Effective Program Assessment Planning, Reporting, and Decision Making

Arizona State University
University Office of Evaluation and Educational Effectiveness

Spring 2018

Welcome to the ASU Program Assessment Handbook

"Effective Program Assessment Planning, Reporting, and Decision Making"

Contents

1. Introduction

The University Office of Evaluation and Educational Effectiveness consults with academic units as they develop and implement strategies to measure student learning at the program level. Strategies include the identification of learning outcomes, the means for measuring student learning on those outcomes, and follow-up activities to review and act on assessment data. The purpose of these efforts is to provide information that can be used to improve student learning.

The primary goal is the assessment and continuous improvement of student learning, not program or faculty accountability. Furthermore, the assessment planning and reporting process does not try to capture all data and information related to students' academic and professional development; this would be far too daunting a task. Arizona State University's assessment planning and reporting process does, however, capture enough information to determine if a culture of assessment and continuous improvement exists and if students are acquiring the skills and knowledge to be academically and professionally successful.

Assessment Portal

This portal allows users to navigate assessment information for active and new programs. Users have access to 1) view current assessment plans and submit updated assessment plans; 2) submit assessment plan information for new programs; and 3) view prior assessment reports and submit updated assessment reports for the current cycle. Visit the Assessment Portal

1.1 Assessment

Academic program assessment is an ongoing process undertaken to measure the extent to which an academic program has a) achieved its objectives regarding the knowledge, skills, and abilities of program graduates; and b) focused continuous improvement efforts to help the program better achieve these objectives. Assessment provides the answers to these questions: "*What do students need to know to successfully graduate and what do graduates need to know to be successful professionals?"* and "*What programmatic changes can be made to continuously improve instructional quality, increase student success, and build required knowledge and skill sets for program completion?"*

Academic program assessment is a structured and iterative process in which qualified faculty:

- Identify the specific knowledge and skills program graduates should possess,
- Identify the elements of general education that complement and enhance the specific knowledge and skills graduates should possess,
- Identify specific methods for measuring the knowledge and skills,
- Interpret the results of those measures of student knowledge and skills,
- Use those results to make curricular decisions intended to continuously improve student learning, and
- Repeat the process to monitor the effectiveness of curricular changes and to identify additional changes.

Academic program assessment should not be thought of as a periodic activity with a finite beginning and end. It is a continuous and ongoing process; each cycle provides information about the degree of success from the previous cycle and informs improvement decisions and activities in subsequent cycles.

1.2 The Purpose of Assessment

Continuous improvement of our programs is an important priority to prepare our graduates to perform in society, in the workplace, or in graduate school. Assessment planning and reporting allow faculty to identify the specific learning outcomes they desire for their graduates and to collect solid evidence of how well those outcomes have been achieved.

Assessment is required to maintain institutional accreditation as well as specialized program accreditation. The Higher Learning Commission (HLC), ASU's regional accrediting body, places a particularly heavy emphasis on assessment and its use in continuous improvement. In addition, nearly all of the accreditation agencies require evidence on the assessment of student learning and using assessment data to continuously improve student learning outcomes. In the sections that follow, we will guide you through the preparation of an assessment plan for a single academic program, then illustrate the ways in which program faculty might use the data collected as a result of the assessment plan.

Important Notes:

All undergraduate and graduate degree programs are required to participate.

Assessment reports are due September 30, annually

The UOEEE assessment team does not keep a tally of the number of outcomes met – or not. Our office maintains logs of units that have current assessment documents on file and the quality of those documents. We provide feedback to units on whether their assessment practices are likely to provide meaningful information about student learning that can be used to improve learning over time. This is so important that units who identify simplistic outcomes, weak measures, and unreasonably low performance criteria receive lower ratings than units who set reasonable expectations, acknowledge when learning outcomes have not been met, and identify realistic changes to address any issues they identify.

As an institution, we are evaluated by accreditors not on the number of learning outcomes we meet, but on the evidence of active engagement in the assessment of student learning at our institution. "Closing the Loop" is the process whereby program faculty use assessment information to drive decision-making aimed at improved student learning. This process is the sole purpose of program assessment, and the basis on which our assessment efforts are evaluated – internally and externally.

Remember: We are not "graded" on the number of learning outcomes we meet, but on our efforts to collect meaningful information about student learning and then use that information to improve student learning.

Note: The exercises throughout the Handbook include examples for a fictitious program, a Bachelor of Science in Marine Biology (BS MB). See Appendix for more description and assessment planning exercises.

2.0 Assessment Planning

The assessment planning stage is the most complex and time-consuming stage of the assessment process, but good planning is a necessary foundation for effective assessment. Think of the assessment plan as the design and data collection plan for a small study that you will conduct over the course of an academic year. Your investment of time at the beginning to design a high-quality assessment plan will ensure that you collect meaningful data that will yield useful information about student learning.

Each step of the assessment planning stage provides the foundation for the next step, so please work through the steps in the order given in this handbook.

2.1 When to begin assessment planning

When a new program is proposed, you will be expected to develop learning outcomes and a full assessment plan. We understand that many aspects of the new program may not be in place yet, and that students may not reach measurement points until two or more years from the time of approval. It is important, however, for program faculty to know the intended program outcomes at the time a program is created. It is equally important for faculty to identify where in the new curriculum students will be exposed to program content, have opportunities to reinforce initial learning on that content, and ultimately demonstrate their knowledge of the content. You may find it helpful to develop a curriculum map at this point to help pinpoint places throughout the curriculum where student learning can and should be assessed.

Once the program has been established, assessment reports built from the plan are due on September 30 of each year.

The graphic above shows the five steps to follow when creating an assessment plan. It is important to follow the steps in the correct order.

2.2 Alignment with ABOR Plan Submission Requirements

For all new and revised assessment plans, information is being collected for Arizona Board of Regents (ABOR) application and reporting processes, as well as ASU's internal program assessment requirements. The required ABOR and ASU information is collected by the UOEEE New Plan form and reviewed by UOEEE for completeness. Assessment plans needing additional information, refinement, or clarification will be asked by UOEEE to be revised and resubmitted. Revised assessment plans meeting all requirements will be approved by UOEEE notification will be posted in the UOEEE assessment portal. New plan submissions meeting requirements outlined by UOEEE will be approved and a PDF required by the Office of the University Provost to complete the ABOR application process will be generated and made available in the UOEEE portal.

Note: The Assessment Methods section of the ABOR application process is completed using information from the UOEEE Measures section of the New Application form.

2.3 Assessing Student Capabilities

As President Dr. Crow has stated in a video regarding ASU's Charter and quality research institutions, "…through years of demonstrated proof, the students being produced at that university regardless of their family circumstance are as capable or more capable than the students being produced at any university." The question for each college, department, and program at ASU to be able to answer is, "How can you assess whether the students being produced by your program can meet the standards set in the Charter?"

Place yourself in the role of an external evaluator assessing and answering the following five questions.

1. Have students mastered skills and knowledge specific to the field or profession?
2. Have students developed the critical thinking, quantitative literacy and other general education skills needed to be successful academically and professionally?
3. Do students have, and take advantage of, opportunities to demonstrate skill and knowledge mastery in the classroom and in field with internships, fellowships, residencies and similar experiences?
4. What key metrics such as retention/graduation rates, professional exam passage rates, employment and advanced education are used by the program, and what trends are occurring?
5. Is there a culture of assessment and continuous improvement, or one of maintaining the status quo?

3. Writing Your Assessment Plan

Those units developing their first assessment plan may wish to review all five steps of the assessment process. As the assessment process is cyclical, it may take a few rounds to realize fully your assessment plan. A review of the process may assist with the development of a more effective initial plan.

The steps below outline the five components of an assessment plan. The components work in unison to produce meaningful assessment data and continuously improve student learning outcomes and measures.

- Mission Statement
- Goals
- Outcomes
- Measures
- Performance Criteria

When to begin assessment planning

When a new program proposal is submitted it will need to include an assessment plan that meets the objectives covered in this Handbook. We understand that many aspects of the new program may not be in place yet, and that students may not reach measurement points until two or more years from the time of approval. It is important, however, for program faculty to know the intended program outcomes at the time a program is created. It is equally important for faculty to identify where in the new curriculum students will be exposed to program content, have opportunities to reinforce initial learning on that content, and ultimately demonstrate their knowledge of the content. You may find it helpful to develop a curriculum map at this point, to help pinpoint places throughout the curriculum where student learning can and should be assessed.

The assessment team will review your draft plan and either provide provisional approval (Provost's Office provides final approval) or return it for revision. When any recommended revisions have been made, submit the plan for final review. The assessment team will notify you when the plan has received provisional approval.

