KNOX COLLEGE

GUIDE TO ACADEMIC PROGRAM ASSESSMENT

Compiled by

The Office of Institutional Research and Assessment
&
The Assessment Advisory Group

Galesburg, Illinois
2010

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A MESSAGE FROM THE ASSESSMENT ADVISORY GROUP

Assessment and Knox's Educational Mission

Many of us have some skepticism about the enterprise of assessment, which is fairly new as a systematic, campus-wide effort at Knox. We have been asked by the Higher Learning Commission to join the mainstream of higher education by turning our ongoing attention and efforts to assessment at both the program and the college levels. On behalf of your fellow faculty members on the newly formed Assessment Advisory Group (AAG), I would also like to make the case that the sort of assessment we as faculty should strive to conduct in the coming months and years can and should be in absolute agreement with our Knox mission as educators. After years of graduate school and teaching, we faculty rightly value our ability to profess, to declaim, to impart. But sometimes, in our focus on "what we are teaching," we lose sight of "what students are learning." As teachers and as faculty responsible for the entire curriculum of the College, our responsibility is also to consider the curriculum from the vantage point of the students. What are the skills, materials, and habits of mind students we intend for them to learn? How do we know they have learned these? How can the students themselves be confident that they have learned these? How do we know students are learning in the best possible manner?

Most of us are fastidious about addressing these questions and concerns at the course level, and we regularly adapt our teaching and grading methods accordingly (think of those teaching narratives you write for your major reviews!). As student populations change over a decade, we may also adopt new strategies in the classroom based on "how well things are working." If we employ these techniques at the course level, then, why would we hesitate doing so at the program level and at the college level? And indeed, we should keep in mind that this is the true goal of assessment, if rightly done: to become as pedagogically self-aware and as pedagogically responsive as we can be. As we take ownership of assessment at Knox and make it truly workable for our students' needs, we take a very important step toward fulfilling our responsibility to the students. We also build our own confidence as educators as we learn to explain the value of our curricula on both the program and college levels more clearly than we currently do.

So as you turn the pages of this guide, please think of assessment as a collective research and creative project in which we as a full faculty will engage: a project in which we are alert to data and creative in our thinking about how best to meet both our students' needs and our own pedagogical aspirations.

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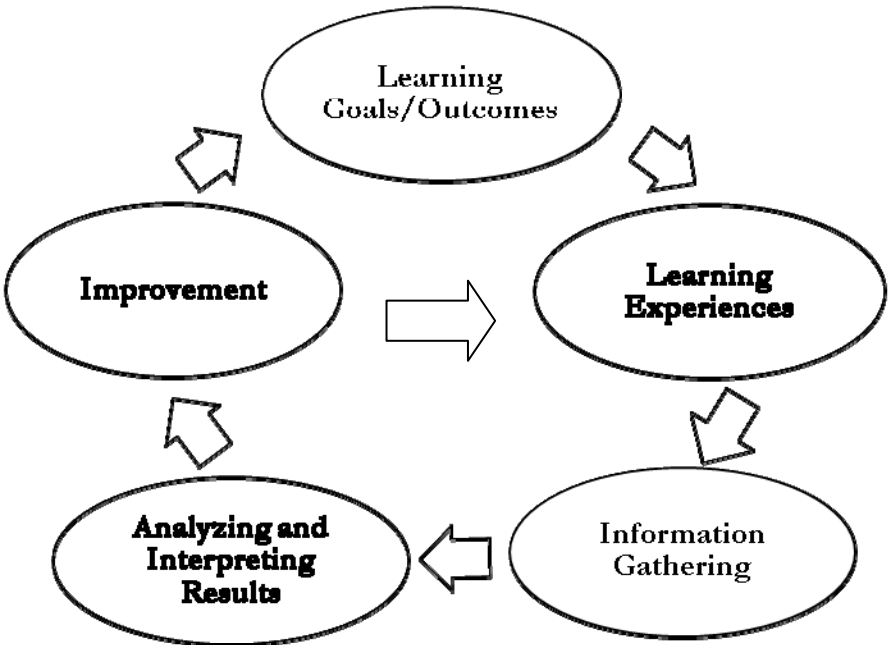
INTRODUCTION

This guide has been compiled in order to help Knox faculty integrate assessment into teaching and learning. The guide focuses on assessment to be carried out at the program level (departments and interdisciplinary programs), but individual faculty members can use these same approaches, strategies, and methods to conduct assessment within individual courses. The guide provides a common reference point, a place to begin. Faculty are also encouraged to consult with the Associate Director for Assessment Support and with members of the Assessment Advisory Group for help with tailoring assessment to the needs of particular programs and courses.

WHAT IS ASSESSMENT?

Assessment is the systematic, cyclical, and on-going process of gathering, analyzing, and using information about educational programs and student learning outcomes to improve programs and student learning in light of core educational missions and goals.

The Assessment Loop



Assessment begins with the setting of learning goals/outcomes, which are used to structure student learning experiences (e.g., readings, assignments, projects, and lab activities). Information is gathered during or after learning experiences and is analyzed to determine how well student performance matches the intended learning goals/outcomes. The results are then used to inform programs in improving student learning and making sure learning goals/outcomes are being met.

PRINCIPLES OF GOOD PRACTICE FOR ASSESSMENT [1]

1. The assessment of student learning begins with educational values. Assessment is not an end in itself but a vehicle for educational improvement. Its effective practice, then, begins with and enacts a vision of the kinds of learning we most value for students and strive to help them achieve. Educational values should drive not only what we choose to assess but also how we do so. Where questions about educational mission and values are skipped over, assessment threatens to be an exercise in measuring what's easy, rather than a process of improving what we really care about.

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

3. Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes. Assessment is a goal-oriented process. It entails comparing educational performance with educational purposes and expectations—those derived from the institution's mission, from faculty intentions in program and course design, and from knowledge of students' own goals. Where program purposes lack specificity or agreement, assessment as a process pushes a campus toward clarity about where to aim and what standards to apply; assessment also prompts attention to where and how program goals will be taught and learned. Clear, shared, implementable goals are the cornerstone for assessment that is focused and useful.

4. Assessment requires attention to outcomes but also and equally to the experiences that lead to those outcomes. Information about outcomes is of high importance; where students "end up" matters greatly. But to improve outcomes, we need to know about student experience along the way—about the curricula, teaching, and kind of student effort that lead to particular outcomes. Assessment can help us understand which students learn best under what conditions; with such knowledge comes the capacity to improve the whole of their learning.

5. Assessment works best when it is ongoing, not episodic. Assessment is a process whose power is cumulative. Though isolated, "one-shot" assessment can be better than none, improvement over time is best fostered when assessment entails a linked series of cohorts of students; it may mean collecting the same examples of student performance or using the same instrument semester after

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[1] These principles were developed under the auspices of the AAHE Assessment Forum with support from the Fund for the Improvement of Postsecondary Education with additional support for publication and dissemination from the Exxon Education Foundation. Authors include Alexander W. Astin, Trudy W. Banta, K. Patricia Cross, Elaine El-Khawas, Peter T. Ewell, Pat Hutchings, Theodore J. Marchese, Kay M. McClenney, Marcia Mentkowski, Margaret A. Miller, E. Thomas Moran, and Barbara D. Wright.

semester. The point is to monitor progress toward intended goals in a spirit of continuous improvement. Along the way, the assessment process itself should be evaluated and refined in light of emerging insights.

