’s performance on a task. A clearly defined checklist is a type of rubric. Faculty may use a checklist to assess the learning demonstrated by a student through an observed activity or an artifact created, such as a science lab, drawing or presentation. A checklist rubric does not determine how well a student completed a task, but it determines whether or not the task was completed. Naturally, each has its advantages and disadvantages. Faculty determine which type of rubric is most appropriate for the learning outcome(s) being assessed:

- **Analytic** rubrics work best when faculty want:
  - Detailed feedback about specific aspects of students’ work or criteria of the task
  - To see relative strengths and weaknesses among various aspects of the outcome being measured
  - To assess complicated skills or performance that requires more detailed ratings
  - Students to self-assess their performance
- **Key advantage:** more detailed feedback for faculty and students and scoring more consistently across students and graders
• **Key disadvantage:** generally more time consuming to develop and use for scoring than holistic rubrics

• **Holistic** rubrics work best when faculty want:
  o A quick snapshot of achievement
  o A single category to define acceptable quality
  o An overall rating of students’ performance on interrelated criteria

• **Key advantage:** quick scoring and provides an overview of student achievement

• **Key disadvantage:** does not provide detailed feedback on students’ strengths or weaknesses and can be difficult to assign scores consistently

• **Checklist** rubrics work best when faculty want:
  o To look for something specific, for example, requiring a student to use 3 sources when researching
  o To assess performances or achievements that distinguish between two types of responses, for example, yes or no

• **Key advantage:** quick scoring and require little training

• **Key disadvantage:** does not address the quality of the work or does not easily inform faculty what to do with partial student performance or achievement

**These steps provide guidance to develop rubrics for direct or indirect measures:**

**Step 1: Reflecting.** We reflect on what we want from the students, why we created this assignment, what happened the last time we gave it (if applicable), and what our expectations are for students’ performance.

Ask the following questions:

1. How does the assessment measure relate to what you are teaching?
2. What skills will students need to have or develop to successfully complete this assignment?
3. What have you asked the student to achieve in the assessment measure?
4. What evidence can students provide in the assignment that would show they have accomplished what the program hoped they would accomplish?
5. What are the highest expectations you have for student performance on the assessment measure?
6. What is the worst fulfillment of the assessment measure the program can imagine, short of simply not turning it in at all?

**Step 2: Listing.** We focus on the particular details of the assignment and what specific learning outcomes we hope to see in the completed assignment what you expect the student to learn or gain by completing the assessment measure.

The starting point for this list should be Questions 2, 3, 4 from Step 1: Reflecting. These questions focus on the skills required, the nature of the task, and the types of evidence of learning. Once you have the list, you can add a description of the highest level of performance you expect for each of the items on the list. These items will assist in the descriptions of the dimensions (criteria) later.
Step 3: **Grouping and Labeling.** We organize the results of our reflections in Steps 1: Reflecting and 2: Listing, grouping similar expectations together in what will become the rubric dimensions.

Complete the following:

- Read through list of performance expectations from Step 2: Listing
- Group together items that are related
- Determine what is common across the groups and label each group accordingly
- Label each group based on the name of the dimension that will appear in the rubric

Step 4: **Application.** We apply the dimensions and dimension descriptions (criteria) from Step 3: Grouping and Labeling to the final form of the rubric. The rubric template link under **Resources** provides a variety of templates for the program to insert its rubric information.

*Steps adapted from Dannelle Stevens and Antonia Levi*

**Resources:**

- **Appendix B:** Example Analytic Rubric
- **Appendix C:** Example Holistic Rubric
- **Appendix D:** Example Checklist Rubric
- **AAC&U:** Value Rubrics
- **Rubric Templates:** Stylus: Intro To Rubrics
- **Evaluating Rubrics:** Criteria for Evaluating Rubrics

**Test Blueprint**

A test blueprint allows faculty to map results of test items back to program learning outcomes and gather information that is more likely to lead to improvements. The test blueprint represents good practice when faculty are writing objective tests. Through test blueprinting, faculty can track the cognitive challenges for individual test items, for example, demonstration of knowledge compared to the ability to analyze.

**These steps provide guidance for a test blueprint:**

**Step 1:** List the program learning outcomes the test will cover.

**Step 2:** Decide what percentage of the entire exam will be dedicated to measuring each outcome. The percentages assigned should reflect their importance to the program learning outcome.

**Step 3:** Determine what types of test items will most effectively measure the program learning outcome (multiple-choice, true-false, matching, fill-in-the-blank, etc.) Be sure to consider whether the type of test item will create an appropriate cognitive challenge.