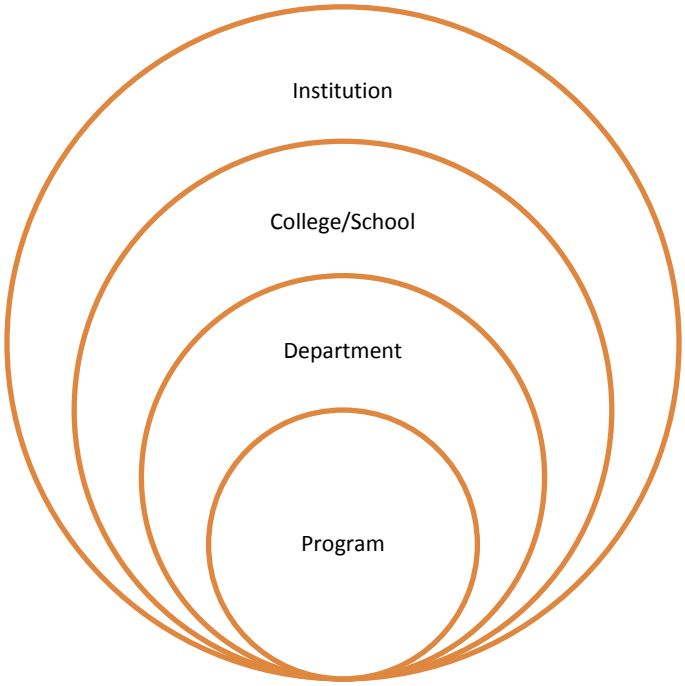
The UOEEE assessment team is available to assist you with assessment planning and curriculum mapping. Assessment reports are due annually on September, 30. After submitting your assessment report, you will then have until December, 2, to submit any assessment plan revisions necessary for the following year.

Note: It is imperative that assessments include only students in the specific program, which is possible for all programs yet may require seeking assistance. Often, courses have students in more than one program and results can be skewed if program populations are not separated for analysis. It may be necessary to involve an UOEEE college delegate or designee to aid in the isolation of student rosters for each program being assessed, for more guidance please contact the UOEEE assessment team.

3.1 Mission

It is important to consider the university, college, and department mission statements in the assessment planning process. There are several reasons for this:

1. The university mission is the foundation upon which everything we do should be based. College mission statements, and in turn departmental mission statements, should flow from and directly support the overall institutional mission. It should not be difficult to "connect the dots" and see the relationships among an institution and the academic and non-academic units that compose it.
2. Accreditors will evaluate how well an institution executes its mission through its academic programs and other endeavors.
3. Because it can be easy to forget the importance of university, college/school, and department missions in all that we do, assessment planning time provides an excellent opportunity to call our attention back to these statements of who we are and what we are about. This may prompt some faculty to review school or department mission statements and consider whether it is time to update them. That, in turn, may prompt fresh thinking about curriculum planning or other activities. Although this is not the primary purpose of assessment planning, it is one example of the unexpected benefits that some faculty report as a result of this process.
4. Assessment outcomes must be directly related to the department mission (and, by extension, those of the university and college). You will be asked to evaluate these relationships as we prepare to develop learning outcomes.



The ASU assessment team does not evaluate the quality of the mission statements prepared by our academic or non-academic units. We collect this information only to help our faculty focus on the issues outlined above.

ASU Charter

ASU is a comprehensive public research university, **measured not by whom it excludes, but by whom it includes and how they succeed**; advancing research and discovery of public value; and assuming fundamental responsibility for the economic, social, cultural and overall health of the communities it serves.

Link to Exercises for Mission Statements

3.2 Goals

What do you want your students to do when they graduate? What hopes and aspirations do members of the program faculty have for program graduates three to five years after graduation? Some examples are:

- Employed in a field related to the academic program
- Further academic study (admission to graduate/professional school)
- Professional licensure/certification
- Contribution to scholarship of the discipline (research, publication, teaching)

We use program goals to help frame our thoughts about the expectations we have for our students. This will help as we begin to write learning outcomes in the next step. At ASU, we don't ask faculty to record these goals on the Assessment Plan Template, but it is a good idea to store this information in departmental records and be sure the information is aligned with what appears in Degree Search.

For most programs, faculty will have more than one goal for their program graduates. For many undergraduate programs, there may be many possible educational and career paths that graduates will follow. You do not need to identify all possible paths; a small number will suffice. Over time, it is helpful to track program graduates in order to identify these long-range goals, but that is not necessary for this step. The purpose of this exercise is to help you to start thinking about the outcomes we will soon develop.

In addition, *do the goals support the department mission statement?* Review your department mission statement and underline those elements that are supported by the program goals above. If the goals you wrote do not support the program mission statement, take a moment to revise your program goals.

Link to Exercises for Goals

3.3 Outcomes

Think about the program goal you developed in the previous step. What kinds of knowledge and skills will students need to have when they graduate in order to achieve that goal? That body of knowledge and that skill set are your program learning outcomes. Program outcomes are the intended learning outcomes of an academic program. They are the answers to the question, "What should program graduates know and be able to do?"

Program faculty are the experts on what specialized and general education skills and knowledge students need to be successful academically and professionally. The skills and knowledge sets specific to the program are most often the focus of program assessment plans, as they should be to capture important uniqueness of each. Guidelines from specialized accrediting and/or regulatory bodies overseeing programs or professionals should be included in the outcomes of all program assessment plans.

Improvements to the UOEEE program assessment report web forms allow programs to create an unlimited number of outcomes and an unlimited number of measures each to accommodate all items program may need to assess. Even so, programs are discouraged from developing more than six outcomes with more than three measures and program criteria each.

All program assessment plans are required to have three learning outcomes with two measures each, at the minimum. However, if a program has developed a culture of assessment and continuous improvement, it would be difficult to measure all related activities with just three outcomes. This is particularly true when all programs specific and general education skills and knowledge sets are considered.

Concepts and Competencies

Another added feature of the UOEEE assessment portal and the assessment planning process is the collection of assessment information required by the Office of the University Provost to complete new program applications to the Arizona Board of Regents. This information includes "Concepts" and "Competencies" and there are definitions and examples below.

1. Concepts: *Write a concept statement listing the knowledge areas, theories, and principles students will draw upon in the successful execution of the outcome.*
   Example: Students will utilize the principles of scientific investigation, knowledge of ecological factors, evolutionary genetics theory, and methods for observation and documentation of animal behavior.
2. Competencies: *Identify and describe the most important competencies students will need to perform the outcome and use this to develop rubrics tailored to these competencies. Avoid competencies that are difficult measure through the use of rubrics or similar instruments.*
   Example: Evaluation of relevant ecological factors, design of observation protocols, identifying gaps in literature, and develop statistical analysis syntax (e.g. MatLab, STATA, R, SAS, Python) to properly process data and perform analyses.

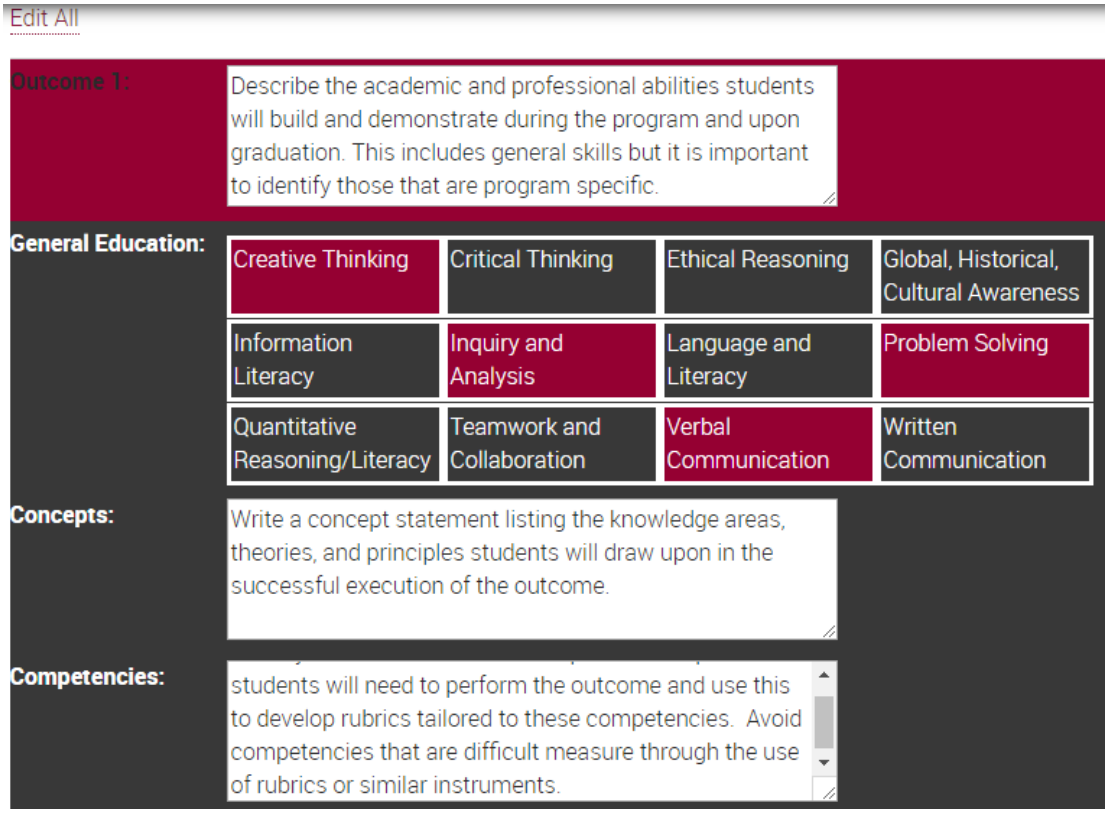
Distinguishing General Education Skills Development for Undergraduate Programs

In the course of higher education instruction, general education skills are developed in conjunction with skills and knowledge specific to each college, department and program. This is especially the case for undergraduate program. For most undergraduate programs at ASU, it is not a matter of adding general education skills to current curriculum and instruction, it is a matter of identifying the skills that students are developing. Undergraduate assessment plans, either in the learning outcomes, measures or rubrics should describe associated general education skills. The American Association of Colleges and University (AAC&U) distinguishes general education skills in its AAC&U VALUE Rubrics Categories and Definitions: Intellectual and Practical Skills (Association of American Colleges and Universities, 2009).