6. Assessment fosters wider improvement when representatives from across the educational community are involved. Student learning is a campus-wide responsibility, and assessment is a way of enacting that responsibility. Thus, while assessment efforts may start small, the aim over time is to involve people from across the educational community. Faculty play an especially important role, but assessment's questions can't be fully addressed without participation by student-affairs educators, librarians, administrators, and students. Assessment may also involve individuals from beyond the campus (alumni/ae, trustees, employers) whose experience can enrich the sense of appropriate aims and standards for learning. Thus understood, assessment is not a task for small groups of experts but a collaborative activity; its aim is wider, better-informed attention to student learning by all parties with a stake in its improvement.

7. Assessment makes a difference when it begins with issues of use and illuminates questions that people really care about. Assessment recognizes the value of information in the process of improvement. But to be useful, information must be connected to issues or questions that people really care about. This implies assessment approaches that produce evidence that relevant parties will find credible, suggestive, and applicable to decisions that need to be made. It means thinking in advance about how the information will be used, and by whom. The point of assessment is not to gather data and return "results"; it is a process that starts with the questions of decision-makers, that involves them in the gathering and interpreting of data, and that informs and helps guide continuous improvement.

8. Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change. Assessment alone changes little. Its greatest contribution comes on campuses where the quality of teaching and learning is visibly valued and worked at. On such campuses, the push to improve educational performance is a visible and primary goal of leadership; improving the quality of undergraduate education is central to the institution's planning, budgeting, and personnel decisions. On such campuses, information about learning outcomes is seen as an integral part of decision making, and avidly sought.

9. Through assessment, educators meet responsibilities to students and to the public. There is a compelling public stake in education. As educators, we have a responsibility to the publics that support or depend on us to provide information about the ways in which our students meet goals and expectations. But that responsibility goes beyond the reporting of such information; our deeper obligation—to ourselves, our students, and society—is to improve. Those to whom educators are accountable have a corresponding obligation to support such attempts at improvement.

FIVE STEPS OF THE ASSESSMENT PROCESS: AN OVERVIEW

STEP 1: IDENTIFY LEARNING OUTCOMES

- What are the knowledge, skills, and dispositions that you want students to gain through your program?
- What should students be able to do as a result of this learning?

STEP 2: ALIGN THE CURRICULUM IN LIGHT OF LEARNING OUTCOMES

- How is your program's curriculum (e.g., courses offered, major/minor requirements, capstone experience) aligned with the learning outcomes?

STEP 3: FORMULATE QUESTIONS; IDENTIFY AND IMPLEMENT APPROPRIATE ASSESSMENT METHODS

- What questions about student learning would you like to address?
- What procedures and/or tools will your program use to gather evidence about student learning?
- What criteria will you use to judge successful achievement of learning outcomes?

STEP 4: MAKE SENSE OF ASSESSMENT RESULTS

- What are the results of your assessment? What have you learned about your program? What is working well, or not so well?

STEP 5: USE ASSESSMENT RESULTS FOR PROGRAM IMPROVEMENT

- What changes, if any, do you plan to implement as a result of what you have learned?
- What are the next steps you will take in assessment? Further questions on the issue just studied? New issues to pursue?

STEP 1: IDENTIFY LEARNING OUTCOMES

WHAT ARE LEARNING OUTCOMES?

Learning outcomes identify what students should be able to do as a result of what they have learned: *"When students complete our program, they will be able to. . ."* Effective statements of learning outcomes will include verbs that identify the ways of thinking, writing, or acting that we expect students to demonstrate. Learning outcomes can be developed at different levels: for an individual course, for a program, or for the institution as a whole. Learning outcomes, developed together by the program faculty, should provide guidance in many areas of the curriculum, such as individual courses, typical learning activities and assignment, and grading.

HOW TO DEVELOP PROGRAM-LEVEL LEARNING OUTCOMES

Aim to develop a short list of key outcomes (about three to five) on which all faculty agree. Do not try to cover all possible learning outcomes, but focus instead on several highly important ones. If there is disagreement among faculty, focus on key outcomes on which all can agree.

Useful strategies

- ***VISUALIZE YOUR "IDEAL MAJOR."*** This is the most effective strategy to identify desirable learning outcomes. What should an ideal student in your program be able to do by the time she or he graduates? What are the knowledge, skills, and dispositions that you want students to gain through your program?

  Other resources that can help in identifying learning outcomes:
  - List of program goals in your most recently completed self-study report
  - Mission statements of the program and/or of the College
  - Assessment material developed by the professional organization in your field
  - Assessment material developed by similar programs at other colleges and universities

Characteristics of effectively stated learning outcomes

- A learning outcome should be stated clearly and concisely, readily understandable by students as well as faculty.
- Each outcome should be expressed as something the **student** might achieve, not as what the **teacher** will do.
- Each outcome should include a verb that refers to specific skills or actions whose achievement is possible to observe (and so to assess). For example, instead of "understand," you might use "describe and interpret." Instead of "be aware of," you might use "name and define." For examples of action verbs, see Bloom's Taxonomy of Cognitive Domain (p. 11) which has been widely used to develop program learning outcomes.

SAMPLE LEARNING OUTCOME STATEMENTS
(FROM VARIOUS COLLEGES)

The following are examples of program learning outcomes in various academic fields. Please note that although only one example is provided within each academic field, departments and programs at Knox need to develop **three to five** program-level learning outcomes.

Anthropology and Sociology

All graduating majors will be able to analyze a contemporary social problem, using major theoretical perspectives of anthropology/sociology.

Art history

All majors will be able to conduct art historical research, interpreting art work and integrating appropriate secondary sources.

Biology

Students will be able to apply their knowledge of biology to the world outside of the classroom.

Modern Languages and Literatures

Majors will be able to design and carry out an original research project in which their target language is the major investigatory tool and vehicle of expression.

Philosophy

Students will be able to explain difficult philosophical ideas and concepts in an informed, effective, and coherent manner.

Physics

Students can evaluate the validity and limitations of scientific theories and claims about the physical properties of the universe.

Political Science

Students will be able to identify and summarize the major structural elements of American government.

Psychology

Graduating psychology majors can describe and summarize the development of psychological theories.

Theatre

All drama majors can identify and describe the relationships among the elements of theatrical performance: writing, directing, acting, design, and audience.

Information Literacy

A student efficiently and effectively evaluates all types of information and makes informed judgments about the quality and usefulness of that information in order to fulfill his/her information needs.

