



Learning Outcomes Assessment in Support of Continuous Improvement of Assignments, Courses, and Programs

A guide for the University of Maryland prepared by the Office of Undergraduate Studies,
the Office of Institutional Research, Planning & Assessment,
and the Teaching and Learning Transformation Center
February 12, 2019

The University of Maryland strives to provide high-quality educational experiences for all students. Achieving, measuring, and reporting on student learning is essential to this goal. By having faculty drive the assessment of student learning in alignment with their priorities, UMD meets the expectations of our institutional accrediting body, Middle States Commission on Higher Education, and programmatic accrediting agencies. UMD promotes an approach to learning outcomes assessment that is mapped to, and reinforced by, the teaching and learning process. This approach engages faculty in an ongoing self-examination of their teaching. Through continuous improvements and assessment, faculty promote student learning and help us meet our institutional aspirations.

The assessment process supports a cycle of curriculum improvement in which learning outcomes are identified as explicit goals; assessment provides evidence on the extent to which those goals are being met (see Figure 1). Gaps between goals and achievement drive continuous improvement.

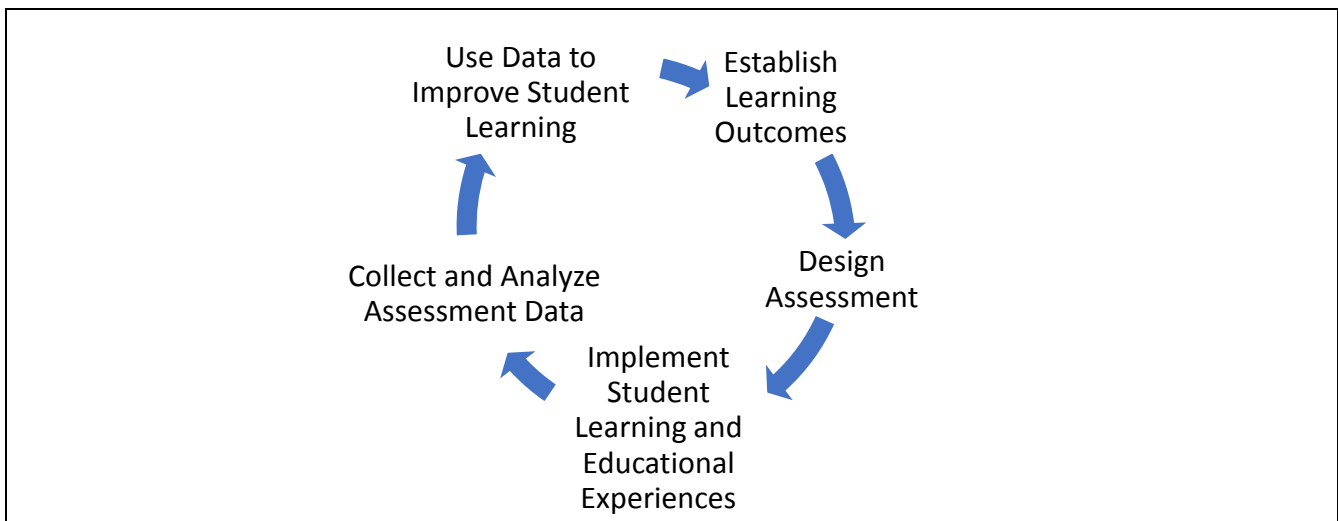


Figure 1: Cyclical Process of Curriculum Development

Development of an assignment, course, or program benefits from this cycle of development and continuous improvement (Wiggins & McTighe, 1998). The cycle begins with faculty establishing learning outcomes, followed by their determining how *they will know* that outcomes have been met (design of assessments). The student learning experience is then built and implemented to align with learning outcomes and assessments. Finally, faculty collect and analyze student performance data and use insights from these data to inform improvements in curriculum and instruction. This last step closes the loop.

The purpose of this guide is to provide a common source of information for UMD faculty and administrators in support of development and continuous improvement of undergraduate education at the assignment, course, and programs levels.

This guide was developed collaboratively by a team representing units on campus currently engaged in leading learning outcomes assessment and curriculum design: Alice Elizabeth Donlan, Teaching and Learning Transformation Center (TLTC), Alan B. Socha, Institutional Research, Planning, and Assessment (IRPA), and Ann C. Smith, Office of Undergraduate Studies (UGST), with input from Ryan Long, The Graduate School, and the Provost's Commission on Learning Outcomes Assessment, which represents all colleges and schools.