General Education/ AAC&U Intellectual & Practical Skills

1. Critical Thinking
2. Creative Thinking
3. Language & Literature (Reading)
4. Information Literacy
5. Collaboration/Teamwork
6. Written Communication
7. Verbal Communication
8. Quantitative Literacy
9. Inquiry & Analysis
10. Problem Solving
11. Ethical Reasoning
12. Global , Cultural, Historical Awareness

Required with all new assessment plans, and optional for all established plans, is the completion of the general education matrix to identify skills embedded in each program that may not be described or recorded elsewhere. As demonstrated in the screen clip below, general education skills buttons turn from grey to maroon when clicked, and there is different set of skills identified by each outcome in an assessment plan.

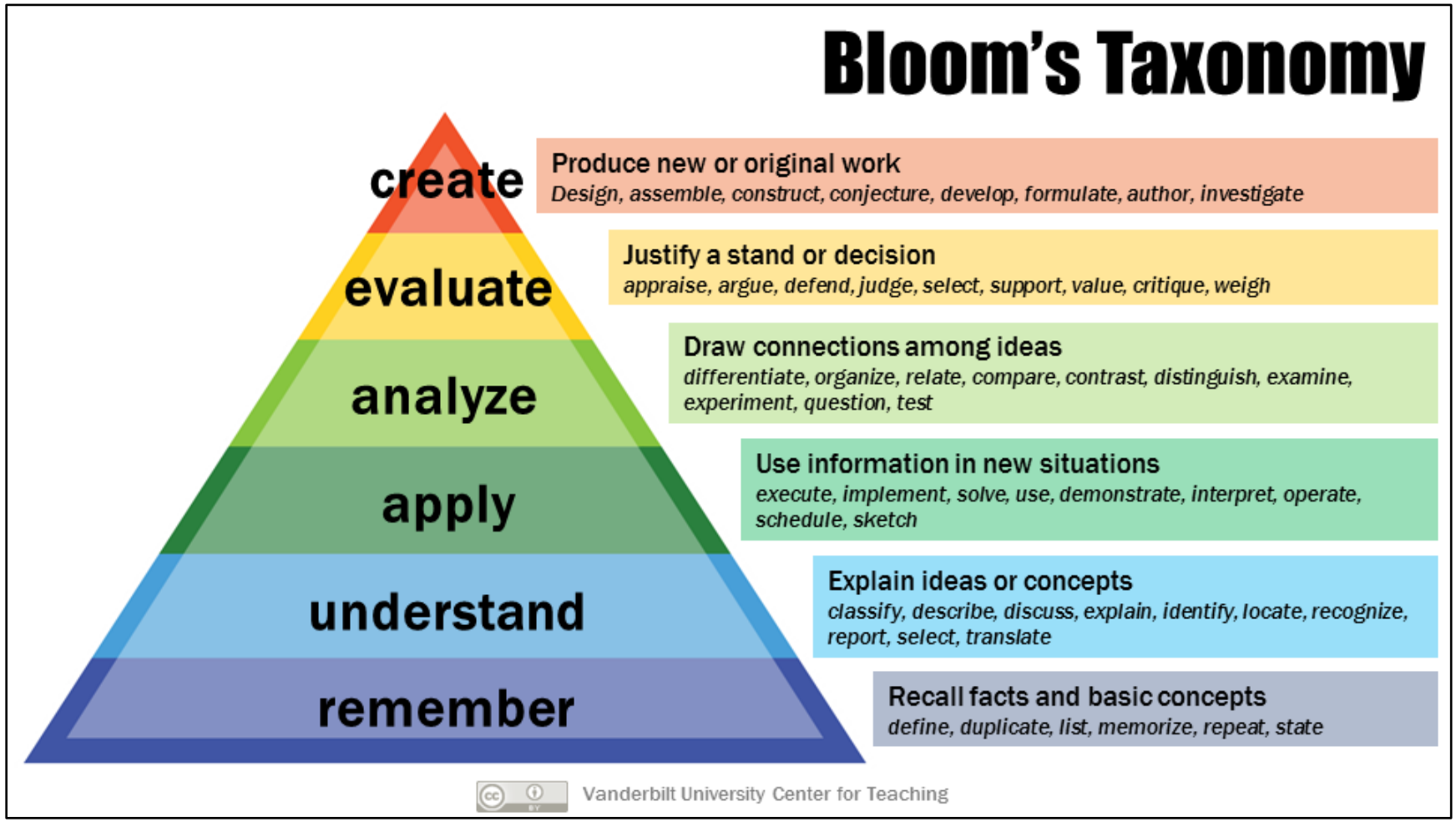


The screen clip also shows assessment information collected for use by the Office of the University Provost when completing the new program application process for submission to the Arizona Board of Regents. This includes the (learning) outcomes, concepts and competencies information.

Differences for undergraduate and graduate programs

The choice of learning outcomes for your assessment plans should always be guided by the program mission and long term goals for your graduates. Program faculty may identify learning outcomes that seem appropriate for both an undergraduate program and a graduate program in the department, yet it is important to differentiate between the two levels of study. The use of Bloom's Revised Taxonomy can help with grade level distinctions, as it provides an ordinal rank to pedagogical progressions. Select different cognitive levels for undergraduate and graduate program outcomes that express your expectations of students. For example, you might define an undergraduate program outcome at Bloom's comprehension level and a graduate program outcome at the evaluation level. A table of verbs for the cognitive domain levels of Bloom's Revised Taxonomy is shown later in this section.

Bloom's Revised Taxonomy



Bloom's Revised Taxonomy Action Verbs

I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Choose Define Find Label List Match Name Omit Recall Relate Select Show Spell Tell	Classify Compare Contrast Demonstrate Explain Extend Illustrate Infer Interpret Outline Relate Rephrase Show Summarize Translate	Apply Build Choose Construct Develop Employ Experiment Identify Interview Model Operate Organize Plan Select Solve Utilize	Analyze Assume Categorize Classify Compare Conclude Contrast Discover Dissect Distinguish Divide Examine Function Infer Inspect List Motivate Participate Simplify Survey Test Theming	Agree Appraise Assess Award Choose Compare Conclude Criteria Criticize Decide Deduct Defend Determine Disprove Estimate Evaluate Explain Influence Interpret Judge Justify Mark Measure Opine Perceive Prioritize Prove Rate Recommend Rule Select Support Value	Adapt Build Change Choose Combine Compile Compose Construct Create Delete Design Develop Discuss Elaborate Estimate Formulate Happen Imagine Improve Invent Make up Maximize Minimize Modify Originate Plan Predict Propose Solve Suppose Test Theorize

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

Many programs find that developing learning outcomes for assessment plans is the most difficult and time consuming part of the process. If you adhere to the guidelines provided below, it will become much easier with practice, and you will avoid many problems with the subsequent steps. The time you invest in planning and preparing will save time later and will ensure that you are able to collect high-quality assessment data.

Note: Programs with more than five outcomes, particularly33 those specified by an external accrediting body, can divide those into subsets for consideration across two or more assessment cycles. There are many possible ways to approach this planning.

- Follow a predetermined rotation that includes a new subset of all program outcomes each year
- Identify a small number of core outcomes that will be included every year, and rotate others each year
- Identify a small number of core outcomes that will be included every year, and identify other outcomes that are focused on recent programmatic changes that should be evaluated; Identify a subset of outcomes, repeating those that are not met, and replacing those that are met with new outcomes
- Group the outcomes into categories such as content knowledge, application, research, communication, clinical skill, or others. Select one outcome from each category during each cycle.

3.3.1 Outcome Development

The learning outcomes you develop at this stage will provide a foundation for all your assessment work. The time and attention you give this activity will pay off later. To begin, you need at least three learning outcomes.

Note: The exercises throughout the Handbook include examples for a fictitious program, a Bachelor of Science in Marine Biology (BS MB). See Appendix for more description and assessment planning exercises.

For this exercise, we will develop a single program outcome in support of the long term goal you identified for your program. Here are several important guidelines to consider when writing learning outcomes. At each step, examples of varying strength are presented to illustrate the guidance principles. The examples build in strength as they align with each principle.