A SUGGESTED LIST OF ACTION VERBS BASED ON BLOOM'S TAXONOMY

Bloom's Taxonomy of Learning Domains (1956) has been widely applied to understand and develop appropriate learning outcomes. For the cognitive domain, Bloom identified six levels—from the simple recall or recognition of facts (the lowest level) to the more complex synthesis and evaluation of ideas (the highest levels). The taxonomy provides a useful structure for using common action verbs associated with categories in the cognitive domain. This list is not exhaustive, but exemplifies some of the more commonly used verbs for writing learning outcomes.

Bloom's Taxonomy: Cognitive Domain		
Outcome-illustrating Verbs	**Levels**	**Definition**
list, define, tell, identify, show, collect, quote, name, list, match, memorize, recall, relate, etc.	Knowledge	To exhibit memory of previously-learned materials by recalling facts, terms, basic concepts, and answers
classify, describe, interpret, contrast, associate, distinguish, estimate, differentiate, discuss, extend, etc.	Comprehension	Demonstrative understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas
apply, demonstrate, calculate, complete, illustrate, solve, examine, modify, relate, change, experiment, discover, solve, use, etc.	Application	Using new knowledge. Solve problems in new situations by applying acquired knowledge, facts, techniques, and rules in a different way
analyze, order, explain, connect, classify, arrange, divide, compare, select, explain, infer, etc.	Analysis	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations
combine, integrate, modify, substitute, plan, create, design, invent, compose, formulate, generalize, rewrite, generate, hypothesize, predict, etc.	Synthesis	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions
assess, decide, rank, grade, test, measure, recommend, convince, judge, discriminate, support, conclude, summarize, appraise; criticize, defend, evaluate, etc.	Evaluation	Present and defend opinions by making judgments about information, validity of ideas or quality of work based on a set of criteria

Adapted from: Bloom, B.S. (Ed.) (1956) *Taxonomy of educational objectives: The classification of educational goals: Handbook I, cognitive domain* and various other sources.

STEP 2: ALIGN THE CURRICULUM IN LIGHT OF LEARNING OUTCOMES

Once a program has clearly stated learning outcomes, the next step is to determine whether the program provides, through its curriculum, the educational opportunities for students to achieve those outcomes. The following section describes how to align program offerings and individual courses with learning outcomes to create a cohesive curriculum.

ALIGNING THE CURRICULUM WITH LEARNING OUTCOMES

- The curriculum of majors and minors should be cohesive and systematically aligned with program learning outcomes.
- Key program learning outcomes should be introduced early in the curriculum, and should be further developed and reinforced throughout the curriculum.
- Programs should identify possible gaps, check for redundancies, inconsistencies, and misalignments.

<u>An overview of curriculum mapping</u>

Curriculum mapping is an easy way to analyze the alignment between the curriculum and program learning outcomes. The following is an example of a curriculum map of a program that has identified five learning outcomes and that has seven required courses for the major.

Example 1. A Curriculum Map

	Course Numbers						
Program Learning Outcomes	101	102	145	245	246	361	363
1	I	I	R		R	D	D
2	I						
3					D	D	
4							
5		I	R	R			D
Key: I = Introduced R = Reinforced D = Demonstrated							

In this example, the curriculum seems well-aligned with Learning Outcome 1 and 5: Both are introduced early, reinforced in mid-level courses, and demonstrated in upper-division courses. Although Learning Outcome 2 is introduced, it receives no attention in the rest of the curriculum. Students are expected to demonstrate Learning Outcome 3 in 246 and 361. However, this outcome has not been introduced or reinforced in the curriculum. Learning Outcome 4 is not reflected in the curriculum. With the help of this activity, faculty are in a good position to identify problems and find solutions and to consider if certain learning outcomes, such as Learning Outcome 4, are worth keeping.

Steps to follow in developing a curriculum map

1. List program learning outcomes.
2. List core courses and other learning opportunities, e.g. senior research, senior recitals, etc.
3. Review syllabi to determine the alignment between course objectives and content with program learning outcomes.
4. Make a judgment regarding the level at which outcomes are addressed in each course/learning opportunity (e.g., Introduced, Reinforced, Demonstrated or Basic, Intermediate, Advanced).

Worksheet 1 (p. 39) can be adapted for analyzing curriculum alignment.

Analyzing a curriculum map

- Are program learning outcomes explicitly referenced in course learning outcomes and objectives?
- Do students have multiple opportunities to develop the learning outcomes?
- Are levels of content delivery organized in a meaningful and seamless manner to address a particular program learning outcome?
- Do individual courses provide students with opportunities to integrate multiple program learning outcomes?
- Do students have opportunities to demonstrate what has been learned on each program learning outcome?
- Are such demonstrations assessed?

ALIGNING INDIVIDUAL COURSES AND ASSIGNMENTS WITH LEARNING OUTCOMES

While curriculum maps provide an overall picture of how well collective expectations of student learning match instructional offerings at the program level, individual courses and assignments also contribute to program learning outcomes. Aligning learning activities/assignments at the level of individual courses details each course's relationship to program learning outcomes, allows all faculty to be aware of existing learning activities/assignments within courses, and provides information for a wider discussion concerning where learning should occur.

The following steps are suggested for developing an inventory for an individual course and for usual types of assignments, connecting them to program learning outcomes. A sample worksheet for inventories on individual courses and typical assignments is provided at the end of this guide (p. 40).

1. Identify the program learning outcome(s) to which the course contributes.
2. Identify ways in which students learn this outcome through the course; for example, through independent projects, performances, or labs.
3. Describe the knowledge and skills students are expected to have in order to complete the assignments, and draw connections, if any, between them and intended program outcome(s).

STEP 3: FORMULATE QUESTIONS AND IDENTIFY APPROPRIATE ASSESSMENT METHODS

FORMULATING QUESTIONS

Once the curriculum has been reviewed in connection with learning outcomes, the next step is to identify questions to ask about the extent to which students are achieving the goals/outcomes set by the program. From the many questions that could be asked, limit your agenda to those questions that are of particular interest, where the answers could make a significant contribution to the program. Consider questions that center on a concrete problem of practice: the sequencing of major requirements, the content of key required courses, expectations for the capstone project, etc. Focus on one learning outcome at a time; a concentrated effort in one area is likely to have more positive results than a "scattershot" approach across various areas of the curriculum.

The more the program focuses on questions of genuine interest to faculty in the program, the more productive the assessment experience will be. Assessment is not an end in itself, but a means to the larger end of the improvement of teaching and learning.

The next step is to decide what tools and measures the program will use to gather evidence about the learning outcome(s) under study.

GUIDELINES FOR DEVELOPING ASSESSMENT METHODS

- Take advantage of existing sources of information by utilizing, adapting, and/or expanding current assignments, learning activities, and tasks from courses within the program.
- Focus on the information and evidence that best represents the learning of the intended outcome.
- Pay attention to problems that are most likely to affect graduates in the academic/professional/personal contexts after Knox.
- Use multiple methods of assessment in order to acknowledge and capture the complexity of student learning.
- Use direct measures when possible to assess student learning, while also using indirect measures for additional information. (See definitions below.)