**Step 4:** Determine how many test items you want to include in order to measure the learning outcomes. Make sure the number of items is proportional to the importance of the learning outcomes.

**Step 5:** Determine how each test item will be weighted.

**Step 6:** Write the test questions or select from a test bank and indicate the cognitive level.
Step 7: List the question numbers that will measure each program learning outcome. Some test items may measure more than one program learning outcome.

Step 8: Before finalizing the test, review the exam with the following questions in mind:
   a. Do the items follow the test blueprint?
   b. Are the formats and content appropriate for the learning outcomes being assessed?
   c. Are the items at an appropriate reading level?
   d. Are the items of appropriate difficulty?

Steps adapted from L.M. Stallbaumer-Beishline, Bloomsburg University of Pennsylvania

Resources
Test Blueprinting: Outcomes Assessment Essentials
Appendix E: Test Blueprint Template

Step 3: Plan for Data Collection & Implement Measure

Effective implementation of the assessment measure is essential to the success of MDC’s assessment process. When planning for data collection, faculty, such as the faculty convener and program assessment team, with input from faculty college-wide, should consider some standard questions for information gathering—Who will be assessed and what will be the sample size; who will collect the data; when will the measures be administered; how will they collect the data; where and how will the data be stored; and what do faculty plan to do with results. By keeping these questions in mind, the program would have successfully planned how they will collect the data, so when the assessment measure is implemented and compiled, faculty can begin to analyze the data to see what the results reveal about student learning.

A description for collecting data is provided for each of the most popular assessment measures used at Miami Dade College:

- **Tips for collecting data from scantrons**
  Students answer faculty-developed questions using a scantron answer sheet. After scanning, the scanner software performs an item analysis on each of the questions. The faculty review the item analysis report and discuss the findings per question. Prior to implementing the assessment measure, the program should locate a scanner that they can use to score and produce the item analysis. Since multiple campuses will participate in the assessment, it might be most helpful to locate a scanner on one campus where all scanning can be done. Many departments have scanners that could serve this purpose. If not, the department chairpersons can help to find a scanner or scanning services in another academic area or in the campus testing departments.

- **Tips for collecting data from Optimal Resume E-folio**
  Faculty may consider using the E-folio function provided by Optimal Resume, to which the College subscribes. The portfolio builder helps students create an online gallery of their work that can be displayed as a page on their Optimal Resume website, shared as a link, or downloaded as a zipped file. Students can easily share their portfolio with others using the “share” button. Faculty would then work together to rate a sample of portfolios or written artifacts using a rubric developed for that purpose. Rubric ratings would be compiled to provide an overall report on students’ work so faculty can review, discuss, and use the results to make appropriate changes aimed at improving teaching and learning.
• **Tips for collecting data from course artifacts**
  Assignments that are embedded into courses can be systemically collected by the program. For example, a program may develop a writing assignment or tweak an existing writing assignment to use as the direct measure. Incorporating a writing assignment as the assessment measure can be handled in different ways. For example, if faculty use a writing assignment that is locally designed and embedded in the course, the faculty would grade the assignment as part of their course requirement and then the same writing assignment could be selected as part of the sample for the program learning outcome. Handling the assessment process this way avoids faculty requiring students to complete additional work for the course, while not infringing on the faculty’s ability to determine what percentage or value the writing assignment earns in the course.

• **Tips for collecting data from learning educational software**
  Faculty may want to consider some of the software or online programs they currently use within their programs. Some of the ones currently used at the College are MyMathLab and MyFoundationsLab by Pearson, Criterion by ETS, and EZ Test Online by McGraw Hill. These programs allow faculty to embed questions in existing tests or develop new tests; the test questions may be developed by faculty or come from the publisher’s test bank. The test format can be multiple-choice, open-ended, or essay. After completing the test, each program has a reporting feature, so faculty can export the information to use for their program learning outcomes assessment process. Some of the reporting features vary, so it is important to speak with the publisher representative in the early stages of planning if a program decides to use this type of technology to facilitate the assessment process.