1. *Write outcome statements that flow directly from, and support, the program goals.* Think about the program goals you wrote previously. The connection to the goals should be evident in your program outcomes.

Weak	Better
Will be prepared for further study in field	Graduates of the BS MB program will be able to demonstrate understanding of a complex issue.

2. *Write outcome statements that relate directly to the academic discipline and reflect the knowledge and skills students should acquire through both general education and discipline-specific courses.* When possible, connect aspects of general education (e.g., critical thinking, quantitative reasoning, oral and written communication skills, and global awareness) to the curricular content of the major. You may consider writing or critical thinking to be very important for graduates of your program. If so, think about how you expect students to demonstrate those skills within the context of your academic discipline.

Consider the example below.

Weak	Better
Graduates of the BS MB program will be able to demonstrate understanding of a complex issue.	Graduates of the BS MB program will demonstrate understanding of a current issue in marine biology.

3. *Write outcome statements that are observable and measurable.* Focus on observable behaviors rather than what students think, understand, appreciate, etc. We cannot measure what students know or understand, but we can measure how they demonstrate evidence of knowledge and understanding. Avoid outcome statements that say, "Students will know …," or "Students will understand …." When you're tempted to use these, think about what students who *know* or *understand* can DO with that knowledge or understanding. Consider the example below. *(Include information on the levels of Bloom's Revised Taxonomy)*

Weak	Better	Better with General Education
Graduates of the BS MB program will demonstrate understanding of a current issue in marine biology.	Graduates of the BS MB program will be able to analyze a current issue in marine biology.	Graduates of the BS MB program will employ principles of scientific inquiry to analyze a current ecosystem issue.

4. *Write outcome statements that focus on knowledge and skills graduates should possess rather than curriculum design, department resources, faculty characteristics, or instructional methods.* Rather than saying that students will learn, students will increase understanding, students will acquire knowledge, etc., express learning outcomes in terms of what students will be able to do. Additionally, internal departmental outcomes are not assessed for this type of skill focused program assessment; your team should consider separately any issues of resources and dynamics that might improve functionality in the program.

   Consider the example below.

Input Focused	Outcome Focused
Faculty will improve their content knowledge through participation in professional development activities. **OR** Department labs will be equipped with state-of-the-art instruments.	Graduates of the Marine Biology program will be able to conduct laboratory experiments to explain species cellular biology.

5. *For programs that have specialized accreditation or certification, write outcome statements that take those assessment expectations into consideration.* Some specialized accreditation organizations focus on curriculum design or other inputs rather than student learning outcomes. For those, you may want to write an outcome statement that addresses an input-based standard from the perspective of student-based outcomes.

   Some specialized accreditors provide specific learning outcomes that institutions must measure. Although the language and format of those mandated outcomes may not adhere to our guidelines, you should use the specific language provided by the specialized accreditation agency. The only time you may need to restate an external standard would be to focus on the student, if the standard is focused more on resources or program operations. Additionally, please make it clear when an outcome comes directly from an accreditor when designing your assessment plan.

Consider the examples below.

External Accreditation Outcome	Acceptable Outcome Specified by External Standard	Better
Association for Marine Biology Accreditation (AMBA), Criteria for Accrediting Marine Biology Programs, Criterion 3, outcome f: "Understanding of professional and ethical responsibility."	This is not specific to the program nor a measureable skill, however, this is a specific outcome mandated by AMBA. We would use it as written and not modify it according to our guidelines.	Graduates of the BS MB program will effectively evaluate animal subject scenarios in light of professional and ethical responsibilities

6. *Do not write outcome statements that combine multiple outcomes in a single statement.* Avoid the temptation to bundle everything you value about your program into a lengthy outcome statement. Stay focused on clear and simple outcomes that will yield high quality information. There are times when an outcome must be rather complex in order to capture the complexity of a particular program. We sometimes speak of such learning outcomes as being so "interwoven" that to separate the elements into separate outcomes would somehow diminish the richness of the assessment. When evaluating your outcome statements, be careful not to lump multiple elements into a single statement unless you truly have a complex outcome for a complex program.

Consider the examples below.

Multiple Outcomes (5)	Simplify and Split Outcome (2)
Graduates of the ___ program will be **lifelong learners** who **principles of sciences** and can **apply those concepts** to **design a research study**, and **analyze and present research findings.**	Graduates of the ___ program will be able to apply scientific principles to design a study of organismal biology. Graduates of the ___ program will be able to communicate relevant findings as they relate to current research in marine biology.

One of the best ways to resolve problems with an outcome statement that consists of multiple learning outcomes is to break them into separate outcomes. A very common example is an outcome that refers to program graduates' ability to "design and conduct research studies, and communicate the results of their research both orally and in writing." This can be resolved by focusing on the discrete skills.

7. *Write outcome statements that are short and concise.* Longer statements tend to be vague or include multiple outcomes.

8. *Write your outcome statements in the form of "Students of the _____ program will be able to _____;"* or *"Students of the _____ program will be prepared to _____."* This format will help you to avoid many of the problems described in the preceding paragraphs.

9. *When writing an outcome, describe the academic and professional abilities students will build and demonstrate during the program and upon graduation. This includes general skills but it is important to identify those that are program specific.*

10. *Write a concept statement listing the knowledge areas, theories, and principles students will draw upon in the successful execution of the outcome.*

    "Students will utilize the principles of scientific investigation, knowledge of ecological factors, evolutionary genetics theory, and methods for observation and documentation of animal behavior."

11. *Identify and describe the most important competencies students will need to perform the outcome and use this to develop rubrics tailored to these competencies. Avoid competencies that are difficult measure through the use of rubrics or similar instruments.*

    "Evaluation of relevant ecological factors, design of observation protocols, identifying gaps in literature, and develop statistical analysis syntax (e.g. MatLab, STATA, R, SAS, Python) to properly process data and perform analyses."

Don't be afraid to consider learning outcomes that may seem too vague or too difficult to measure. If you have an idea about an outcome that you consider important to your program but doesn't seem to fit these guidelines, contact the UOEEE assessment team. We may be able to help you identify an appropriate measure for your outcome or to revise it into something more easily measured.

Link to Exercises for Section 3.3

3.4 Measures

Note: It is imperative that assessments include only students in the specific program, which is possible for all programs yet may require seeking assistance. Often, courses have students in more than one program and results can be skewed if program populations are not separated for analysis. If you need help to separate or identify majors in a course, it may be necessary to involve an UOEEE college delegate or designee, for more guidance please contact the UOEEE assessment team.

To start, identify at least three measures for each outcome. One measure must be a direct measure, and others can be direct or indirect.

A direct measure is one in which students demonstrate their learning through a performance of some kind. Direct measures include any student artifacts such as digital portfolios, exams, projects, papers, etc. where the students themselves actually demonstrate their knowledge or skill. An indirect measure is one that provides information from which we can draw inferences about student learning. Indirect measures do not call on students to demonstrate their knowledge or skill, but rely on information reported where the student skill can be inferred. Surveys and employment data are the most common indirect measures.

Examples of direct and indirect measures are shown below.

Direct	Indirect

Digital Portfolios/ Capstone (project/paper)	Design projects	Student surveys and focus groups
Standardized tests (ETS field tests, for example)	Practical clinical assessments	Exit surveys and interviews
Presentations/oral defenses	Artistic creations or performances	Alumni surveys and interviews
Classroom exams or quizzes	Classroom discussions	Employer surveys and interviews
Classroom/homework assignments	Online discussion threads	Job placement data
Course projects	Licensure/certification exams	Admission to graduate/professional programs
Papers (research, term, creative, etc.)	Publications/presentations	Publications/presentations
Internships or practicums	Master's theses or doctoral dissertations	Course evaluations

There are several important guidelines to consider when identifying appropriate measures for your outcomes:

1. *Align Measure with Outcome.* Ensure that the measure that you are writing directly illuminates the outcome you are exploring. If the outcome intends to assess writing skills, a direct measure of a classroom writing artifact or an indirect measure from a survey can be used to assess a student's writing abilities.

2. *Utilize Rubric Items when possible*, as opposed to full grades in a course or completion of a course, thesis or dissertation, or program. Rubrics created at the skill or knowledge level allow programs to identify instructional areas where students struggle most, when coupled with analytic scoring. The first matrix below is a simple example of using a matrix to measure quantitative literacy skill levels among students in the hypothetical BS MB program. These results can then be fed into the second matrix below, "Analytic Scoring of Course Level Rubrics" in order to create a course level portrait of students' strengths and weaknesses. This information is crucial to guiding continuous improvement efforts that can have the greatest positive impact on student learning outcomes.