DIRECT AND INDIRECT MEASURES OF ASSESSMENT

Direct measures of assessment indicate the attainment of student learning, knowledge, or skills by directly observing students' demonstration of knowledge, skills, and learning.

Indirect measures of assessment focus on student *perceptions* of learning and often involve surveys, interviews, or focus groups to ask students to self-report or reflect on their learning rather than to demonstrate it.

Examples of direct assessment methods

Course-embedded assessment

Course-embedded assessment takes advantage of methods traditionally used to evaluate students' performance within a class, e.g., assignments, lab reports, and testing. Faculty can identify specific classes where the program will design an assessment to embed in the course. Student work in designated courses is then collected and assessed in relation to the program learning outcomes, not just for the course grade.

Advantages

- Normal workload of students and faculty
- Immediate feedback to faculty about the effectiveness of teaching
- Relevance of existing assignments and course requirements
- Faculty autonomy

Cautions

- Designing meaningful and effective rubrics, criteria, and standards involves significant effort—but the Office of Institutional Research and Assessment is available to provide help! (See p. 19-20 for discussion of rubrics.)
- There are no longitudinal data about individual student improvement over several years.

Recommendations

- Course-embedded assessment will be easier to carry out if objectives and learning activities in the course are aligned with student learning outcomes identified by the program as a whole.
- Consider a variety of ways in which student achievement within the course might be observed and assessed: e.g., essays, oral presentations, oral exams, research papers, lab reports, performances.
- Develop a form for each faculty member to report course learning activities in targeted outcomes (can use Inventory on Individual Courses and Typical Assignments, p. 40).
- Share grading process, assignments, and syllabi to further develop teaching practices.

Capstone courses

Doing assessment in a program's capstone course is one example of course-embedded assessment.

Advantages

- A window on a comprehensive range of abilities
- Optimal timing for assessing program outcomes by assessing students near the completion of the program
- Quick feedback on major program goals
- Information about the major in particular

Cautions

- Variations in course content with different instructors of the course
- Not easy to compare students' work early and late in their academic career

Recommendations

- Capstone assessment should be designed and evaluated by all of the program's faculty and not just course instructors.
- Aggregate results rather than sharing data from individual faculty's classes; focus on general trends and patterns.

Locally developed tests

Advantages

- Easy to match program and college goals and learning outcomes
- Criteria for performance easy to establish in relation to the curriculum
- Cheaper than commercial exams
- Easier to use in a pre- and post-test approach

Caution

- Time-consuming to develop valid and reliable exams

Recommendations

- Encourage strong cooperation among program faculty.
- Include on-campus and external experts to help with construction and validation.
- Consider embedding within a course common to all students in the program.
- Check results against those obtained from other assessment methods.
- Aggregate results rather than sharing data of individual faculty's classes; focus on general trends and patterns.

Commercial tests, national licensure, certification, or professional exams

Advantages

- Easy and quick to adopt
- Established reliability and validity
- Cross-institutional comparisons of results
- Longitudinal comparisons for the overall program

Cautions

- Not easy to match with the specific learning outcomes of a program or of the College
- May be costly
- Possible lack of student motivation to do their best work

Recommendations

- Select tests carefully based on faculty review and judgment of the match between test content and curriculum content and goals.
- Use the technical manual on reliability and validity available from the publisher.
- Check results against those obtained from other assessment methods.
- Embed the test as part of course requirements.

Portfolios

A portfolio is a compilation of student work, and is used to demonstrate a student's achievement of various learning outcomes.

Advantages

- Tracking learning and development longitudinally
- Addressing multiple components of the curriculum
- Easy to identify student weaknesses for remediation if timed properly
- Can be used by students to show to potential employers

Cautions

- Time-consuming and not easy to evaluate
- Space, ownership, and confidentiality challenges

Recommendations

- Communicate to students clear expectations about the purpose of the portfolio and about the mechanics of how the collection is created and maintained.
- Have portfolios submitted as part of course requirements.
- Develop specific, measurable criteria for observing and evaluating progress.
- Have more than one faculty member rate each portfolio.

Performance measures outside a specific course setting

Sometimes relevant student work is done outside the setting of a specific course; this, too, can be a useful site for assessment. Such types of work might include: performances, poster presentations, exhibitions, demonstrations, supervised internship or practicum, etc.

Advantages

- Examining student achievement when addressing a wider audience or context than that provided within a specific course
- A most valid way of assessing skill development and ability to implement knowledge outside the classroom

Cautions

- Some options are time-consuming and labor-intensive.
- Students may not receive direct feedback regarding their performances, thus limiting their own gains from their expanded efforts.

Recommendations

- Develop specific, measurable criteria and rubrics for observing and evaluating performance.
- Clearly communicate expectations to students prior to the assessment, and provide models or performance criteria.
- Whenever possible, provide direct feedback to students regarding their performance.

Developing rubrics

Many of the previously-described direct measures of assessment involve open-ended types of assignments and projects, such as student performances, research papers, lab reports, essays, or presentations. With these types of work, a simple answer key as used in objective, standardized tests will not work. Instead, a scoring scheme is structured to account for multiple dimensions of learning and to help ensure consistency among faculty who administer and score the assessment. The tool used for such a scoring scheme is called a rubric. Rubrics classify student work into categories that are steps along a continuum. These steps generally range from "unacceptable" to "exemplary."

Rubrics can be used to classify virtually any kind of student work and are versatile tools that can be used to provide feedback to students, to grade student work, and to assess learning outcomes.

Types of rubrics

- **Analytic rubrics**: Rubrics are most useful when they are structured to separate out several key characteristics or areas of performance for assessment. Such "analytic rubrics" lead faculty through a series of judgments about student work, each addressing a trait of the performance being assessed.

Example 2. Analytic Rubric for Grading Oral Presentations

	Exemplary (3 pts)	Satisfactory (2 pts)	Below Expectation (1 pt)	Score
Organization	The presentation is carefully organized.	The presentation has a focus.	No apparent organization.	
Evidence	This presentation provides convincing evidence to support conclusions.	This presentation provides some evidence that supports conclusions.	Evidence is not used to support assertions.	
Content	The content is accurate and complete. Listeners are likely to gain new insights about the topic.	The content is generally accurate, but incomplete. Listeners may learn some isolated facts, but they are unlikely to gain new insights about the topic.	The content is inaccurate or overly general. Listeners are unlikely to learn anything or may be misled.	
Connection to Audience	The speaker interacts effectively with listeners.	Listeners are sometimes ignored or misunderstood.	Listeners are largely ignored.	
Style	The speaker is relaxed and comfortable, speaks without undue reliance on notes.	The speaker is generally relaxed and comfortable, but too often relies on notes.	The speaker appears anxious and uncomfortable and reads notes, rather than speaks.	

Adapted from Allen, M. J. (2004) *Assessing academic programs in higher education*

- **Holistic rubrics** provide a general assessment of performance, including a range of expected characteristics or areas of performance. Holistic rubrics describe how one global, holistic judgment about student work is made. Example 3 is a holistic rubric.