Sections:

- ❖ **Establish Learning Outcomes**
 - The Elements of a Learning Outcome
 - The "Action" in a Learning Outcome
 - The Characteristics of Learning Outcomes
 - The Curriculum Map: a Tool to Align Course-level Outcomes with Program-level Learning Outcomes
- ❖ **Learning Outcomes Assessment**
 - Information on Direct vs Indirect Measures, Program Assessments Embedded in Courses, and Developing Rubrics
- ❖ **Design of the Student Learning Experience**
- ❖ **Collect and Review Assessment Data**
- ❖ **Use Learning Outcome Assessment Findings to Inform the Learning Experience**
- ❖ **Campus Support and Procedures for Curriculum Development and Learning Outcomes Assessment**
- ❖ **UMD Review Process for Undergraduate and Graduate Degree Learning Outcomes Assessment**
- ❖ **Resources**
- ❖ **References**

Establishing Learning Outcomes

The Elements of a Learning Outcome

Instructors and programs always have a list of concepts and skills that they want students to master. The establishment of student learning outcomes gives structure to this list by formally articulating the skills, knowledge, and abilities that faculty expect students to acquire by completing an assignment, course, or program.

Learning outcomes are **specific and measurable, and they guide the development and assessment of an assignment, course or program.**

A learning outcome has three written components:

1. The **condition** (i.e., “After completion of the program/course/assignment”)
 2. The **action** the student will be able to take (state, explain, describe, analyze, etc.)
 3. The **criterion** for success (what the student needs to know/do).
- (Baker et al., 2014)

Learning outcomes are developed at the assignment, course, and program level.

- **Example of an assignment-level learning outcome:**
After this activity, students will be able to state at least two characteristics that all living cells share.
- **Example of a course-level learning outcome:**
After taking this course, students will be able to distinguish prokaryotic cell from eukaryotic cells based on the presence of unique cell structures.
- **Example of a program-level learning outcome:**
After completion of a microbiology degree program, students will be able to predict the function of a prokaryotic cell structure according to its structural characteristics.

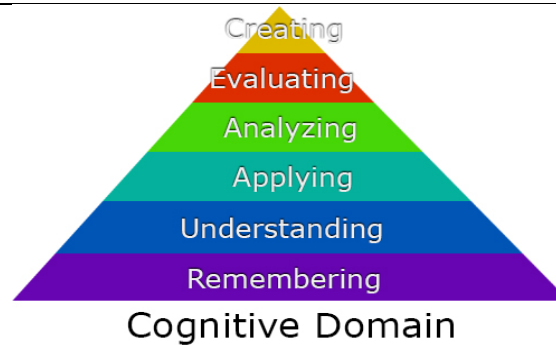
The assignment-level learning outcome provides one step toward achieving a broader course-level learning outcome, which in turn leads to a program-level outcome.

The Action in a Learning Outcome

Expectations for student learning may include many different cognitive processes and skills. Bloom’s taxonomy of cognitive processes (Bloom, 1956; Krathwohl, 2002) can help instructors think through the *actions* that they expect of students and the extent to which the actions involve higher- or lower-order thinking. Higher-order learning outcomes typically employ actions that are more cognitively difficult than lower-order learning outcomes and will require learning experiences that include more scaffolding and guidance than outcomes addressing lower-order cognitive domains. In representations of Bloom’s taxonomy, higher-order actions (such as analyzing and evaluating) are located near the top of the model, while lower-order actions (such as remembering) are near the bottom (Figure 2). Charts with action verbs categorized by Bloom’s Taxonomy are widely available and are good resources when developing learning outcomes statements (See Resources: Learning Outcomes Based Instruction).

Figure 2: Bloom's Taxonomy of Cognitive Domains

Representation of actions that pair with Bloom's taxonomy of cognitive domains: lower-order (remembering) to higher-order (creating)