Course-Level Rubrics Summary Sheet

	1	2	3	4	5
Perform Analysis (Quantitative Literacy)	Can access databases and perform basic statistic functions	Can perform and interpret descriptive statistic output	Can perform and interpret inferential statistic output	Can evaluate inferential output as applicable to research question	Can create and test statistical model predicting future outcomes
Student A			X		
Student B			X		
Student C				X	
Student D				X	
Student E		X			
Student F			X		
Student G			X		
Holistic Average	3.1				

While using courses critical to students' success in a program, important knowledge and skills can be evaluated using rubrics with analytic scoring. Through the use of rubric analytic scoring at this detailed level, program faculty can separately evaluate students' knowledge and skills as they relate to specific program outcomes and general education objectives. Such a rubric will permit faculty to give feedback (and grades) for each of the separate components. This same approach can be used at the course level and easily aggregated to program-wide levels. We will see later that this approach can also yield rich assessment information that can be used to identify specific program strengths and weaknesses, guide continuous improvement efforts, and measure this development over time. (Note: 3.8 was chosen in the examples above because it is > 75% of a 1-5 scale).

Example: Analytic Scoring of Course Level Rubrics

	Literature Review (Literacy, Subject)	Research Study Design (Principles of Science)	Perform Data Collection (Literacy, Technological)	Perform Analysis (Quantitative Skills)	Self & Peer Evaluation (Evaluation, Collaboration)	Professional Presentation (Oral Communication)	Final Report (Written Communication)	Cumulative Score	Course Average
Student A	3	4	5	3	4	3	5	27	3.9
Student B	4	4	5	3	4	3	5	28	4.0
Student C	4	3	4	4	5	2	4	26	3.7
Student D	5	3	4	4	3	4	5	28	4.0
Student E	5	3	4	2	4	4	4	26	3.7
Student F	3	4	5	3	4	2	5	26	3.7
Student G	4	5	4	3	5	4	4	29	4.1
Item Average	4.0	3.7	4.4	3.1	4.1	3.1	4.6	27	3.9

Outcome: Students will be able to design, conduct, analyze and present advanced level legal research.

Measure: Students will be able to properly apply research principles to current legal issues and work collaboratively to produce accurate findings and effective recommendations.

Criteria: *80% of students will score 3.8 or above on a scale of 1-5 in course JPS - 367.*

Results: Criterion 1, 57% of students scored 3.8 or above, therefore, standards were not met.

Areas where students struggled most: quantitative skills, oral communication, and principles of science. Continuous improvements will focus on rubric item scores ≤ 3.8 for coming year.

Some specialized accreditors provide specific learning outcomes that institutions must measure. Although the language and format of those mandated outcomes may not adhere to our guidelines, you should use the specific language provided by the specialized accreditation agency. The only time you may need to restate an external standard would be to focus on the student, if the standard is focused more on resources or program operations. Additionally, please make it clear when an outcome comes directly from an accreditor when designing your assessment plan.

3. *Include at least one direct measure.* Student skills must be directly evidenced at least once for each outcome. The assessment committee will have a direct report of their performance. You will notice publications/presentations are listed as both direct and indirect. If the committee has reviewed the student publication or presentation, this would count as a direct measure. However, if the committee receives a report of approval or acceptance by a journal or conference, this alone would be an indirect measure. There are some measures such as certificates and licensures and internship performance that could constitute as direct or indirect measure based upon how the demonstration of the skill is assessed. How much information does the committee have on the individual student's performance or contribution (i.e. rubric, grade, supervisor evaluation, etc.)?

4. *Avoid creating additional tests or other assessment activities simply to satisfy your assessment data collection needs.* It should be possible to use rubrics with digital portfolios, projects, exams or other measures of student learning that already occur as part of your existing instruction and testing activities. If you have difficulty identifying appropriate measures for an outcome, you may want to consider whether students are being adequately tested on the outcome – or whether the outcome is an appropriate one for your program. If the outcome is an important one, but is not adequately measured, program faculty will need to identify appropriate measures.

5. *Course grades are not appropriate measures of student learning.* *It is appropriate to use the grade on a specific exam, project, etc. that specifically measures student learning on the outcome.* Course grades are based on overall satisfaction of course requirements rather than performance on a specific program-level outcome. Those course requirements typically include several course-level outcomes that are likely related to more than one program outcome. Course grades frequently include extra credit for attendance, class participation, or other things unrelated to program outcomes. Course grades alone do not provide specific information about the concepts mastered by students or those concepts that proved challenging – important information for faculty to consider if they want to improve student learning over time.

   Consider the following example of two students who successfully completed MBS-442 (Scientific Methods for the Marine Biologist). The instructor considers attendance to be important, so 10% of the course grade is based on attendance. Students who miss three or more class sessions receive no credit for attendance.

Assignment	Weight	Student A	Student B
Attendance	0.10	100.0	0.0
History quiz	0.15	90.0	92.0
Homework	0.15	90.0	96.0
Midterm	0.30	89.0	98.0
Final	0.30	88.0	100.0
Total		***90.1***	***87.6***
	Course Grade	**A**	**B**

6. *Course completion is not an appropriate measure of student learning.* Avoid using completion of a single course or block of courses as a measure. The issues are the same as with course grades. Completion of capstone (thesis, dissertation, etc.) or other works is also not appropriate; these are layered assignments that require a deeper examination via a rubric or more precise measure on a particular section. We are looking to assess the specific skill listed in the outcome for each measure, such as the analysis or writing ability.
7. *Identify at least one direct measure.* The second measure can be direct or indirect.
8. *Identify a specific artifact and/or items within an artifact.* Rather than saying "tests," say "Final exam in MBS 428, Senior Capstone." Rather than "research papers," say, "Research paper in MBS 393, Social Issues in Law Enforcement." By identifying a specific exam or assignment in a specific course, the program can identify instructional areas that challenge students most and focus improvement efforts on these areas. For surveys, indicate the specific item(s) that will be used to measure the outcome. For example, "Exit survey item that asks the extent to which the BS MB program helped students to develop their analytical thinking skills." Otherwise, you may be leaving your data collection to chance and fail to collect important information about your students' learning.
9. *Don't write a long description of the measure.* It is not necessary to describe the content of an exam or assignment, a rationale for its inclusion in your assessment, or the scoring method you will use. This level of detail is appropriate to record in any program or departmental notes or minutes you will maintain. For your assessment plan, you only need to list the specific measure (final exam in [*course ID, course name*], senior capstone paper, oral presentation of MBS-301 [*course ID, course name*] project, dissertation, etc.).

10. *Do not rewrite the outcome as a measure.* The measure is meant to state the student work used as evidence for the assessment process. If you feel the need to restate an outcome in your measure, perhaps consider refining the scope of your outcome. Assessment plans can become vague or unaligned when skills are listed in the measure that do not correspond directly with the outcome skill.

11. *Do not combine multiple measures as one.* Avoid saying, "exams and assignments in MBS-442." You may decide to combine the scores for multiple quizzes or homework assignments, to identify a specific subset of test items that relate to the outcome, or to identify a specific subset of survey items that relate to the item. It is appropriate to do so, and you may want to describe your measure as an aggregate (*e.g.*, mean score) on the quizzes or items used.

12. *Sample only when necessary.* When there are a large number of student artifacts that require additional faculty time and attention beyond regular classroom duties to complete, as when a rubric is used post-hoc to assessment outcomes, it is acceptable to randomly sample the artifacts. A minimum sample size in this instance can be debated. Yet, if a program can assess at least 20, and hopefully 40 or more, artifacts then patterns should begin to appear in the results. This approach, however, should only be used when the assessment is not part of every student's classroom performance.

Assessment Measures and Resources

The most commonly used assessment tools are exams, portfolios, rubrics, and university data (e.g., surveys, course evaluations).

- **Rubrics:** Rubrics are very effective tools for measuring skill and knowledge attainment in many instances, if developed carefully and analytic scoring is utilized. However, when designing a rubric there are a few considerations to be made. First, is the work being addressed holistic (cumulative) or analytic (item focused and cumulative)? The difference between these types is that a holistic rubric will result in a single score, thus the criteria being assessed consists of related properties that will be assessed holistically. An analytic rubric consists of criteria that are assessed and scored separately, resulting in scores for specific skills and knowledge that are combined to the course, program, department, college, and university levels. The other element to consider is whether the rubric consists of checklists, ratings, or descriptions. A checklist rubric consists of checkboxes that indicate whether a criterion was met or not.

  A rating scale rubric determines the level to which a criterion exists and is preferred for most program assessments as data assisting continuous improvement efforts are created. A descriptive rubric keeps the ratings but replaces the checkboxes with spaces where brief descriptions can be written in to explain the rating. For programs that want to include outcomes that may seem ambiguous or difficult to measure, consider using AAC&U's Valid Assessment of Learning in Undergraduate Education (VALUE) rubrics. The rubrics were developed as part of a large FIPSE-funded project… The rubrics can be downloaded, free of charge, https://www.aacu.org/value-rubrics. Although the rubrics were developed for undergraduate education, they also can be used to measure graduate work. Numerous examples of rubrics can also be found through the Association for the Assessment of Learning in Higher Education; AALHE Sample Rubrics

- **Exams:** Either as an objective or subjective assessment, exams can be used for outcome indicators for the completion of a course. When designing an exam both for a course as well as a program assessment, it can be helpful to design a blueprint for the exam. This will help ensure all learning goals are represented and balance among conceptual understanding and thinking skills is obtained. This will make the writing of the questions for the exam easier as it is clear what knowledge and which skills a student must demonstrate to meet the learning outcome. Additionally, the test blueprint will make it easier in the review process to pair questions back to their appropriate outcomes, as well as allowing for an in-depth review of the demonstrated skills of each section of the test.