Example 3. Holistic Rubric for Assessing Student Essays

Holistic Rubric for Assessing Student Essays	
Sophisticated	The essay is focused and clearly organized, and it shows depth of development. The language is precise and shows syntactic variety, and ideas are clearly communicated to the reader.
Acceptable	The essay is generally focused and contains some development of ideas, but the discussion may be simplistic or repetitive. The language lacks syntactic complexity and may contain occasional grammatical errors, but the reader is able to understand what is being communicated.
Developing competence	The essay may be somewhat unfocused, underdeveloped, or rambling, but it does have some coherence. Problems with the use of language occasionally interfere with the reader's ability to understand what is being communicated.
Inadequate	The essay has at least one serious weakness. It may be unfocused, underdeveloped, or rambling. Problems with the use of language seriously interfere with the reader's ability to understand what is being communicated.

Adapted from Allen, M. J. (2004) *Assessing academic programs in higher education*

Steps in developing a rubric

1. Identify what you are assessing through the student work (e.g. critical thinking, writing, analysis of sources).
2. Identify the key aspects of student performance on which the assessment will be scored (e.g. logical inference, appropriate use of evidence, content knowledge).
3. Based on the nature of student work, decide on how many levels of achievement you will illustrate. For example: *exemplary, satisfactory, unacceptable*; or *exemplary, good, acceptable, unacceptable*.
4. Write a clear description of each level of achievement.

Tips for developing rubrics

- Limit the number of traits being assessed in any given rubric to no more than seven.
- Develop the rubric through collaborative work among faculty within the program.
- Share the rubric with students to help them focus on the relevant abilities and skills needed for completing the work.
- Pilot the rubric before implementation. Select some examples of student work that vary in quality and have faculty apply the rubrics to the samples. Discuss faculty scoring in order to reach a consensus about rating of the samples (i.e., "norm" the scoring).
- After first use of the rubric, meet again to discuss how effectively the rubric assesses student performance.

Examples of indirect assessment methods

Surveys and questionnaires

Surveys or questionnaires administered to students, faculty, alumni and/or employers of alumni can be useful for gathering information about perceptions or opinions about student achievement. These instruments can measure such things as levels of satisfaction, perceived knowledge gain, attitudes, affective development, etc.

Advantages

- Easy to administer
- Cover a wide range of topics in a brief amount of time
- Easy to communicate results

Cautions

- Information on student learning is indirect evidence (measuring perceptions and opinions rather than the learning itself).
- Good surveys and questionnaires are difficult to develop.
- Non-response and sampling errors are inherent to survey research.

Recommendations

- Use as a supplement to direct assessment.
- Use carefully constructed instruments. Consult with OIRA which provides on-going support with survey design, administration of surveys, and reporting/analysis of results.
- Pilot instruments to identify trouble spots in proposed instruments.
- Follow up with non-respondents.
- Cross-validate results through other sources of data.

Exit interviews and focus groups with students

Exit interviews ask students to respond to a series of questions about their academic experience upon completion of the academic program or capstone projects. Focus groups are structured discussions among groups of students who respond to specific open-ended questions designed to collect information about their common experience in a particular educational activity, e.g., honors program, minors.

Advantages

- A depth and richness of information that can be obtained through face-to-face interactions
- A thorough exploration of issues through the use of follow-up questions
- Reveals unforeseen areas of concern

Cautions

- Conducting the studies and analyzing the information can be time- and labor-intensive.
- There exists difficulty (and uncertainty) of obtaining a representative group of volunteers.
- Results can be influenced by the capability of the interviewer and therefore not consistent across groups.

Recommendations

- Focus questions on aspects of learning about which it is difficult to collect information through direct measures.
- Student anonymity needs to be protected and stray comments about individual faculty must not become part of the assessment data.
- Have an external person conduct the interviews, since students may be more candid with people external to the program.
- Consult with OIRA for development of the interview or focus group protocol.

Transcript analysis

Transcript analysis involves using data from College databases to explore course-taking or grade patterns of students. Transcript analysis provides a picture of students at a certain point in their academic careers, shows what classes students took and in what order, and identifies patterns in student grades. Specific information can be drawn from transcripts to help answer research questions. Examples of specific questions include: Looking at course pattern sequences, is there a coherence to the order of courses taken? In how many different areas within a program do majors take courses? How much foreign language beyond the minimum required for graduation do students take? Do students who have taken the prescribed prerequisites for a course do better than those who haven't?

Advantages

- A comprehensive overview of student course enrollment paths
- Specific research questions pertaining to course offerings
- Trends of students' learning at particular times in their academic pathway

Cautions

- Not directly addressing the questions of learning outcomes
- Usually a manual process that is time-consuming

Recommendations

- Once the faculty have identified questions of interest, consult with the Registrar to identify those that are most feasible to answer with existing records.

SETTING CRITERIA FOR SUCCESS

After selecting methods and measures appropriate for the assessment question, programs need to identify the expected level of performance or benchmark on each means of assessment. What quality of student performance do faculty expect? The following table provides some examples of criteria for success.

Example 4. Criteria for Success

Sample Criteria for Success	**Assessment tools used**
Students have an average score of ___ for the overall performance on the essay and no score less than __ for the subcategories on the rubric.	*rubric assessing student essays*
70% of the students can generate and analyze data in biology with appropriate techniques and methodological approaches.	*research project or lab performance*
80% of students can pass the professional licensure exam on the first attempt.	*external exam*
Panels of reviewers confirm that student portfolios reflect progressive development of critical thinking skills over time.	*portfolio*
80% of students and employers of graduates indicate satisfaction with the program.	*Surveys of students and employers*
Interviews with graduating seniors indicate that students are overwhelmingly satisfied with the program.	*Exit interviews and focus groups*

Tips for establishing criteria for success

- The criteria should be reasonable given the nature of students and the resources available. Avoid using absolutes such as 100% or zero when establishing criteria.
- Although both qualitatively and quantitatively described criteria are acceptable, most of the criteria for success should be stated in terms of percentages, percentiles, averages, or other quantitative measures.
- Pilot assessment data can be used to inform faculty with regard to how well students are currently performing and the criteria for success can then be set with those first levels as a benchmark.
- Ideally, criteria for success should be established at both the overall and specific levels, especially when assessing with rubrics (Example 5 below). The overall criteria specify the general expectation for student performance, while criteria at specific levels prompt more detailed analysis and inform faculty of areas for improvement through the consideration of student performance on specific subareas.

Example 5. Criteria for Success When Assessing With a Rubric

<table>
<tr><th colspan="3">Oral Presentation Rubric</th></tr>
<tr><th></th><th>Range of Points</th><th>Criteria for Success</th></tr>
<tr><td>Organization</td><td>1-3</td><td rowspan="6"><u>Overall Criteria</u>

Average score 10 or higher.