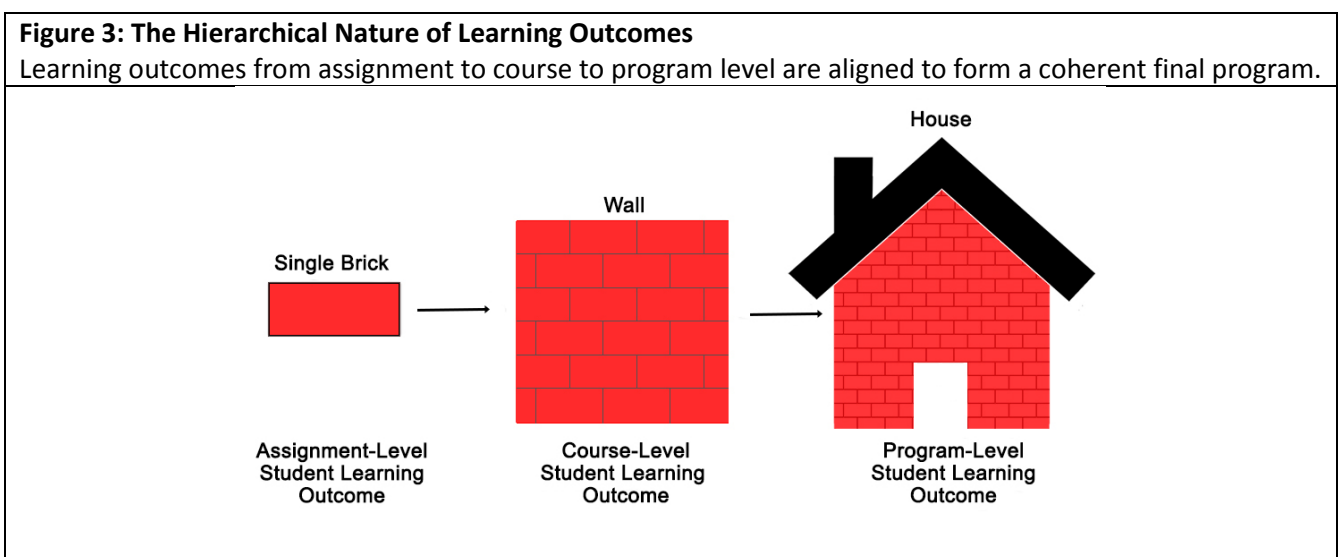
The Characteristics of Learning Outcomes

Learning outcomes are most useful when they are clearly stated; meaningful to the faculty; student focused; specific to the assignment, course, or program; and aligned from assignment to course to program. Outcomes have meaning when they are established by faculty in a collaborative process, are understandable to the students, and are written in the language of the discipline. Outcomes have specificity when they identify what distinguishes an assignment/course/program from other assignments/courses/programs (Table 1). The specificity of learning outcomes will vary from broad for university-level outcomes to narrow for assignment-level outcomes. Outcomes are aligned when assignment, course, and program expectations are nested into a coherent structure (Figure 3). For outcomes to be aligned, it is important for faculty to begin with the development of program-level learning outcomes and then design course-level learning outcomes that lead to the achievement of the program-level learning outcomes. After these are established, course instructors should develop assignment-level learning outcomes that roll up to the course-level outcomes. Students will experience the outcomes in the reverse order: assignment level, course level, program level. A curriculum designed in this way provides students with a coherent set of experiences leading to the achievement of the program's learning goals. Students should show increasing levels of sophistication and integration of skills as they progress through the program.

Table 1: Learning Outcomes Characteristics
 Meaningful outcomes are written in the language of the discipline and identify what distinguishes the assignment/course/program from other assignments/courses/programs.

Level	Specificity	Characteristics	Example
University	Broad, global	Describe broad areas of learning in which all undergraduate students should attain proficiency.	<i>After completion of the university degree, students will be able to formulate hypotheses and persuasive arguments.</i>
Program*	Describe what students will learn across their years of study, more specific than university outcomes.	Describe knowledge and/or skills that undergraduate students who complete the program should attain. Written in the language of the discipline, and identifies what distinguishes the program from others. <i>See Curriculum Map discussion.</i>	<i>After completion of a microbiology degree program, students will be able to predict the function of a prokaryotic cell structure according to its structural characteristics.</i>
Course	Provide detailed articulation of learning that occurs in a course, which connects to broader program outcomes.	Emphasize course specific learning that students who have completed the course should attain. Written in the language of the discipline.	<i>After completion of the course Introduction to Microbiology, students will be able to distinguish prokaryotic cells from eukaryotic cells based on the presence of unique cell structures.</i>
Assignment	Provide detailed articulation of learning that occurs in an assignment, which connects to broader course outcomes.	Point to skills and knowledge students should hone by completing individual assignments within courses. These will be relevant to course-level outcomes. Written in the language of the discipline.	<i>After the completion of this assignment, students will be able to diagram the structure of a bacterial flagellum.</i>

***UMD Program Level Learning Outcomes:**
 Undergraduate Degree Programs <https://www.irpa.umd.edu/Assessment/LOA-ug.html>
 General Education Program <http://www.gened.umd.edu/documents/GeneralEducationLearningOutcomes.docx>



The Curriculum Map: a Tool to Align Course-level Outcomes with Program-level Learning Outcomes

Mapping illustrates the relationship between the student learning experience and learning outcomes. Curriculum maps show where learning outcomes are *enacted* within an assignment, course, or program, and reveal how learning in one level aligns with another level. Curriculum maps chart the structure of a course or program and convey its intentional organization. Maps indicate how learning is scaffolded within a curriculum indicating, for example, where knowledge or skills are introduced, reinforced, or emphasized. Curriculum maps make the curriculum transparent to all stakeholders (Harden, 2001).