- **Portfolios:** ASU has become a national leader in the use of digital portfolios, and they are an effective assessment tool as they allow students to display a wide variety of learning and skills. Portfolios can show the value added of a student's education as it can demonstrate development across the program. Additionally, portfolios require

student reflection upon their work for inclusion in the portfolio, allowing the student to choose how to document their achievement of learning outcomes. This process further involves the student within the assessment process and allows for a very holistic review of learning for students and faculty.

- **University Data:** Though indirect, it is important to consider the attitudes, dispositions, and values students assign to their education and learning outcomes. The best method for collecting this information is through the graduating student and alumni surveys or the course evaluations. This data indicates students' reflections on their education as a whole in addition to students' behaviors after obtaining the program's learning objectives. This data can provide new insight into growing fields and expanding learning opportunities to be explored for current students. Click here to access Annual Survey Data

Advantages from Using Digital Portfolios

Arizona State University has a digital portfolio system with features that include artifact collection and rubric scoring that can be adapted to the course and program level. Programs are encouraged to utilize the digital portfolio system to help students build their academic repertoires as well as aid in program assessment and continuous improvement. Incorporating rubrics into digital portfolios makes course expectations transparent, allowing students to better understand how levels of performance are determined for a course or program. Furthermore, rubrics utilized within ASU's digital portfolio system allow faculty, programs, departments and colleges to create a history of assessment and continuous improvement efforts. The ASU University Technology Office (UTO) provides more detailed information in the appendix entitled Digication.

Link to Exercises for 3.4

3.5 Performance Criteria

For each measure, a performance criterion will be used to determine the level of performance necessary to ascertain whether student performance on the measure indicates that the program outcome has been achieved. Not all students in a program will perform perfectly on every measure, so program faculty must identify a threshold above which they will be satisfied that, on the whole, students who graduate from the program possess the knowledge or skill specified in the outcome.

Performance criteria must be identified prior to the collection and analysis of assessment data. When setting performance criteria, it can be tempting to set unreasonably high "nothing but the best" standards or to set unreasonably low "guaranteed to show success" standards. Both of these practices can be defeating. Over time, it is far more beneficial to a program and its students to set reasonable expectations and work toward meeting them

Avoid setting a performance criterion that says that 100% of students will achieve at a high level. When tempted to set the threshold at 100%, consider the following scenario. If even a single student in a large program did not meet high expectations on the measure, would you conclude that your program graduates do not possess the knowledge or skill of the outcome? Probably not. Think of a reasonable standard, and set the threshold at that level.

There are cases when a program needs all students to demonstrate skills and knowledge at a minimum high standard. In these instances using a criterion of 100% of students is preferred. An example might be a nursing program requiring all graduates to demonstrate minimum competence with safety and health standards.

When setting criteria, consider a) the proportion of students a program can reasonably expect to perform at b) the necessary level of mastery to demonstrate necessary skills and knowledge have been attained. Below are two examples that can be considered reasonable criteria given the context for each:

- An engineering program expects 80% of students to score a four or higher (scale of 1-5) on rubrics focused on electrical engineering skills and knowledge. In this situation, past student performance can help determine what is reasonable to expect and measure changes over time.
- An aviation program requiring 100% of students meeting a minimum score of four or higher (scale 1-5) on rubrics focused on piloting skills and knowledge. In this situation, will student performance lead to passing national exams and performing as a safe, competent pilot?

Programs that set performance criteria so low that they are assured of meeting their outcomes present a number of issues. Unreasonably low standards deprive faculty in those programs of the opportunity to identify strengths and weaknesses in their students' performance, thus depriving present and future students of the benefits of program improvements that might otherwise occur. The low standards communicate to current and potential students that the faculty have low expectations for them. A program that establishes low expectations for student performance may not push students to perform at their maximum potential and may not attract the most qualified applicants.

A performance criterion is written as a statement indicating that some percentage of students will perform at or above a certain level on the measure. Examples:

- 80% or more of students will earn a grade of B or higher on the final exam.
- 75% or more of students will earn a rating of "Meets Expectations" or better on the research paper.
- 90% or more of student papers will be evaluated at a level 3 or higher using the VALUE rubric for Ethical Reasoning.
- 85% of alumni survey respondents will report that they are currently employed in a field that is "related" or "closely related" to their degree program.
- 80% of exit survey respondents will report that the BS MB program contributed "Quite a Bit" or "Very Much" to the development of their critical thinking skills.
- 75% of papers reviewed will be evaluated at a level of "Satisfactory" or higher using a faculty-developed rubric.
- 80% of doctoral dissertations will receive a rating of "Very Good" or "Outstanding" for methods using the Lovitts' (2007) rubric for [*academic discipline]*.

Course grades and course completion are not appropriate for use in performance criteria.

Considerations:

- ✓ Employing Rubrics: We recommend using the rubrics presented in Lovitts' (2007) work on the assessment of doctoral assessment. Her work with doctoral faculty at institutions from across the U.S. yielded rubrics for a variety of graduate disciplines that describe the characteristics of the elements of a dissertation (*e.g.,* literature review, methods, analysis, etc.) at four levels: Outstanding, Very Good, Acceptable, Unacceptable. The rubrics can also be used as a model for rubrics to be used for the evaluation of master's theses, for applied or performance projects, or for other disciplines. Such a review is distinct from the traditional defense process, and faculty may or may not choose to share the results of individual reviews with their students. Some programs have found it useful to share rubrics with entering graduate students as a means to inform them at an early stage about expectations regarding the quality of their graduate work. For large programs, it is not necessary to review and evaluate every thesis, dissertation, or project. It is acceptable to review a representative sample of student work. Programs that utilize rubrics to evaluate the quality of theses or dissertations will write a performance criterion that indicates that a percentage of students will earn a rating of Acceptable or better on the element that relates directly to the outcome.

There are several important guidelines to consider when identifying appropriate performance criteria for your outcomes:

1. *The performance criterion must be directly related to the measure.* If the measure is an exam, the performance criterion will be a threshold of performance on the exam. If the measure is a survey item, the performance criterion will be threshold of respondents' ratings on that particular item.
2. *Write performance criteria in this format: "XX% of students will earn a grade/rating of YY or higher on the [name of exam/project]."* Or *"XX% of students will perform at or above expectations on the [licensure exam, dissertation] based upon the faculty developed rubric."* or *"XX% of respondents will report that [use scale points from survey item].*
3. *Course grades and course completion are not appropriate for use with performance criteria.* As with measures, it is important to focus on the specific exam, project, etc., that will be used to measure student learning on the outcome of interest.
4. *Performance criteria related to the thesis or dissertation must reflect a standard other than passing on the first attempt.* These measures represent the culmination of a student's program of study and should be analyzed at specific levels for their achievement across a spectrum or within a singular area. Faculty developed rubrics are the best resource to use for a performance criteria of these measures. The master's thesis and doctoral dissertation are excellent measures of student learning, but can present a challenge for faculty writing performance criteria. Many programs will set performance criteria that state that a percentage of students will successfully defend the thesis or dissertation on the first attempt. On the face, this seems to be a suitable approach. However, most graduate faculty support and closely supervise their students' thesis and dissertation work and don't schedule the defense until the work is satisfactory. When this is the case, a performance criterion based on success rate of first time defenses is an artificial threshold, and the program has guaranteed that it will meet the outcome. This practice also deprives programs of the opportunity to examine differences in the level of their students' performances and identify opportunities for improvement. Completion is not sufficient in itself.

Link to Exercises for 3.5

Appendix

Note: It is imperative that assessments include only students in the specific program, which is possible for all programs yet may require seeking assistance. Often, courses have students in more than one program and results can be skewed if program populations are not separated for analysis. It may be necessary to involve an UOEEE college delegate or designee to aid in the isolation of student rosters for each program being assessed, for more guidance please contact the UOEEE assessment team.

The exercises throughout the Handbook include examples for a fictitious program, a Bachelor of Science in Marine Biology (BS MB).

Does the department mission statement support the school mission statement? The BS-MB mission statement supports the elements of the School's Mission Statement. It might also be considered to give greater emphasis to some elements than others. If you review the mission statements of the other departments in this school, you might find that each gives particular emphasis to those mission elements most related to its specific purpose; you will also find that, overall, the departments support the mission communicated in the school's and college's mission statements.

- ✓ Prepares students for professional careers and academic success in Marine Biology.
- ✓ Strives to uphold the highest ideals of ethical and scientific responsibly.
- ✓ Seeks to produce scientific leaders who will exemplify those values in their professional practice.
- ✓ Teaching, research, and social engagement that support and serve our local, regional, national, and global communities.