<u>Sub-category Criteria</u>

On no category will average score be less than 2.</td></tr>
<tr><td>Evidence</td><td>1-3</td></tr>
<tr><td>Content</td><td>1-3</td></tr>
<tr><td>Connection to Audience</td><td>1-3</td></tr>
<tr><td>Style</td><td>1-3</td></tr>
<tr><td>Total</td><td>5-15</td></tr>
</table>

DEVELOPING ASSESSMENT PLANS

An assessment plan lays out a schedule for how each of the program's learning outcomes will be assessed over a period of time (about seven years). As assessment activities are undertaken, changes will usually occur, as the results of one assessment activity will suggest the next question to be asked. Plans should be reviewed annually, so that adjustments may be made. The format of assessment plans may vary, but several key elements should be included in any plan.

Key elements of a program assessment plan

- Learning outcomes being assessed
- Methods that will be used
- Criteria for success
- The timeline for assessment implementation

Characteristics of a well-developed assessment plan

Adapted from Polomba, C., & Banta, T. W. (1999), *Assessment Essentials*

- The learning outcomes identified are assessable and are addressed by appropriate measures.
- Multiple assessment measures (direct and indirect) are used.
- Assessment procedures are efficient.
- The plan includes a description of people, committees, and processes involved.
- The plan "closes the loop" (that is, uses the assessment information for program improvement).

Worksheet 3 (p. 41) is a suggested format for program assessment plans.

STEP 4. MAKE SENSE OF ASSESSMENT RESULTS

ANALYZING ASSESSMENT DATA

The key step between assessment activities and improvement of academic programs is analysis of the data garnered from assessment. The Office of Institutional Research and Assessment can provide extensive help with analysis of data. Below are examples of the kinds of results such analysis will provide, separated into examples of quantitative data and qualitative data.

Analyzing quantitative data

Tallies, percentages, and averages can be used to summarize quantitative results.

- Tallies are straightforward counts of how many students earned each rating or chose each option. Example 6 is such a tally for 25 papers scored using a rubric.

Example 6. A Tally of Results for a Rating Rubric

	Unacceptable -1-	**Borderline -2-**	**Acceptable -3-**	**Exemplary -4-**	**Total # of students**
Content Representation	0	5	15	5	25
Use of Primary Sources	2	12	7	4	25
Logical Inference	1	13	8	3	25
Contextual Analysis	0	8	14	3	25

- Percentages are easier to understand and more meaningful than raw numbers. Percentages make it easier to compare groups of different sizes, e.g., when you compare your current class again a class four years ago or against peers at other schools. Example 7 provides the percentages for the tallies in Example 6.

Example 7. Results in Example 6 Presented as Percentages

	Unacceptable -1-	**Borderline -2-**	**Acceptable -3-**	**Exemplary -4-**	**Total**
Content Representation	0%	20%	60%	20%	100%
Use of Primary Sources	8%	48%	28%	16%	100%
Logical Inference	4%	52%	32%	12%	100%
Contextual Analysis	0%	33%	54%	13%	100%

- Averages (or means) are numbers that summarize the central tendency of assessment results. Example 8 summarizes the assessment results presented in Example 6 and 7 by looking at the class as a whole and finding the mean as the central tendency.

Example 8. Results in Example 6 and 7 Presented as Means

	Mean (Scale 1-4)
Content Representation	3
Use of Primary Sources	2.5
Logical Inference	2.5
Contextual Analysis	2.8

More complex quantitative analysis, beyond the descriptive statistics shown above, can also be done, especially as data accrue across time. Programs can contact the Office of Institutional Research and Assessment for assistance with such analysis.

Analyzing qualitative data

Qualitative results from reflective writing, open-ended survey questions, and focus group transcriptions can be summarized through grouped listings and thematic analysis.

- Grouped listings can be used if the qualitative information consists of brief statements that fall into meaningful discrete categories. Example 9 is a listing of qualitative feedback on a discussion-based session.

- Thematic analysis is appropriate when the qualitative results involve more extensive information such as reflective papers and transcriptions of focus groups. Such results can be summarized and analyzed by looking for common themes and patterns in the results. Example 10 is a thematic analysis.

Example 9. Grouped Listing: A Summary of Qualitative Feedback on a Discussion-Based Class Session

What was the one thing that was most useful for you to learn in this session?

Interaction with peers (five comments)

- Discussing with peers
- Learned from classmates
- It was helpful interacting with each other.
- Different perspectives within group discussions
- Group work on topics

Teacher presentation (three comments)

- Lecture on subject matter
- Examples of practical implications
- The PowerPoint slides are really helpful.

General (two comments)

- A great learning atmosphere
- Interesting topics

Example 10. Thematic Analysis: Focus Group on use of Moodle

Students had a generally positive experience with Moodle.

Students' experience in Moodle was very positive. All students agreed that Moodle was used productively in the course and many suggested that Moodle could be used more widely in teaching.

Students found Moodle effective and helpful in a variety of ways.

Much of the discussion in the focus group concerned the students' evaluation of the different ways in which Moodle was a helpful supplement to learning activities and to print materials. The majority of students found Moodle a convenient tool to access both print and web materials regularly. Many enjoyed the online forums provided by Moodle and thought these online forums facilitated meaningful outside-of-class contact and conversation with other students and with the instructor.

A few students had recommendations for further improving the use of Moodle in the learning process.

A few students had had courses where Moodle was more extensively used. They suggested the quiz and wiki modules as other functions on Moodle useful to learning. The online quiz provides rapid feedback and the wiki encourages collaborative work.

[For brevity, direct quotations of students are not included here. In a real thematic analysis, representative student quotes should be incorporated to support each theme.]

INTERPRETING ASSESSMENT RESULTS

The interpretation of assessment data involves relating data to the learning outcomes they are supposed to measure, drawing inferences and conclusions, and evaluating the results. The following strategies can be used when interpreting assessment results.

- Review why the assessment was conducted and what learning outcomes were being assessed.
- If a benchmark or criterion has already been set, summarize results in a way that reflects that goal. For example, if the criterion for success is that at least 80% of students should reach some performance level, summarize the results as the percentage of students reaching that level.
- Search the results for elements that stand out—significant successes or failures relevant to the given learning outcome.

SHARING AND DOCUMENTING ASSESSMENT RESULTS/EVIDENCE

- Share assessment results with faculty members within the program.
- Depending on program assessment needs, additional audiences could be involved, e.g., students within the department, alumni, Admission, Public Relations.
- Keep a record of assessment results. Such a record will be useful for doing longitudinal studies of assessment projects, which can reveal trends and patterns in student learning.
- Send a copy of this record to the Office of Institutional Research and Assessment.

STEP 5. USE ASSESSMENT RESULTS FOR PROGRAM IMPROVEMENT

Making good use of assessment data is the most important phase of assessment, as the central purpose of assessment is to provide information needed to improve student learning. This section provides some strategies to guide the process of using assessment results to improve teaching, learning, and academic planning.