• **Tips for collecting data from survey software**
  Surveys are usually designed as indirect measures and should be used in conjunction with a direct measure. Surveys can be used to gather information about students’ opinions of the course content or self-assessments of their abilities related to the program/discipline outcomes. Qualtrics online survey software is used widely at the college and provides immediate access to compiled responses. In addition, faculty may want to consider some tools available via the Internet, such as Poll Everywhere. Poll Everywhere is a simple application that works well for live audiences using mobile devices like phones. People participate by visiting a fast mobile-friendly web page for your survey or co-curricular activity, sending text messages, or using Twitter. Instructions are displayed on-screen. Both Qualtrics and Poll Everywhere have reporting features, so faculty can export the information to analyze. There are several types of survey questions, such as open-ended, close-ended, partial open-ended, scaled, and ranking; therefore, the approach to using the results will vary. The most common types of survey questions used at MDC are close-ended and scaled. Close-ended surveys are generally multiple-choice or yes/no. Scaled surveys determine the degree of the student’s opinion, for example, strongly agree, agree, and so forth. For example, if a program incorporated a close-ended question survey, faculty would look at the response rate for each answer of each survey question. Based on the questions being asked, faculty have pre-determined acceptable targets for the appropriate answer for each survey question and will compare these targets with the results. Based on this information, the survey, in conjunction with the selected direct measure, may impact courses, the program, and instruction.
• **Tips for collecting data through word analysis**
  Student focus groups provide a structured environment for groups of students to respond to specific open-ended questions designed to collect data about their beliefs, attitudes, and experiences. This indirect measure can be used to complement the program’s direct measure. Focus groups may provide a wide variety of qualitative data that can be easily understood and used. To analyze and report information collected through focus group notes, faculty would identify prominent themes or topics that surface from the students’ responses, which may impact courses, the program, and instruction.

• **Tips for collecting data from curriculum mapping**
  Curriculum mapping charts learning outcomes across courses and co-curricular activities. The maps then provide assurance to program faculty and the college that students will have ample opportunities to attain the expected outcomes. The maps assume that students will take specific sequences of courses if enrolled in specific programs.

An integral part of planning for data collection is selecting a sample because it provides the evidence that faculty need. An important question to consider is: “How much evidence is enough?” Collect enough evidence to feel reasonably confident that you have a representative sample of what your students have learned and can do (Suskie, 2009). Programs can contact the Office of Learning Outcomes Assessment for help determining an appropriate sample size for the assessment. More information about sampling and sampling techniques is below:

**Sampling** is the process of selecting units from a population of interest. When considering sampling, it is helpful to think about whom you want to assess through the selected measure. For example, the sampling may be students from a program or students who participate in an event or a college sponsored initiative. By studying a sample, the program is able to fairly generalize the results back to the student population from which the sample was drawn.

There are several reasons why selecting a sample to assess the program is appropriate:

- The population of students (i.e. every student enrolled in a particular program) may be too large to analyze every single one.
- Available resources (such as funding staff time, etc.) may not be sufficient to conduct analysis on the entire population.
- A desire to focus the analysis to a particular group within the population; for example, Honors College students within the program/discipline.
- Most often both of the limitations stated above (student population and resources) are present.

To determine the sample used by the program to assess the learning outcomes, there are two types of sampling: **probability sampling** and **non-probability sampling**.

**Probability sampling** ensures that all students in the population have the same chance of being selected in the sample. This type of sample is preferred since it should be adequately representative of the total population, allowing us to assume that results reflect the ability level of the total group. **Simple random sampling** is when each student selected for the assessment process is chosen randomly and entirely by chance. A variation of this method is systematic sampling that might choose every 20th student from a list of all students or every third section of the class; for example, a list is generated of a course offered at each campus; the third section on each campus’s list is selected to participate in the assessment process. This list does not...
distinguish between a face-to-face and a virtual class, nor does it distinguish between full time
and part time faculty. *Stratified random sampling* divides students into subgroups before
sampling; for example, each campus becomes the subgroup and students/classes are selected
from each campus.

**Non-probability sampling** does not involve random selection. The most common type of non-
probability sampling is *convenience sampling*. A *convenience sample* is a subset of students
chosen based on easy access or availability, such as every student who participates in a co-
curricular activity or is enrolled in courses taught by volunteer faculty; for example, a discipline
that incorporates a great deal of service learning activities through a partnership with MDC’s
Institute for Civic Engagement and Democracy may use this student population as a subset to
assess a learning outcome related to civic and social responsibility. Also, some disciplines may
solicit faculty to volunteer to participate, which may yield an appropriate sample size, but if not,
the other sampling methods may be used as well. While convenient, non-probability samples do
not always adequately reflect the general population, making it more difficult to assume that
assessment results reflect the ability level of all of the students. For example, students who
participate in a co-curricular activity may be especially motivated to do well and not be the
“typical” student enrolled in the course.

When it comes to sampling, the most common question asked by programs is: “How big should
the sample size be?” There is no hard or fast answer for this question; however, the program may
consider this formula when making the determination:

- **Confidence interval**: (also called margin of error) is the plus-or-minus figure usually
  reported in newspapers or television opinion poll results. For assessing student learning
  outcomes, an acceptable margin of error is often as high as 10.
- **Confidence level**: tells you how sure you can be. It is expressed as a percentage and
  represents how often the true percentage of the population who would pick an answer lies
  within the confidence interval. For assessing student learning outcomes, the confidence
  level is typically between 90%-95%.