Program curricula may be built on course sequences or on course groupings. In course sequences, students make structured progress through courses, with each course building on the knowledge gained in the one before it (e.g., students use the outcomes they gain in ASTR120 as a starting point in ASTR121). In course groupings, the order of the courses is less important, but as the course level advances, they generally become more challenging (e.g., after the completion of five 300-level courses, students will be able to analyze the formal features of contemporary literature across cultures). When students review a program curriculum map, they see what they are expected to learn and find that program outcomes cannot be acquired through the completion of one course. An example of a program curriculum map is in Table 2. In the Germanic studies program, all of the core courses engage students in some level of learning for all program outcomes. Other programs may use a different approach to ensure that all students meet the program learning outcomes. Not all courses have to connect to every program-level learning outcome (see Resources: Curriculum Mapping).

The process of intentional curriculum mapping can reveal gaps that need to be addressed as well as areas of duplication that could be simplified to align learning experiences within a curriculum. To achieve alignment, it is important that faculty be collectively engaged. Often, the instructor of a course controls the articulation of the assignment-level to course-level learning outcomes, which can make the alignment across these two levels relatively simple. Different people may be constructing course-level and program-level outcomes, however. If these groups do not communicate regularly it is difficult to align these levels.

Engaging the full faculty in the curriculum mapping process serves as a program-level communication and consensus-building tool. Working together ensures that instructors know which program-level learning outcomes they are responsible for introducing, reinforcing, or emphasizing. Communal development of a program curriculum map fosters a supportive and collaborative culture among the faculty (Uchiyama and Radin, 2009).

Table 2: Curriculum Map from Germanic Studies Program				
Program learning outcomes listed in the top row are represented by short-hand terms. Core courses are listed in the first column. In this program, all of the core courses address all program learning outcomes.				
Learning Outcome	LO1: Writing	LO2: Reading	LO3: Oral Proficiency	LO4: Culture
Core Course				
Intro language sequence (103, 203)	Introduced	Introduced	Introduced	Introduced
Intermediate language sequence (204, 301, 302)	Reinforced	Reinforced	Reinforced	Reinforced
Survey of German Studies (320)	Reinforced	Emphasized	Reinforced	Emphasized
Highlights of German Literature II (322)	Reinforced	Emphasized	Reinforced	Emphasized
Advanced Conversation (401)	Reinforced	Reinforced	Emphasized	Emphasized
Advanced Composition (403)	Emphasized	Reinforced	Reinforced	Emphasized
Content Courses (436, 439, 442, 443, 444, 458)	Emphasized	Emphasized	Emphasized	Emphasized
Capstone Seminar (488)	Emphasized	Emphasized	Emphasized	Emphasized

Learning Outcomes Assessment

Assessment is not an end in itself but a vehicle for educational improvement. Learning outcomes assessment is the process of reviewing evidence of student learning to determine if the assignment, course, or program has provided the opportunity for students to make progress in meeting expectations.

The assessment measure provides evidence of student learning described in a learning outcome. To successfully gauge student learning, the assessment measure must be specifically aligned to the learning outcome being assessed. *Direct measures* require students to represent, produce, or demonstrate their learning, whereas *indirect measures* capture information about students' perceptions about their learning experiences and attitudes toward the learning process.

Direct evidence provides explicit, clear, and convincing support of student learning. Examples of direct evidence of what students have learned include:

- Student performance on a specific test question that is aligned with a learning outcome;
- Student performance on a pre-test as compared to performance on a post-test;
- Portfolios of student work assessed according to specific criteria (e.g., a rubric);
- Student performance on identified portions of certification or licensure exams that are aligned with a particular learning outcome;
- Student performance on a particular task (e.g., within a field experience context) assessed according to specific criteria (e.g., as outlined in a rubric);

- Student performance on a course project, paper, report, work of art, etc., which is assessed according to specific criteria (e.g., as outlined in a rubric).

The last example of a direct measure listed above describes assessment that is embedded within the regular curriculum. This approach links assessment with the usual practices of teaching and learning. For *embedded assessments* of program-level learning outcomes, it is important that assignments have a dual purpose; they serve goals beyond their course-specific role determined by a single faculty member, and become the “collective property” of the faculty as a whole. Because of their collective importance, student responses to these assignments should be rated independently of the course grading process, by a set of faculty using criteria and rubrics determined collaboratively by the program faculty (Ewell, 2009).