The following steps can be a guide to using assessment results:

- Share assessment results with all program faculty and discuss them together, so that any changes can be decided on collectively.
- Looking at the most positive results, consider what practices may have contributed to these results. If it would be appropriate to extend such practices (or to test if these are the source of the positive results), how might that be done?
- Looking at the least positive results, consider what change in practice might remedy the situation. (See below for more detailed suggestions.)
- Develop a timetable for implementing changes and for following up to see if the change had the intended effect.
- Decide on the program's focus for the next assessment task.

When assessment results are less than satisfactory based on pre-established criteria for success, faculty may want to consider the following aspects of learning and teaching (and of the assessment process):

<u>Learning outcomes</u>

- Are the learning outcomes appropriate?
    - Consider whether the learning outcomes need to be scaled back to levels that still challenge students but are realistic.

- Are there too many learning outcomes being assessed?
    - Assessment tasks are best accomplished when they are focused. Students learn and retain better if faculty focus on one or two key learning outcomes to assess than if they address too many superficially.

<u>Assessment strategies and measures</u>

- Are test questions or assignments written in such a way that students might misinterpret them? Are they too difficult?
- Are the assessment measures really a good match with the learning outcomes being assessed?
- Were the questions and assignments administered appropriately (allowing enough time, allowing access to relevant resources, etc.)?

These problems are especially likely the first time an assessment measure is used. Revise such assessments by soliciting faculty and student input before using them again.

Curriculum

- Does the current curriculum give sufficient attention to the learning outcomes established by the program?
    - If a particular learning outcome is truly a major priority, faculty should ensure that students have many opportunities to study and practice it intensively.

Teaching and Learning

- Are particular skills or concepts relevant to the assessed learning outcomes being addressed effectively in courses?
- Do teaching methods need improvements?
- Are additional and/or revised learning materials needed?
- Do students have good study habits? Do they need to be better engaged in the classroom?

If limitations in the teaching and learning process are suspected, faculty are encouraged to consider making changes. The following list includes many suggestions of teaching strategies that have been shown to be effective in working with today's students.

STRATEGIES THAT PROMOTE DEEP, LASTING LEARNING

Students learning more effectively when:

- They understand course and program goals and the characteristics of excellent work.
- They are academically challenged and given high but attainable expectations.
- They are graded on important goals. While students do pick up some things through faculty and staff modeling, discussions, and the like, they focus their time and energy learning what they will be graded on and therefore learn those things more effectively than ungraded concepts.
- They are taught with enthusiasm.
- New learning is related to their prior experiences.
- They spend significant time studying and practicing.
- They use or apply memorized facts in some way, because facts memorized in isolation are quickly forgotten.
- The diversity of their learning styles is respected. They are given a variety of ways to learn and to demonstrate what they have learned.
- They spend more time actively involved in learning through hands-on practice and receiving information visually. They spend less time listening to lectures and reading long texts.
- They engage in multidimensional real-world tasks in which they explore, analyze, justify, evaluate, use other thinking skills, and arrive at multiple solutions. Such tasks may include realistic class assignments, field experiences, and service-learning opportunities.
- They spend more time interacting with others—either face-to-face or online. They receive individual attention from faculty and work collaboratively with fellow students.
- They participate in co-curricular activities that build on what they are learning in class.
- They reflect on what and how they have learned and see coherence in their learning.
- They have a synthesizing experience such as a capstone course, independent study, or research project.
- Assessments are learning activities in their own right.
- They receive prompt, concrete feedback on their work.
- They have opportunities to revise their work.

Source: Suskie, L. (2009) *Assessing student learning: A common sense guide.*

EXAMPLES OF USING ASSESSMENT RESULTS TO IMPROVE LEARNING AND TEACHING

When assessment results indicate that certain aspects of student learning are in need of improvements, faculty should take action to address the warranted improvements. Although by no means exhaustive, the following list provides some of the many possible examples for improving learning, teaching, and programs.

- Ensure the coherence of the curriculum by eliminating redundancies.
- Identify and fill gaps in learning opportunities to practice a particular learning outcome.
- Ensure more consistency in the content and skills taught in multi-section courses.
- Revise program learning outcomes to include higher-order skills.
- Conduct a retreat or workshop for program faculty to reflect on how to utilize effective teaching strategies that contribute to improved student learning.
- Explore active learning strategies and other teaching methods.
- Engage students in taking greater ownership for their learning by tracking their own progress towards learning outcomes.
- Provide students with multiple and varied ways of learning knowledge and skills critical to program learning outcomes.
- Explore alternative ways of assessing outcomes.
- Explore technological enhancements (labs, equipment, etc.), using assessment results to support a request for increased funding.
- Improve process of advising so that it focuses on the attainment of key learning outcomes.

DEVELOPING AN ACTION PLAN

As previously mentioned, an *assessment plan* sets up a schedule for assessment in the future. An *action plan*, however, keeps track of what has been learned from the assessment process and results, and offers a blueprint for the final act: closing the assessment loop by using the results to improve student learning and academic programs. Assessment is an ongoing task, not a once-every-ten-years event. Use the results of each assessment activity to determine the next. Do you want to continue pursuit of the same question with the same (or revised) instrument? Do you want to pose a new question? These next steps should be included in your action plan. Worksheet 4 (p. 42) can be used in developing an action plan.

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(Article appears on pages 140-142 of the PDF.)

Briggs provides a brief review of various approaches to classroom assessment and offers a model that focuses on developing learning objectives and adopting teaching methods and assessment measures that draw on the learning objectives.

Malik, D. J., & Lees., N. D. (2009). The accountability movement: Its role, opportunities, and meaning for chairs. *The Department Chair: A Resource for Academic Administrators*, *19*(3), 3-5. Retrieved from The Tomorrow's Professor Blog, http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=924

The authors discuss the Spellings Commission report and recent pressures on institutions to participate in the Voluntary System of Accountability, with implications for faculty roles, curriculum development, and assessment of student learning.