Another approach to selecting a sample size is to consider the type of assessment being used.
Generally, a larger sample is better as long as the sample adequately reflects the population, but
a large sample may not be feasible for certain assessment measures. For example, if a program is
using a departmental exam that is completed on a scantron, then it is probably easier to use all
results from the student population because the exams will be graded by a scanner. However, if
the program has a team of faculty assessing a portfolio using a rubric, then a smaller sample will
suffice given the time expended in rating the portfolio.

*The same standard of sampling for the assessment of student learning outcomes is not
the same standard for sampling in a research study for a new medicine; therefore, a
relatively small sample of student artifacts selected to assess program student learning
outcomes can still be reliable and valid for the purpose of improving student learning.*

In the context of assessment, reliability may be determined by whether or not the assessment
measure can be duplicated, and validity may be determined by the extent to which an
assessment measure provides evidence of learning related to the intended outcomes.
There are numerous calculators available via the Internet to determine a sample size based on the confidence interval and confidence level. The program may also contact Institutional Research for help in determining sample size and selecting the sample.

**Step 4: Analyze Data**

During this step, faculty, such as the faculty convener and program assessment team, discuss what the assessment data mean. This step is one of the most challenging, so there is a natural tendency to focus on the limitations of an assessment measure or the sampling method. Even though limitations may be inherent in all assessment measures, faculty can be proactive by following Steps 1-3 of the assessment process and by engaging faculty college-wide. Data analysis can occur by: tallying—counting how many students earned each rating or chose each option; using percentages, which are easier to understand than raw numbers; aggregating—summarizing results in overall scores; and by using averages to summarize the central tendency. Institutional Research and the Office of Learning Outcomes Assessment can serve as resources to assist in the analysis.

Some of the best ways to analyze and interpret assessment information is by:

- Presenting data in relation to identified learning outcomes
- Selecting and using appropriate procedures for data analysis
- Using qualitative and quantitative methods to present a well-balanced picture of the program
- Keeping in mind the audiences who will access and use the data
- Varying the analysis and reporting procedures according to the identified audience
- Preparing written statements that identify and elaborate on the pros and cons of the academic program
- Developing recommendations based on analysis of data

To analyze the data, the following discussion questions may guide the conversation about what the data mean. These questions address the integral components of the assessment plan. Once these questions are asked and answered, faculty share and use the results.

**Discussion Topics and Questions for Analysis:**

**Learning Outcomes:**

- Did the program learning outcomes that were assessed describe the kind of cognitive thinking, skills, or behaviors the program feels all successful students should take away from the program?
- Were students made aware of these learning outcomes prior to the assessment, and if so, how?

**Resources**

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Assessment Instrument:
- Did the student performance on the assessment assignments or questions provide strong information about how well students achieved the learning outcomes?
- Were the assessment assignments or questions clearly worded?
- Do classroom experiences align with or support the intended learning outcomes and the assessment?

Assessment Rubric:
- If a scoring rubric was used for assessment questions that were close-ended (i.e., multiple choice), was the rubric clear and easy to apply?
- Did the rubric adequately reflect the standards your discipline adheres to?

Assessment Process:
- Was communication about the expectations of the process clear and early enough to all faculty who participated in assessment implementation?
- Was the assessment administered with reasonable uniformity across all sections (i.e., approximately the same timeframe of the term and similar explanations to students).

Assessment Results:
- What do the assessment results say about how well students achieve the intended learning outcomes?
- Are there new or different things that the program thinks would be worth trying that might improve future results?

Overall Strengths:
- What general strengths or positive observations arise from the assessment process?
- What results or observations should be acknowledged as strengths?

Overall Concerns:
- What concerns are raised by the results?
- What concerns are raised by the assessment process?

Questions adapted from Montgomery College

Resources
Appendix F: Analyzing the Data Activity

Step 5: Use Results to Improve Student Learning

Once the assessment team of faculty meets to discuss and analyze the data, the results and information gained should be shared and distributed to the faculty college-wide to obtain their ideas on how to improve student learning. Faculty should consider collectively implementing changes based on the decisions made during the analysis of the data.