Indirect evidence is often useful in interpreting or supplementing findings of direct assessments, but is insufficient by itself to substantiate student learning. Examples of indirect evidence include:

- Job placement rates and salaries;
- Retention and graduation rates;
- Course grades (which typically compile information including multiple learning outcomes and other factors besides learning, such as attendance, participation, improvement, or effort);
- Transfer rates;
- Surveys of students and alumni;
- Documentation that content was covered in a course or a curriculum.

Rubrics are tools that articulate student performances that meet, or do not meet, the expectations of a learning outcome. Rubrics make explicit faculty expectations of student learning, as well as providing descriptions of what student work looks like at progressively higher levels of performance. Table 3 outlines some questions that help guide rubric development.

Table 3: Questions to Guide Rubric Development
<ol style="list-style-type: none"> 1. What type of student work would best demonstrate that students met the learning outcome? 2. What criteria will be used to judge the student work? <ul style="list-style-type: none"> • Do the criteria represent what you are trying to assess? • Are the criteria observable and measurable? • Do the criteria operationalize the learning outcomes? • Is the meaning of each criterion evident? 3. Are the performance level descriptions useful for assessment? <ul style="list-style-type: none"> • Do the descriptions represent what you are trying to assess? • Do the descriptions provide appropriate detail to allow distinctions among performance levels? Are the descriptions qualitatively distinct? • Does the advanced level description represent an outstanding level of expectation for the performance? 4. Is the overall rubric useful? <ul style="list-style-type: none"> • In guiding students in how to improve their performance? • In evaluating program/course/assignment design?

Even with the most specific rubrics, reviewers must still interpret student work. To limit the variance in raters' scores of the same student work, discussing and reaching consensus on the meaning of criteria and performance levels is essential. When reviewers calibrate (or norm) their scoring of student work before completing assessments, the assessment data are more reliable and can be aggregated to provide more useful information about student learning. In addition to increasing the consistency of scoring student performance, the use of rubrics to make expectations and criteria explicit promotes learning and improves instruction (Jonsson and Svingby, 2007). (See Resources: Rubrics.)

The General Education program has developed rubrics for assessment of the General Education outcomes (See Resources: UMD Learning Outcomes Assessment). If the General Education outcomes align with your program or course outcomes, you may find the General Education rubrics helpful for assessing an assignment, course, or program, or they may provide a starting point to develop your own program- or course-specific rubrics. You are encouraged to use these rubrics as they are helpful to you. They are available on the [General Education website](#) (see Resources: UMD Learning Outcomes Assessment) and in ELMS via the Speedgrader tool. The American Association of Colleges and Universities also has a set of rubrics that are designed to assess a series of skills including critical thinking and collaboration (See Resources: Rubrics).

Design of the Student Learning Experience

Backward Design (Wiggins & McTighe, 1998) is the practice of constructing an assignment, course or program by planning the end of the process first. The instructor or program faculty begins by naming explicit learning outcomes, then structures the learning experiences to guide students toward those outcomes. Without such goals, it can be difficult to maintain direction and consistency in terms of curriculum development and student assessment. Further, without identifying precisely what skills or knowledge students are meant to attain, instructors can find it difficult to choose appropriate content, or to select one assignment over another. The [Teaching and Learning Transformation Center](#) offers consultations and workshops to support the design of the student learning experience (See Resources: UMD Curriculum Development and Assessment).

Collecting and Reviewing Assessment Data

Once the curriculum is designed, the next step is to collect and review student work to assess the effectiveness of the curriculum. Depending on the assessment goals, it may be appropriate to look at the performance of all students in a program or course, or you may choose to review a sample of students. To allow for a meaningful analysis of student performance, consider creating a chart that includes the number of students assessed, scores achieved, and any other pertinent information that can help with interpretation. You may want to look at subpopulations of students to see if different groups have different learning achievements or to determine if your sample size is representative of the full program or course populations. It will be important to have demographic information (e.g., student major, year in school, gender) to allow for this review of subpopulations. The example table below lists the total number of students in the program, the number of students in the sample, the criteria for assessment, and the number of students and percentage of students who met the expectation for the outcome. This table includes some demographic data that is pertinent to the question: Which major curriculum path (path 1 or 2) best prepares students for meeting outcome 1? Other demographic information may be of importance to other programs or other learning outcomes.

Table 4: Sample Table for Presenting Results of Learning Outcomes Assessment

In this example, a total of 200 students' essays collected in the senior capstone course were reviewed according to criteria related to Outcome 1 (listed in column 1). The table contains counts of students receiving a score of 4 or greater on the rubric.