Bachelor of Science in Marine Biology

The mission of the BS in Marine Biology program is advance the science and to educate students, policy makers, and scientific community on critical issues. The BS MB program provides a high-quality education in the biology and ecology of the Marine systems as well as the current scientific, technical, quantitative, skills necessary in an increasingly complex science. BS MB graduates are prepared for further study at the graduate level or for employment in the field of marine biology.

Does the BS MB Mission Statement support the Department and School's Mission Statements? The BS MB Mission Statement supports the elements of the department's Mission Statement. It might also be considered to give greater emphasis to some elements than others. If you review the mission statements of the other programs in this department, you might find that each gives particular emphasis to those mission elements most related to its program-specific purpose; you will also find that, overall, programs support the overall mission communicated in the department and school mission statements.

- ✓ Prepares students for professional careers as fish and wildlife biologist, aquatic biologist, fisheries biologist, and other marine biology-related fields.
- ✓ Provides students a comprehensive and multidisciplinary education in the science, technology and ecology of marine environments.
- ✓ Study and application of scientific principles in marine biology's scientific advancement. .
- ✓ Graduates are prepared to serve as ethical and responsible marine biologist.
- ✓ Local, regional, or national levels in their chosen careers.

Direct measure for BS MB program: Environmental analysis paper in -MBS 442 (Marine Biology in Tropical Regions)

Indirect measure for BS MB program: ASU undergraduate alumni survey items that ask whether students are employed and how closely related their job is to their undergraduate program at ASU.

Program goals for the BS MB program

There are several possible goals that we could identify for graduates of our BS MB program. Some examples are shown below:

- We want our graduates to be employed as marine biologist.
- We want our graduates to be qualified for and admitted to graduate school.
- We want our graduates to the scientific body of knowledge for marine biology.

Mission Statement: Exercises 3.1

Exercise 1: Analyze your mission statements

Does your college's mission statement support the ASU Charter? Take a minute to review the mission statement for your college. Underline those parts of the ASU Charter that you believe are supported by your college's mission statement. Do you believe that your college's mission statement supports the ASU Charter very well? Somewhat? Not very well?

Does your department/school mission statement support your college's mission statement? Return to the college mission statement and underline those elements that are supported by your department/school mission statement. Do you believe that your department/school mission statement supports your college's mission statement very well? Somewhat? Not very well?

If you are unsatisfied with the degree to which any of your mission statements support those above them, you may want to initiate a later conversation with your colleagues.

Exercise 2: Select a program

What program in your department will you use for today's exercise? Please list the program below.

Goal: Exercises 3.2

Exercise 3: Use the space below to list two or three program goals for your program.

Do the goals above support the department mission statement? Review your department mission statement and underline those elements that are supported by the program goals above. If the goals you wrote do not support the program mission statement, take a moment to revise your program goals.

Choose one program goal from the list above that you will use for this exercise. You and your colleagues may decide to use the other program goals as you develop your full assessment plan. You may also decide to revise the list or add other program goals not listed above.

Our program goal for the BS MB program is, "We want our graduates to be employed as marine biologist."

Exercise 4: Write a program goal for your program:

Outcomes: Exercises 3.3

Use the following steps to develop a program outcome.

Exercise 5: Begin to brainstorm about possible program outcomes for your program.

***Step One*:** Focus on Specialized Accreditation, HLC, and university expectations on necessary components of assessment, i.e., General Education. Review a long term program goal and think about the knowledge and skills necessary to prepare your students *to achieve that goal.* Let's start by reviewing our long term goal for BS MB graduates:

We want our graduates to be employed as marine biologist.

That is a very large goal. In order for program graduates to become marine biologist, they will need to possess considerable scientific knowledge by the time they graduate. They should also have acquired at least some of the basic skills they will later use in their professional lives.

It helps to begin by brainstorming about the many possible knowledge areas or skills that students should acquire prior to graduation.

Step Two: *Review the examples of knowledge and skill areas.*

Step Three: Identify areas of content knowledge that are closely related. You may realize that some areas represent subsets of knowledge or skill represented on others. That is fine; just group these together in groups that make sense to you. As you do this, you may see some areas that you want to discard. Mark through them with an "X," if you want, but don't discard them just yet – they may give you other ideas. You also may begin to think of additional words you'd like to add to flesh out your ideas. You might find it helpful to cluster related ideas on a sheet of paper and draw a circle around each cluster. Use this time to focus more closely on the specific things your students should know and be able to do at graduation if they are to be prepared for your long term goal.

Step Four. Identify one area of content knowledge that you will use to develop a single learning outcome.

For the BS MB program, I decided to use: "Knowledge of marine biology." I noticed that it was too broad, though, so I added notes to remind me that I need to decide what kind of policies to focus on for my learning outcome. I decided to focus my outcome on writing specific biology skills and knowledge.

Exercise 6: Pick one knowledge area or skill (or a related cluster) that you will use for your outcome. Copy any additional notes you made below. Use this opportunity to narrow your focus on a specific knowledge area or skill.

Identifying only two to five program outcomes can seem like an impossible task if we don't follow this systematic approach.

Step Five: Review the guidelines detailed earlier, then write the first draft of a program outcome based on the knowledge or skill you chose for Exercise 6. Don't worry about perfection – you'll have an opportunity to review this draft and revise.

First draft – BS MB program outcome:

BS MB graduates who enter the marine biology profession will have high publication rates for their research.

Guidelines	Are the guidelines met?
Support program mission	☒ High publication rates are important to any scientist, but unrelated to the BS MB program mission. *Remember to base each program outcome on a long term goal to ensure consistency with program mission.*
Directly related to discipline	☒ The BS MB program trains its students in scientific inquiry, not policy issues.
Observable and measurable	☑ Marine biology statistics are readily available through a number of public sources.
Focused on outcomes rather than inputs	☑ Scientific publication is an outcome rather than a curricular input.
Consider external standards, if any	☑ No accreditation standards apply.
Avoid combining multiple outcomes	☑ This is a single outcome.
Short and concise	☑ This is not an overly wordy outcome.
Students will be able (or prepared) to _____	☒ This does not describe a specific student ability.

Exercise 7: Write the first draft of a program outcome for your program. Write your outcome statement in the shaded box below. Next, check the boxes for guidelines that your outcome meets.

Program Outcome	Are the guidelines met?
	☐ Measure flows from and supports plan goal(s) ☐ Directly related to discipline ☐ Observable and measurable ☐ Focused on acquired skills and knowledge rather than inputs ☐ Consider external standards, if any ☐ Avoid combining multiple outcomes ☐ Short and concise ☐ Students will be able (or prepared) to _____

Step Six: Write second (or third, etc. draft) of your outcome. Continue to evaluate using the guidelines, and revise until all eight guidelines have been met.

Revised Draft - BS MB program outcome:

BS MB graduates will be able to apply knowledge of biology, ecology, and genetic issues to develop well-written studies that are scientifically defensible and socially acceptable to key stakeholders.

Guidelines	Are the guidelines met?
Support program mission	☑ This outcome is directly related to our long term goal, so we know that it supports the program mission.
Directly related to discipline	☑ This outcome is directly related to marine biology.
Observable and measurable	☑ There are many ways in which faculty can ask students to demonstrate their scientific inquiry skills.
Focused on outcomes rather than inputs	☑ Demonstration of content knowledge and skills is outcome-focused.
Consider external standards, if any	☑ No accreditation standards apply.
Avoid combining multiple outcomes	☒ This is multiple outcomes combined in a single statement:
Short and concise	☒ This is somewhat wordy – a red flag for multiple outcomes.
Students will be able (or prepared) to _____	☑ This is in the correct form.

Final Draft – program outcome:

BS MB graduates will be able to research issues in marine biology.

Guidelines	Are the guidelines met?
Support program mission	☑ This outcome is directly related to our long term goal, so we know that it supports the program mission.
Directly related to discipline	☑ This outcome is directly related to Marine Biology.
Observable and measurable	☑ There are many ways in which faculty can ask students to demonstrate their biology knowledge and scientific inquiry skills.
Focused on outcomes rather than inputs	☑ Demonstration of content knowledge and skills is outcome-focused.
Consider external standards, if any	☑ No accreditation standards apply.
Avoid combining multiple outcomes	☑ This is a single outcome.
Short and concise	☑ This is short and concise.
Students will be able (or prepared) to _____	☑ This is in the correct form.

Exercise 8: Write the second (or third) draft of your program outcome. Continue to revise until all guidelines are met.

Program Outcome	Are the guidelines met?
	☐ Measure flows from and supports plan goal(s) ☐ Directly related to discipline ☐ Observable and measurable ☐ Focused on acquired skills and knowledge rather than inputs ☐ Consider external standards, if any ☐ Avoid combining multiple outcomes ☐ Short and concise ☐ Students will be able (or prepared) to _____

Program Outcome	Are the guidelines met?
	☐ Measure flows from and supports plan goal(s) ☐ Directly related to discipline ☐ Observable and measurable ☐ Focused on acquired skills and knowledge rather than inputs ☐ Consider external standards, if any ☐ Avoid combining multiple outcomes ☐ Short and concise ☐ Students will be able (or prepared) to _____

Program Outcome	Are the guidelines met?
	☐ Measure flows from and supports plan goal(s) ☐ Directly related to discipline ☐ Observable and measurable ☐ Focused on acquired skills and knowledge rather than inputs ☐ Consider external standards, if any ☐ Avoid combining multiple outcomes ☐ Short and concise ☐ Students will be able (or prepared) to _____

Use the space below to write your final program outcome.