After faculty have reviewed the assessment data and identified likely factors that led to these results, this information should be used to make program-related, curriculum, and assessment decisions aimed at improving student learning and teaching. Faculty pool their collective wisdom to make decisions based on results.
The key to using the results effectively is to make appropriate decisions based on the answers to questions asked about the assessment measure implemented. The questions will depend on whether the assessment measure is direct or indirect. After collecting and analyzing the data using the guiding questions from Step 4: Analyze Data, faculty may apply these questions in developing strategies to use the results. Using assessment results is synonymous with the phrase “closing the loop”:

**Results from a direct measure will answer:**
1. What does the student know versus what the program intends the student to know? (Cognitive)
2. What does the student do versus what the program expects the student to be able to do? (Skills)
3. What does the student care about versus what the program intends the student to care about? (Affective)

**Results from an indirect measure will answer:**
1. What does the student report she knows versus what the program thought the student’s perception would be? (Cognitive)
2. What does the student report he can do versus what the program intended for the student to be able to do? (Skills)
3. How does the student respond to questions dealing with program impact on the student’s values versus how the program intended to impact the student’s values (Affective)

The descriptors after each question (cognitive, skills, and affective) connect to the beginning of the program learning outcomes assessment process. The first step in developing a learning outcome for the program learning outcomes assessment process is to describe the ideal student in the program, focusing on skills and values. While developing this description, consider the answers to these questions: What does the student know (cognitive)? What can the student do (skills)? What does the student care about (affective)? This type of connection can be found throughout the major steps of the assessment process. A program’s ability to use the results hinges on the effectiveness of the learning outcomes; the selection and design of the assessment measures; the plan for data collection and implementation of the measures; and the analysis of the data.

After answering the using the results question that applies to the appropriate measure and descriptor, the program can begin to develop strategies to “close the loop.” Examples for “closing the loop” are: address gaps in curriculum; vary teaching strategies and methods; review course(s) learning outcomes; increase student exposure in the area addressed in the outcome; revise the assessment process; and/or offer targeted professional development and training for faculty. To make using the results more tangible, here is an example from an Associate in Science program. To ensure the MDC assessment resource example parallels the information required for the College’s annual effectiveness report, the program would provide this type of information:

**Outcome:** Students will write in a unified, coherent, and effective manner.

**Measure:** A written report (direct measure) assigned in the FIL 2560 (Editing Level III) course of the Radio and Television Broadcasting Technology program.
Details: Prior to implementation, the assessment team for the Radio and Television Broadcasting Technology program with input from faculty college-wide designed the written report assignment. Faculty members could use the industry topic of their choice, but faculty determined what elements of the assignment needed to be consistent to use the rubric. The program assessment team decided to implement the assessment through a systematic sampling approach which selected every 2nd student on each FIL 2560 course roster.

Acceptable Target: 80% of students in FIL 2560 (Editing Level III) will earn a minimum rating of 3 in each of the rubric dimensions. (3-level, analytic rubric)

Ideal Target: 85% of students in FIL 2560 (Editing Level III) will earn a minimum rating of 3 in each of the rubric dimensions. (3-level, analytic rubric)

Results: The Fall data indicate the overall percentages of students who earned 3 for each of the rubric dimensions are: purpose and audience 71%, organization/logic 62%, development 52%, writer's authority 69%, and readability 51%. The Spring data indicate that the overall percentages of students who earned 3 for each of the rubric dimensions are: purpose and audience 73%, organization/logic 80%, development 49%, writer's authority 72%, and readability 53%.

Use of Results: After reviewing results for both terms, faculty decided all dimensions needed to be addressed at some point, but for the next assessment year, emphasis would be placed on the two dimensions with the lowest percentages (Development and Readability). The instructional approach was a collaborative effort. Faculty provided various supplemental exercises and activities that they would incorporate during the next term. Faculty could use their individual instructional style and select the most appropriate exercises for their classes.

This example for the Radio and Television Broadcasting Technology program can be linked directly to “using the results” question for a skill: what does the student do versus what the program expects the student to be able to do? The faculty expected at least 80% of the students to earn at least a rating of 3 (proficient) on each of the rubric dimensions. Since the student sample did not meet faculty expectations, faculty need to explore possible reasons for the results. Faculty can refer to their responses from the guiding questions in Step 4: Analyze Data to assist in determining why students did not perform as anticipated.

As the experts, faculty can determine how to use the results once the results have been carefully analyzed and discussed. Some of the common approaches to “close the loop” are to:

- Address gaps in curriculum
- Enhance teaching pedagogy and strategies
- Review course(s) competencies
- Increase student exposure in the area addressed in the program learning outcome
- Revise the assessment process
- Offer faculty professional development and training
The MDC assessment resource focuses on the five-step cyclical process required for effective program learning outcomes assessment. Program faculty can use this resource to improve teaching and learning and foster conversations that focus on student success.