Rubric criterion for Learning Outcome 1	Path 1 students	% of all students	Path 2 students	% of all students	Both Paths	% of all students
1.1 Displays....	50	25%	50	25%	100	50%
1.2 Develops	100	50%	20	10%	120	60%
1.3 Analyzes...	120	60%	60	30%	180	90%

For learning outcomes assessment to be meaningful, assessment strategies need to be both reliable and valid. *Reliability* refers to the extent to which a measure assesses a learning outcome consistently across contexts, time, and students from different backgrounds. Some questions to consider: Were the conditions for the assessment similar from one student to the next? Who rated student work? Was the rating conducted in a consistent, unbiased way? Using clear, precise rubrics and engaging raters in a norming session before scoring student work can increase reliability.

Validity refers to the extent to which a measure accurately assesses the learning outcome that one intends to assess. Some questions to consider: Have multiple faculty familiar with this outcome agreed that this assessment tool is an appropriate measure of the learning outcome? Does the assessment tool capture all aspects of the learning outcome?

A note about sample size: Larger sample sizes provide data that are more generalizable and meaningful, and they provide greater opportunities to detect more subtle patterns than smaller sample sizes. Exactly what counts as a large sample size varies by the size of the full population, the reliability of the data collected, and the type of analyses one intends to perform. Broadly speaking, faculty are encouraged to collect enough data to make confident inferences about student learning.

A note about data collection design: Depending upon the goals for assessment, the collection design will vary. If the goal is to determine if an assignment, course, or program allows students to meet performance expectations for a learning outcome, measuring student performance at the completion of the learning experience will provide useful information. Programs may assess student learning at the culmination of the program (e.g. in a senior-level or capstone course), or in a course that has been indicated in the curriculum map as one where mastery is expected to be met for a particular outcome.

It should be noted that assessing students only at the culmination of a program does not reflect growth (i.e., students may be entering the program already at a mastery level). If the goal is to take a deeper dive and compare student performance prior to the learning activity, to performance after the learning activity, a “pre-post” design will provide insight. A “pre-post” design accounts for students’ skill or knowledge prior to the learning activity and provides information on the learning gained. “Pre-post” designs vary depending upon available options to collect data and assessment goals. Ideally, the same students would be assessed before and after the learning activity. This is more feasible for assessing the effectiveness of an assignment, or a course. In programs, students may enter at various points or may leave before completion. As such, assessment of all students as they enter and complete the program may not be feasible. In addition, collection of data only from those who enter at a selected point and

who complete the program may bias the results. For programs, an alternative collection design may be to assess a cross section of the students. For example, comparing the performance of current freshman to current seniors may serve to provide the insight about curriculum design that the program seeks.

A note about grading versus assessment: Course grades generally reflect a compilation of information about multiple learning outcomes and may be based on other criteria unrelated to learning, such as attendance or effort. As such, course grades do not provide useful data for evaluating how well the course curriculum allows students to meet specific learning outcomes. Only in instances where grades represent the evaluation of defined aspects of student learning (e.g., performance of a specific skill or response to a test question) and where the grades specifically reflect a defined level of performance (as would be articulated in a rubric) would grades provide data useful in evaluating the impact of a particular activity on student learning. As noted above when describing *embedded assessments*, programs might choose to review specific examples of student performance in courses to assess program-level learning outcomes. Using this approach, ratings from a review of the work using criteria established at the program level (and not the grade received for the work in the course) provide the assessment data.

Use of ELMS to Capture Assessment Data

The ELMS learning management system can support learning outcomes assessment. Faculty may include course learning outcomes in rubrics (via the ELMS “outcomes” and “rubric” tools) and review student performance on learning outcomes using an alternative gradebook (Learning Mastery Tool). Programs may similarly embed program learning outcomes assessment into an ELMS course using outcomes and rubrics established at the program level. The [General Education Learning Outcomes Assessment](#) process is set up in ELMS (See Resources: UMD Curriculum Development and Assessment). Faculty teaching General Education courses are encouraged to use program-level rubrics to assess student work aligned with the General Education outcomes and to submit ratings using the Speedgrader tool. Instructions for this process are available on the [General Education website](#) (See Resources: UMD Curriculum Development and Assessment). To use ELMS for program-level assessment, see the online resource for [Developing Program Level Assessment in ELMS Using Outcomes and Rubrics for Program Administrators](#), or contact the DIT Learning Technology Design Working Group for support (See Resources: UMD Curriculum Development and Assessment).