Measures: Exercises 3.4

Exercise 9: Write a direct measure for your outcome. Use the space below, and check the guidelines in the right column to identify any problems with your measure.

Use the space below to write a direct measure for your outcome. Check the guidelines in the right column to identify any problems with your measure.

Measure 1.1 (Direct)	**Are the guidelines met?**
	☐ Align measure with outcome ☐ Rubrics used/ analytic scoring ☐ At least one direct measure ☐ No unnecessary tests for assessment purposes ☐ No course grades ☐ No completion of thesis, dissertation, or course ☐ Specific artifacts described ☐ No long description ☐ Outcome not rewritten/repeated as a measure ☐ No multiple measures

Exercise 10: Write an indirect measure for your outcome. Use the space below, and check the guidelines in the right column to identify any problems with your measure.

Use the space below to write an indirect measure for your outcome. Check the guidelines in the right column to identify any problems with your measure.

Measure 1.2 (Indirect)	**Are the guidelines met?**
	☐ Align measure with outcome ☐ Rubrics used/ analytic scoring ☐ At least one direct measure ☐ No unnecessary tests for assessment purposes ☐ No course grades ☐ No completion of thesis, dissertation, or course ☐ Specific artifacts described ☐ No long description ☐ Outcome not rewritten/repeated as a measure ☐ No multiple measures

If MBS faculty chose to use grades from MBS-442 as a measure of scientific inquiry skills, it would appear that Student A had graduated with better scientific inquiry ability than Student B. In reality, Student B performed much better than Student A on the only direct measure of scientific inquiry from the MBS-442 class.

See next page

Example: Course Grade vs. Direct Measure	Student A	Student B
Course Grade	**3.2**	**3.1**
Written Communication	4	2
Scientific Inquiry	**2**	**4**
Critical Thinking	2	4
Information Literacy	3	3
Teamwork	4	2
Creative Thinking	4	3

Other measures that would be appropriate for this program outcome include the following:

- The MBS-442 final exam rubrics that required students to evaluate findings and make recommendations. Rubric items need to be able to target skills and knowledge necessary for success as a marine biologist.
- Alumni surveys that ask program graduates employed as marine biologist how well the program prepared them to perform research. (indirect)
- Evaluations that program interns and/or graduates employed as marine biologist complete about how well prepared program graduates were to perform research.

Performance Criterion: Exercises 3.5

Exercise 11: Write one performance criterion for each measure.

Use the space below to write a performance criterion for your direct measure. Check the guidelines in the right column to identify any problems with your measure.

Performance Criterion 1.1 (Direct Measure)	Are the guidelines met?
	☐ Directly related to the measure ☐ Written in correct format ☐ No course grades or completions ☐ Thesis or dissertation reflects standard other than passing on first attempt

Use the space below to write a performance criterion for your indirect measure. Check the guidelines in the right column to identify any problems with your measure.

Performance Criterion 1.2 (Indirect Measure)	Are the guidelines met?
	☐ Directly related to the measure ☐ Written in correct format ☐ No course grades or completions ☐ Thesis or dissertation reflects standard other than passing on first attempt

Digication

For information and assistance with digital portfolios at Arizona State University, contact the UOEEE Assessment Team at Assessment@ASU.edu.

Digication Digital Portfolios - Reporting Capabilities

Introduction
Digication provides a variety of reporting options for viewing data collected through portfolio submissions as well as assessment data. Additionally, Digication provides options to export reports and submission data and provides administrators with tools to oversee system usage statistics.

Data Collection
Digication renders the process of data collection seamless due to its nested model of assessment. Data for student competencies and program effectiveness can be collected from any number and types of sources: assignment responses, practicum performance, course-level outcomes, specialization-specific outcomes (e.g., special education, early childhood education), whole portfolios or just particular portfolio pages, and other types of student work.

Once the Digication system is adopted by students, faculty and administrators, their individual modalities of system usage will be integrated in the Digication system as forms of learning evidence, assessment of learning outcomes, and management and analysis of collected data.

Portfolio Submission and Assessment Data
Digication has a unique approach in regards to program and institutional level assessment needs. Traditionally, most tools have had to choose to support either unstructured (but expressive) portfolios, or structured (but limiting) portfolios. Neither way has worked for institutions: unstructured portfolios are "hard" to assess, and structured portfolios do not encourage students to document authentic learning experiences. Digication supports both through a unique mapping process. Students can freely create portfolios by collecting and presenting work in a variety of formats (text, files, image, video, audio, hyperlinks, etc.), and submit only relevant pages for any assignments/projects in courses that they take or within assessment groups that are cohort or program based. Faculty, programs or the institution can create different contexts in which to collect student work, whether it is by learning outcomes or by projects and assignments. Each of the contexts can be mapped to one or more learning outcomes. During the submission process, Digication creates a permanent archive of the submission so that students can be freed to further edit their "live" portfolios while allowing institutions to retain non-editable, permanent, and time-stamped copies of any portfolio submissions. Digication also supports the process of allowing programs randomly sample and assign committee members (including internal and external reviewers) to perform assessments using rubrics retrospectively. The results can then be shown in reports for accreditation and for curriculum development.

Every portfolio and artifact uploaded to Digication, and every submission of user-created portfolios and artifacts, are associated with the user's ASUrite unique ID and also the course ID (if relevant).

Within Digication students can submit individual files (such as documents), text as well as a whole portfolio or selected pages of a portfolio. Each submission is archived within the system so that it may be accessed for assessment and reporting needs in the future. Archived portfolios (which are referred to as snapshots) are clickable versions of the portfolio no longer editable by the student. The student can make changes to their portfolio without impacting the assessment process or important institutional archives of student work. All submitted documents or portfolio snapshots are

permanently archived. Any files, sections or pages within the portfolio that are later amended will have no impact on the archived submissions or assessment data collected.

Snapshots are time-stamped and include other important metadata (e.g., the student, course or assessment group, mapped outcomes, assessment collected via written feedback and/or rubric scores, faculty and reviewers).

These are permanent archives for the institution that may be used for course, program and large scale institutional assessment. Archived work is also referenced in assessment reports.

Archived work may be used in evaluated student growth during a course but may serve as a collection of work to be reviewed as a larger college experience and also may be utilized in longitudinal research efforts.

Collecting snapshots does not require manual steps by University staff.

As portfolios are developed and submitted to courses and relevant assessment groups, specific programs can accumulate large amounts of data about student performance and assess the data in light of determined institutional objectives and program learning outcomes. This can be done easily by: initiating queries under any category deemed relevant (such a courses, specific portfolio assignments, specific outcomes, faculty, submission dates, assessment dates, etc.) sampling individual portfolios or program-specific portfolios, comparing sets of data, or measuring learning outcomes by reference to institution-specific, program-specific, AAC&U and other metrics of interest.

Reporting Capabilities

Digication reporting capabilities will provide relevant data to the University regarding student progress toward learning outcomes and standards. The platform enables programs to specify its goals in detail, track progress towards them at the course level rather than waiting extended periods of time after a student may have been enrolled to assess their work. Instructors and programs will have access to real-time assessment data linking to actual evidence of student work and therefore make use of valid measures to assess program performance. This real-time collection and assessment of student work ultimately provides instructors and programs with the information they need to make critical curriculum or course design changes to benefit student learning. It provides programs with the data they need to develop and adopt new policies much more quickly if students are not developing the skills at the rate intended to ensure future program improvements.

The University will be able to export critical assessment data for sharing with accreditation teams regarding student progress and achievement and provide evidence of student learning through archived student work and portfolios.

The University will also be able to share with accrediting teams reports detailing course and program alignment to specific standards and learning outcomes and how data is driving decisions for curriculum development and course design.

Many predefined reports are available with sophisticated filtering options to allow institutions to create ad hoc reports as needed. Digication is also available to customize reports based on units' needs to add to the list of predefined reports. Custom reports are included for no additional charge. Below is a list of the predefined reports available and the filtering options for each report.

Assessment By Standard (See evidence and assessment data with options to filter by Standard(s), Specific Student(s), Major, Graduation, Specific Course(s), Specific Faculty, Evidence format, Evidence Submission Date Range, Assessment Date Range, Custom Filters).

Course Assessment (Course evidence and assessment data with options to filter Specific Student(s), Major, Graduation, Specific Course(s), Specific Faculty, Assignment Step Types (Evidence, Rubric, Reflection, and Standards), and Custom Filters).

Overview: Standards (see an Overview of standards and their current usage with options to filter by Standard(s), Specific Course(s), and Custom Filters).