**Resources**

HigherEdAssessment.com: [Internet Resources for Higher Education Outcomes Assessment](https://www.higheredassessment.com/internet-resources-for-higher-education-outcomes-assessment)
Assessment Terms

**Artifacts:** An object produced to indicate mastery of a skill or component of knowledge. It is often stored for future use.

**Assessment:** An ongoing process aimed at understanding and improving student learning. It involves: (a) making our expectations explicit and public; (b) setting appropriate criteria and public; (c) systematically gathering, analyzing, and interpreting evidence to determine how well performance matches those expectations and standards; and (d) using the resulting information to document, explain, and improve performance.

**Assessment Tool:** Instrument used to measure the characteristic or outcome of interest. It is the tool used to implement part of a larger assessment plan.

**Authentic Assessment:** An assessment approach that has been designed to provide a realistic task, simulation, or problem related to that attribute or performance being measured. It engages students in challenges that closely represent what they are likely to face as everyday workers and citizens.

**Criterion/Criteria:** A standard for judging how well or to what degree something has been learned.

**Direct Assessment:** Gathers evidence, based on student performance, which demonstrates the learning itself. Can be value-added, related to standards, qualitative or quantitative, embedded or not, and can use local or external criteria.

**Embedded Assessment:** A means of gathering information about student learning that is built into the teaching-learning process or is a natural part of the teaching-learning process.

**External Assessment:** Use of criteria or assessment instrument developed by an individual or organization external to the one being assessed.

**Indirect Assessment:** Gathers reflection about the learning or secondary evidence of its existence.

**Learning Outcome:** Learning outcomes are statements that indicate what is expected that the student will be able to do upon completion of an activity, course, program, or degree.

**Local Assessment:** Are methods developed by college’s faculty, based on teaching and learning goals.

**Portfolio:** Compilation of evidence demonstrating a level of development of essential competencies and the achievement of specific learning outcomes. The portfolio serves as a tool for both formative and summative assessment. A portfolio is a repository of professional and/or academic work.

**Target:** Indicates the desired level of performance. The target will be expressed in percentages. “Acceptable Target” is what you would still be satisfied with. “Ideal Target” is what you would be happy with while still being realistic.
Appendices

Appendix A: Writing Learning Outcomes Worksheet

Step 1: Decide what student learning outcome you want to measure.

Step 2: Think through your student learning outcome. Include the following:

A. Who will be assessed?
B. What is the appropriate action verb?
C. What course, program, initiative, special activity, or service is being assessed?
D. How is the outcome being measured?
E. What is the timeline for measuring the outcome?

Step 3: Write the learning outcome:

Step 4: After writing the learning outcome, evaluate the learning by answering these questions with Yes or No (Y/N) or with detail if needed:

1. Does the outcome describe what the faculty/staff intend for students to know (cognitive), think (affective), or do (behavioral)? (Y/N)