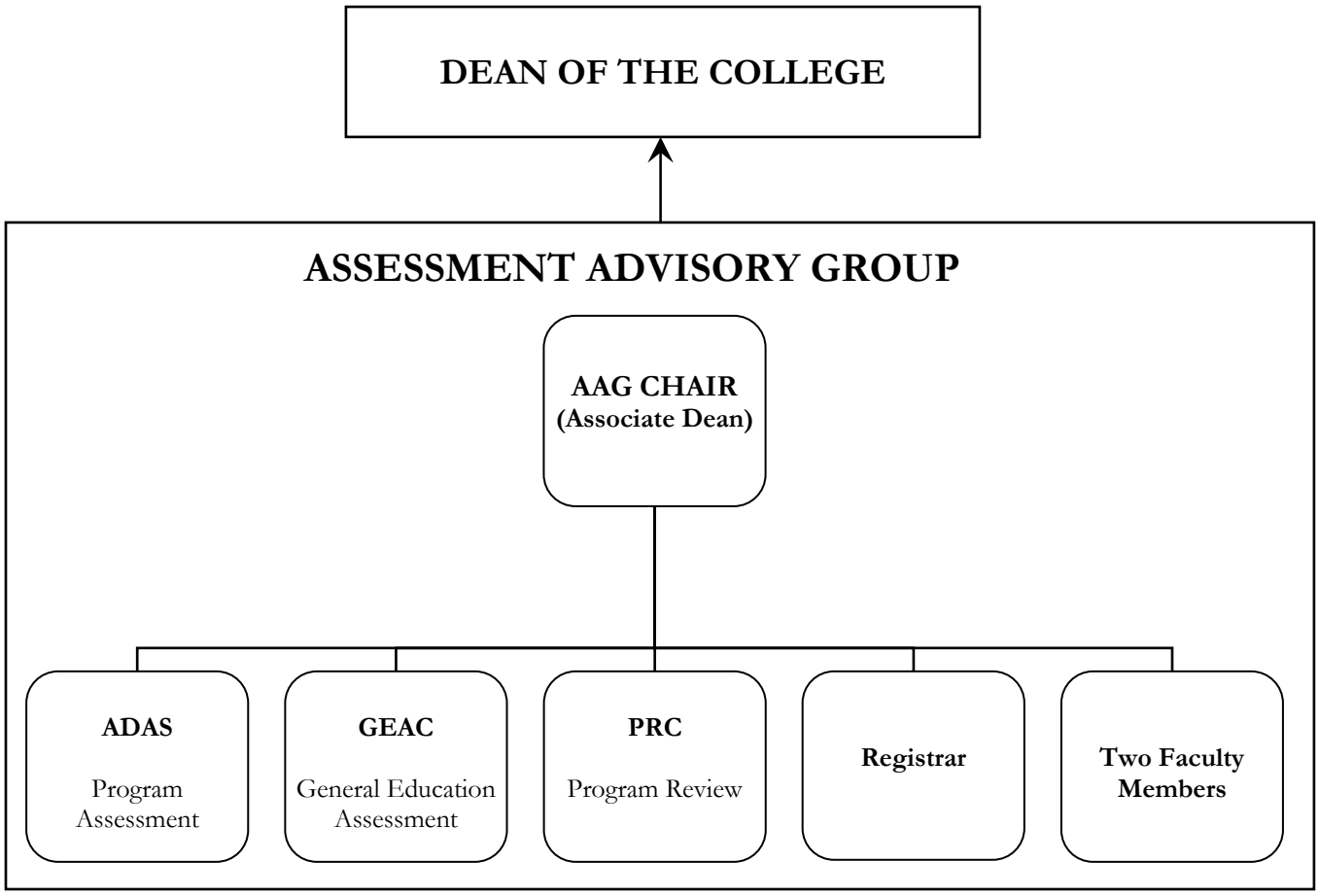
National Center for Academic Transformation (2005). *Five models for assessing student learning.* Sarasota Springs, NY: Author. Retrieved from http://www.thencat.org/PlanRes/R2R_ModAssess.htm

This article offers suggestions for a range of methods of assessing student learning, such as comparisons of performance on common exams among parallel course sections, pre-post test comparisons, and evaluating student work using common rubrics.

Volkwein, J. F. (2003, May). Implementing outcomes assessment on your campus. *eJournal*, *1*. Retrieved from http://www.bmcc.cuny.edu/iresearch/upload/Volkwein_article1.pdf

The author provides framework and guidelines on planning and conducting outcomes assessment in the areas of general education, basic skills, the major field of study, personal/social growth, and professional/technical education.

ASSESSMENT ORGANIZATIONAL CHART



AAG – Assessment Advisory Group
ADAS – Associate Director for Assessment Support
GEAC – General Education Assessment Coordinator
PRC – Program Review Coordinator

WORKSHEETS

Worksheet 1. Curriculum Map (or Curriculum Alignment Matrix) (see p. 12 for an example)

Program: _____ Academic Year: _____

	Courses/Learning Opportunities										
Program Learning Outcomes											
[Insert program learning outcome here]											
[Insert program learning outcome here]											
[Insert program learning outcome here]											
[Insert program learning outcome here]											
[Insert program learning outcome here]											

Key: **I** = Introduced **R** = Reinforced **D** = Demonstrated

**The key can be modified according to particular disciplinary features and curricular offerings. For example, programs can indicate whether the outcome is intended to be met at a basic (B), intermediate (I), or advanced (A) level.*

Worksheet 2. Inventory on Individual Courses and Typical Assignments (Aligning individual courses and usual types of assignments with a learning outcome)

Course: Art 399	Program: Art History	Academic Year:		
	Pedagogy	**Typical Assignments and Learning Activities**	**Knowledge and Skills Needed**	**Connections to Program Outcome**
Program Learning Outcome	Identify ways in which students learn the intended learning outcome.	Describe typical assignments and learning activities of the course.	Describe the knowledge and skills needed for the assignments.	Draw connections between the knowledge and skills and program outcome.
Example: All majors will be able to conduct art historical research, interpreting art work and integrating appropriate secondary sources.	Example: Independent research with guidance from a faculty mentor.	Example: Students will conduct a research project, including multiple drafts of the paper and a presentation to an audience of peers.	Example: Knowledge of the art historical background relevant to the specific topic, both works of art and key secondary sources.	Example: Directly addressing program learning outcome.

Worksheet 3. Program Assessment Plan

Department/Program:		**Academic Year:**		
Intended Program Learning Outcomes	**Means of Program Assessment and Criteria for Success**	**Timeline**	**Provisions for Administration**	**Use of Information**
[Describe what students in the department/program should be able to know, do, perform, and/or value.]	[Indicate how the department/program will assess the achievement of intended learning outcomes, including measures of assessment, target groups, and criteria for success.]	[Decide when the assessment data will be collected and analyzed, when reports will be available, when recommendations based on the results will be made, and when possible improvements might be made.]	[Indicate who will be responsible for oversight in carrying out the plan, who will collect the data, who will analyze the data, and who will report the data.]	[Describe how assessment information will be used, including likely analysis of data, types of reports to be prepared, and intended audiences. Describe any internal process or discussion, review, and decision making.]

Worksheet 4. Action Plan Based on Assessment Results

Actions	Type of Action	Action to Take	Implementation Steps	Timeline	Intended Effect	Follow-up
Action 1	Describe the nature of the action: Type of action may include: improving teaching, improving academic program, assessing the outcome further, or improving assessment measures.	Describe in general what measures will be taken.	List specific steps in carrying out the action.	Describe the timeline for implementing the action.	Describe the intended effect of the action.	Describe timeline for follow-up.
Example	*Improving teaching*	*Helping students engage more prior scholarship in conducting research*	*1. Place more emphasis on the importance of prior knowledge during instruction.* *2. More in-class practices requiring the use of prior knowledge.* *3. Share grading rubrics with students.*	*Spring term, 2011, 300- level courses.*	*Students' knowledge and awareness of prior scholarship will be improved and students will use that understanding in their research.*	*Administer the same assessment tool at the end of the Spring term, 2011.*