Using Learning Outcomes Assessment Findings to Inform the Learning Experience

Using assessment data to inform the student learning experience is called closing the loop because it connects one round of the teaching/curriculum development experience with the next (see Figure 1). At the end of the semester, faculty think back on what worked in the course and what did not. As cohorts of students move through programs, program faculty do the same reflection work. Using learning outcomes assessment to guide this reflection process leads to evidence-based reform. After reviewing the data, what conclusions can faculty make? What actions will faculty take to improve a course or program? Within the context of a course, an action may include revising an assignment to include more writing; within the context of a program, an action might include revising the flow by which students move through required courses. In addition to making changes in the learning experiences, faculty may find that assessment data prompt a review and revision of course or program learning outcomes or assessment measures.

Program development benefits from a regular schedule of assessment and engagement of multiple faculty in all stages of assessment: development of learning outcomes and assessments, collection of data, review and discussion of results, planning of evidence-based improvements, etc. Engagement of non-faculty stakeholders may be appropriate to provide a wider perspective on assessment. Some programs may engage non-faculty stakeholders in direct review of student work or may gain perspectives that influence continual improvement efforts with surveys (e.g., alumni survey, exit survey) or focus groups.

The General Education Program uses a “Reflection Survey” to capture information about how faculty use learning outcomes assessment findings for improvements in their General Education courses (See Resources: UMD Curriculum Development and Assessment).

Campus Support and Procedures for Curriculum Development and Learning Outcomes Assessment

Contact information for curriculum development and assessment resources at UMD are found in the Resource section of this document. For help in course and program curriculum development, creating or assessing course-level student learning outcomes, contact the [Teaching and Learning Transformation Center](#) and request a consultation. Contact [Division of Information Technology](#) for help with technology based solutions. See Resources: UMD Curriculum Development and Assessment.

For help in creating or assessing program-level student learning outcomes, contact the [Provost’s Commission on Learning Outcomes Assessment](#) or the [Office of Institutional Research, Planning & Assessment](#).

UMD Process for Review of Undergraduate and Graduate Degree Learning Outcomes Assessment

All undergraduate and graduate degree programs must submit yearly reports on learning outcomes assessment to the [Provost’s Commission on Learning Outcomes Assessment](#). This group of faculty provides peer review to programs in support of continual improvement. Contact your department to discuss the learning outcomes assessment process for your degree program. To gauge your learning outcomes and assessment measures, see the expectations from the [Undergraduate Degree Learning Outcomes Assessment Summary Report Rubric](#) (See Resources: See Resources: UMD Curriculum Development and Assessment).

Resources

Learning Outcomes Based Instruction

Unpacking Relationships: Instruction and Student Outcomes. Jankowski, N. A. (2017). Washington, DC: American Council on Education. *Information about aligning instruction with student outcomes.*

<http://www.acenet.edu/news-room/Documents/Unpacking-Relationships-Instruction-and-Student-Outcomes.pdf>

Principles of good practice for assessing student learning. Astin, Alexander W., et al. AAHE Bulletin 45.4 (1992). *Principles to guide assessment practices and promote improved student learning:*

Blooms Taxonomy Action Verbs from Utica College Assessment resources

Handout with action verbs for drafting learning outcome statements.

<https://www.utica.edu/academic/Assessment/new/Blooms%20Taxonomy%20-%20Best.pdf>

Curriculum Mapping

Mapping Learning: A Toolkit from National Institutes of Learning Outcomes Assessment

Information about curriculum maps and for approaches in curriculum map development

<http://www.learningoutcomesassessment.org/documents/Mapping%20Learning.pdf>

How to Develop a Curriculum Map

Site with details about how to develop a curriculum map, the value of mapping and examples from degree programs

[http://www.southernct.edu/faculty-staff/faculty-](http://www.southernct.edu/faculty-staff/faculty-development/teachingandlearningresources/curriculummapping.html)

[development/teachingandlearningresources/curriculummapping.html](http://www.southernct.edu/faculty-staff/faculty-development/teachingandlearningresources/curriculummapping.html)

Rubrics

Quick Guide to Norming On Student Work for Program Level Assessment From Washington State University

Example of how to set up a norming session for learning outcomes assessment using rubric criteria

<https://atl.wsu.edu/documents/2015/03/rubrics-norming.pdf/>

AACU VALUE Rubrics

Rubrics established by faculty associated with the American Association of Colleges and Universities.

Rubrics are aimed a skills including critical thinking and collaboration.

<https://www.aacu.org/value/rubrics>

Use of rubrics for evaluation of student work

Finley, Ashley P. "How reliable are the VALUE rubrics?." Peer Review 13.4/1 (2011): 31.

AACU PEER REVIEW issue Information about development and use of rubrics including an article about establishing the validity and reliability of a rubric.