2. Is the outcome important or worthwhile? (Y/N)

3. Is the outcome:
   A. Detailed and specific? (Y/N) How? ________________________________
   B. Measurable? (Y/N)

4. Can an activity be created to enable students to learn the desired outcome? (Y/N)

5. Can the outcome be used to make decisions on how to make improvements? (Y/N)

Adapted from Gail Short Hanson
**Appendix B:**

**Example: 3 Level Analytic Rubric**

<table>
<thead>
<tr>
<th>Writing Convention: Rhetorical Negotiation of:</th>
<th>3—Proficient</th>
<th>2—Competent</th>
<th>1—Developing</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose and Audience</strong>&lt;br&gt;Given the purpose and audience...</td>
<td>The written text effectively expresses the student’s purpose and effectively addresses audience concerns. Readers are definitely persuaded to consider the text’s ideas.</td>
<td>The written text expresses the student’s purpose and addresses some audience concerns. Readers are probably persuaded to consider the text’s ideas.</td>
<td>The written text vaguely expresses the student’s purpose and/or gives little attention to audience. Readers are confused and/or insulted and are not persuaded to consider the text’s ideas.</td>
<td></td>
</tr>
<tr>
<td><strong>Organization/Logic</strong>&lt;br&gt;Given the purpose and audience...</td>
<td>The written text demonstrates a logical arrangement of paragraphs, a logical use of transitions between paragraphs, and a logical organization of ideas within paragraphs. The organizational logic enhances a reader’s understanding of the text’s ideas.</td>
<td>The written text demonstrates a generally clear arrangement of paragraphs, a generally clear use of transitions between paragraphs, and a generally clear organization of ideas within paragraphs. The organizational logic assists a reader’s understanding of the text’s ideas.</td>
<td>The written text demonstrates a confusing arrangement of paragraphs, a formulaic use of (or lack of) transitions between paragraphs, or a confusing arrangement of ideas within paragraphs. The disorganization makes it difficult for a reader to understand the text’s ideas.</td>
<td></td>
</tr>
<tr>
<td><strong>Development</strong>&lt;br&gt;Given the purpose and audience...</td>
<td>The written text effectively employs reasons and evidence—i.e., all reasons support the text’s purpose, and specific evidence supports all reasons.</td>
<td>The written text adequately employs reasons and evidence—i.e., most reasons support the text’s purpose, and specific evidence supports most reasons.</td>
<td>The written text employs some faulty reasons or inappropriate supporting evidence—i.e., most reasons do not support the text’s purpose, and/or specific evidence is not provided for most reasons.</td>
<td></td>
</tr>
<tr>
<td><strong>Writer’s Authority</strong>&lt;br&gt;Given the purpose and audience...</td>
<td>The writer’s voice in the text demonstrates a comprehensive understanding of the content and a personal engagement with the content (via the writer’s ideas, values, and beliefs). Readers perceive this textual voice as trustworthy.</td>
<td>The writer’s voice in the text demonstrates a general understanding of the content and some personal engagement with the content. Readers perceive this textual voice as mostly trustworthy.</td>
<td>The writer’s voice in the text demonstrates neither understanding of the content nor personal engagement with the content. Readers perceive this textual voice as untrustworthy.</td>
<td></td>
</tr>
<tr>
<td><strong>Readability</strong>&lt;br&gt;Given the purpose and audience...</td>
<td>The written text contains few or no errors in spelling, grammar, punctuation or sentence structure, and the style is effective.</td>
<td>The written text contains some errors in spelling, grammar, punctuation, or sentence structure, but these errors do not interfere with comprehension; and the style is appropriate.</td>
<td>The written text contains numerous errors in spelling, grammar, punctuation, or sentence structure that interferes with comprehension, and/or the style is inappropriate.</td>
<td></td>
</tr>
</tbody>
</table>

*Adapted from Central Carolina Community College*
Appendix C: Example: Holistic Rubric for Critical Thinking

4 Consistently does almost all of the following:
- Accurately interprets evidence, statements, graphics, and questions
- Identifies the salient arguments (reasons and claims), pros and cons
- Thoughtfully analyzes and evaluates major alternative points of view
- Draws warranted, judicious, non-fallacious conclusions
- Justifies key results and procedures, explains assumptions and reasons
- Fair-mindedly follows where evidence and reasons lead

3 Does most or many of the following:
- Accurately interprets evidence, statements, graphics, and questions
- Identifies the salient arguments (reasons and claims), pros and cons
- Analyzes and evaluates major alternative points of view
- Draws warranted, judicious, non-fallacious conclusions
- Justifies some results and procedures, explains reasons
- Fair-mindedly follows where evidence and reasons lead

2 Does most or many of the following:
- Misinterprets evidence, statements, graphics, and questions
- Fails to identify strong, relevant counter-arguments
- Ignores or superficially evaluates obvious alternative points of view
- Draws unwarranted or fallacious conclusions
- Justifies few results and procedures, seldom explains reasons
- Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions

1 Consistently does almost all of the following:
- Offers biased interpretations of evidence, statements, graphics, questions, or the points of view of others
- Fails to identify or hastily dismisses strong, relevant counter-arguments
- Ignores or superficially evaluates obvious alternative points of view
- Argues using fallacious or irrelevant reasons, and unwarranted claims
- Does not justify results and procedures, nor explains reasons
- Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions
- Exhibits closed-mindedness or hostility to reason

Adapted from UC, San Francisco
Appendix D: Example: Checklist Rubric

<table>
<thead>
<tr>
<th>Expectations for Oral Presentation:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student introduced him/herself prior to starting the presentation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student explained why the topic was selected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student stated the thesis/purpose of the presentation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student presented three points of support for the thesis/purpose of the presentation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The structure of the presentation was logical and smooth.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student made eye contact with the audience.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student varied voice throughout the presentation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student used at least one form of multimedia during the presentation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student provided a handout for the audience.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student did not have any grammatical errors on the handout.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student acknowledged a minimum of 3 secondary sources but no more than 5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student restated the thesis/purpose of the presentation in the conclusion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student ended presentation with a closing statement versus ending abruptly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student met the length requirement for the presentation (3-5 minutes).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix E:

## Test Blueprint Template

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Learning Outcomes (list PLOs tested on individual exam; if broadly phrased, include topics, themes, concepts)</td>
<td>Percentage of Test Dedicated to Measuring the PLO (Column must total 100%)</td>
<td>Type(s) of Test Items to Measure the PLO (Multiple-choice, true-false, ordering, fill-in-the-blank, short answer, Likert scale, etc.)</td>
<td>Number of Questions for Each Item Type &amp; Item Weight (item weight here is expressed in point values)</td>
<td>Indicate Level of Cognition (e.g. knowledge, comprehension, application, analysis, synthesis, evaluation or use levels of Webb’s Depth of Knowledge)</td>
<td>List Question Numbers for Each PLO (some test items may measure more than one PLO)</td>
<td>Percentage of students who answered correctly (use to reflect upon learning, teaching and outcomes assessment reporting)</td>
</tr>
</tbody>
</table>

Adapted from L.M. Stallbaumer-Beishline, Bloomsburg University of Pennsylvania
Appendix F: Analyzing the Data Activity

Program Learning Outcome: The Associate in Science program for Music Business has identified five program learning outcomes (listed below). In addition to the faculty developing a capstone project to assess the program learning outcomes, they have developed a course embedded exam using a Test Blueprint as an additional direct measure to assess the program’s learning outcomes.

Program Learning Outcomes (PLO)
Students will be able to:
1. Determine the entrepreneurial procedures for the development and marketing of a startup music business.
2. Evaluate key components of the Digital Millennium Copyright Act applicable to intellectual property rights of musical content.
3. Compare commercial music idioms and theoretical constructs
4. Demonstrate the skills necessary to manage funds related to licensing, royalty payment, collection, taxation, promotion, and production of musical content
5. Explain correct procedures related to recording, mixing, and mastering music for distribution

The program faculty have determined acceptable targets (listed below) based on the level of cognition expected for the exam questions.

Targets:
1. PLO #1:  85% of students will answer questions 1-10 correctly.
2. PLO #2:  85% of students will answer questions 11-20 correctly.
3. PLO #3:  80% of students will answer questions 21-25 correctly.
4. PLO #4:  80% of students will answer questions 26-30 correctly.
5. PLO #5:  80% of students will answer questions 31-34 correctly.

Based on the Test Blueprint Sample (p. 2), respond to questions below:

Group Questions:
1. What do the assessment results say about how well students achieve the intended learning outcomes?
2. Do the results indicate any strengths?
3. What concerns are raised by the results?
<table>
<thead>
<tr>
<th>Program Learning Outcomes (list PLOs tested on individual exam; if broadly phrased, include topics, themes, concepts)</th>
<th>Percentage of Test Dedicated to Measuring the PLO (Column must total 100%)</th>
<th>Type(s) of Test Items to Measure the PLO (Multiple-choice, true-false, ordering, fill-in-the-blank, short answer, Likert scale, etc.)</th>
<th>Number of Questions for Each Item Type &amp; Item Weight (item weight here is expressed in point values)</th>
<th>Indicate Level of Cognition (e.g. knowledge, comprehension, application, analysis, synthesis, evaluation or use levels of Webb’s Depth of Knowledge)</th>
<th>List Question Numbers for Each PLO (some test items may measure more than one PLO)</th>
<th>Percentage of students who answered correctly (use to reflect upon learning, teaching and outcomes assessment reporting)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLO #1</strong></td>
<td>10%</td>
<td>Multiple-Choice</td>
<td>10 (1 point each)</td>
<td>Knowledge</td>
<td>1-10</td>
<td>84%</td>
</tr>
<tr>
<td><strong>PLO #2</strong></td>
<td>10%</td>
<td>Matching</td>
<td>10 (1 point each)</td>
<td>Knowledge</td>
<td>11-20</td>
<td>86%</td>
</tr>
<tr>
<td><strong>PLO #3</strong></td>
<td>10%</td>
<td>Ordering</td>
<td>5 (2 points each)</td>
<td>Comprehension</td>
<td>21-25</td>
<td>82%</td>
</tr>
<tr>
<td><strong>PLO #4</strong></td>
<td>50%</td>
<td>Multiple-Choice (interpreting financial graphs &amp; tables)</td>
<td>5 (10 points each)</td>
<td>Analysis</td>
<td>26-30</td>
<td>80%</td>
</tr>
<tr>
<td><strong>PLO #5</strong></td>
<td>20%</td>
<td>Likert Scale: Strongly agree-Strongly disagree (in response to scenarios)</td>
<td>4 (5 points each)</td>
<td>Analysis</td>
<td>31-34</td>
<td>70%</td>
</tr>
</tbody>
</table>
References