<https://www.aacu.org/value/rubrics>

UMD Curriculum Development and Assessment

General Education

- General Education learning outcomes assessment process
http://www.gened.umd.edu/documents/5_6_16_GenEdAssessmentELMS-SetUp&Explantion%20FAQ.pdf
- General Education Learning Outcomes Assessment Instructions
<http://www.gened.umd.edu/for-faculty/faculty-gened-assessment.html>
- General Education Rubrics
Fifteen rubrics developed by faculty addressing General Education learning outcomes including teamwork and oral communication.
<http://www.gened.umd.edu/for-faculty/faculty-gened-assessment.html>

Degree Program Learning Outcomes Assessment Process and Support

- UMD Program Level Learning Outcomes:
Undergraduate Degree Programs
<https://www.irpa.umd.edu/Assessment/LOA-ug.html>
General Education Program
<http://www.gened.umd.edu/documents/GeneralEducationLearningOutcomes.docx>
- UMD Undergraduate Degree Learning Outcomes Assessment Materials
Find here the template for the yearly report to the Provost, which contains examples for presenting and interpreting assessment data, and the rubric that is used to assess LOA in undergraduate degree programs.
<https://www.irpa.umd.edu/Assessment/LOA-ug.html>
- University of Maryland Accreditation Information
Find here the most recent Self Study that includes a discussion of learning outcomes assessment
<https://www.provost.umd.edu/MS17/>
- Institutional Research Planning & Assessment
Resource for developing program assessment
<https://www.irpa.umd.edu/>
- Office of the Associate Provost and Dean for Undergraduate Studies
Resource for information about developing program assessment or with questions about assessment of a General Education course. The Associate Provost serves as the chair of the Provost's Commission on Learning Outcomes Assessment
<https://www.ugst.umd.edu/>
- Instructions for Developing Program Level Assessment in ELMS Using Outcomes and Rubrics for Program Administrators
https://umd.service-now.com/itsc?id=kb_article&article=KB0013527
- DIT Learning Technology Work Group
<https://it.umd.edu/governance/learning-technology>

Course and Curriculum Design Support

- Teaching and Learning Transformation Center
Resource for course and curriculum development and assessment
<https://tltc.umd.edu/>

References

- Baker, N., Chang, A., Hung, K., Liao, M., Merkel, S., & Stevens, A. (2014). ASM General Microbiology Learning Outcome Examples. *American Society for Microbiology*. Retrieved from: <https://www.asm.org/ASM/media/Education/FINAL-Learning-Outcomes-w-title-page.pdf>
- Bloom, B.S. (Ed.). Engelhart, M.D., Furst, E.J., Hill, W.H., Krathwohl, D.R. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York: David McKay Co Inc.
- David R. Krathwohl (2002). A Revision of Bloom's Taxonomy: An Overview, *Theory Into Practice*, 41:4, 212-218, DOI: 10.1207/s15430421tip4104_2
- Ewell, P. (2009). Assessment, Accountability, and Improvement: Revisiting the Tension. *National Institute for Learning Outcomes Assessment*. Retrieved from: http://learningoutcomesassessment.org/documents/PeterEwell_005.pdf
- Finley, Ashley P. "How reliable are the VALUE rubrics?." *Peer Review* 13.4/1 (2011): 31.
- Harden, Ronald, M. "AMEE Guide No. 21: Curriculum mapping: a tool for transparent and authentic teaching and learning." *Medical teacher* 23.2 (2001): 123-137.
- Huba, M. E., & Freed, J. E. (2000). *Learner-centered assessment on college campuses: Shifting the focus from teaching to learning*. Boston: Allyn and Bacon.
- Jonsson, Anders, and Gunilla Svingby. "The use of scoring rubrics: Reliability, validity and educational consequences." *Educational research review* 2.2 (2007): 130-144.
- Kuh, G., Jankowski, N. Ikenberry, S., & Kinzie, J. (2014). *Knowing what students know and can do: The current state of student learning outcomes assessment in U.S. colleges and universities*. Retrieved from: <http://www.learningoutcomeassessment.org/documents/2013%20Abridged%20Survey%20Report%20Final.pdf>
- Uchiyama, Kay Pippin, and Jean L. Radin. "Curriculum mapping in higher education: A vehicle for collaboration." *Innovative Higher Education* 33.4 (2009): 271-280.
- Undergraduate Learning Outcomes Assessment. (n.d.). Retrieved from <https://www.irpa.umd.edu/Assessment/LOA-ug.html>
- Wiggins, G., & McTighe, J. (1998). *Understanding by Design*. Alexandria, VA: Association for Supervision

and Curriculum Development.

Wood, WB. (2009). Innovations in Teaching Undergraduate Biology and Why We Need Them. *Annual Review of Cell and Developmental Biology*, 25, 93-112.