University Studies Program Assessment Plan

Appendices

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Appendix A. Excerpts from WSU's 2001 NCA Self-Study Report

From the section "Response to Previous NCA Concerns"

- *NCA Concern: "Courses have been repeatedly added to the general education program without concern for the overall definition of the program causing it to lack focus, direction, and an articulated set of goals. No office or official appears to have direct responsibility for the oversight of the general education program. The development of a new general education program must be based on themes and concepts reflecting current practice in defining this component of the baccalaureate degree, examining potentials of a core set of courses, prescriptive liberating studies courses and limited electives through upper division course work."*

The most difficult academic concern for the faculty to address over the past decade was the question of revamping the general education program. In 1991, the site team encouraged the development of a new general education program based on themes and concepts reflecting current national practices, and urged the faculty to examine the possibility of creating a core, some limited liberal studies, and some upper-division course work to meet general education goals.

T**he new "University Studies" Program has just gone into effect for the class of 2001**, and although the faculty struggled with process of program design and implementation, the progress made on the new program is considerable. The university has appointed a faculty director with reassigned time to manage the program. Dr. Kerry Williams, a full professor in the Department of Psychology, has been involved with the general education committee for several years and has exercised sound leadership at critical junctures. A standing subcommittee of the university's Academic Affairs and Curriculum Committee, comprised of representatives from each college and each

Basic Skills area (Math, English, Communication Studies, and Physical Education and Recreation), oversees the approval and assessment of courses.

The new University Studies Program is structured differently from the old general education program. After considerable discussion about the efficacy of a common core, the wisdom of the faculty was to retain a modified version of the distribution requirement system that has been in place for years, and which is the common structure for general education nationally.

Structural changes highlight the new program. The revised distribution system eliminated the intellectually unjustifiable Allied Studies category. Within the Arts and Sciences Core area, the new program added a category for Fine and Performing Arts. The new major category, "Unity and Diversity," supplanted Different Culture and Allied Studies, and allows for a broadening of the curriculum. In addition, the new program requires twelve hours of upper-division "flagged courses" that re-focus attention on the basic skills.

The required Basic Skills courses (College Reading and Writing, Oral Communication, Mathematics, and Physical Development and Wellness) remain the same, but the courses now have much more specific goals and objectives. English 111 is designed to promote students' "critical reading, thinking, and writing skills" and features a new focus on critical reading, argumentation, and documentation. Communication Studies 191 teaches students "to become highly competent communicators… who are skilled at expressing their ideas… and interacting with others." The Mathematics courses "help students develop an appreciation of the uses and usefulness of mathematical models," while Physical Education and Recreation courses teach students "practical skills in the areas of lifetime physical activity, health awareness and wellness."

The Arts and Sciences Core is very traditional, except for the addition of a Fine and Performing Arts category. The Humanities classes help students "understand… human experience and… the meaning and value of life by examining its expression in (Western) culture." The Social Sciences courses are designed to have students learn about "perspectives regarding human behavior." The Natural Science classes acquaint students with the "methods… of scientific inquiry which increases our understanding of the natural world." The final category, the newly added Fine and Performing Arts requirement, offers students a opportunities for appreciating and performing "creative expression." These areas represent the traditional core areas of liberal studies, and are extremely valuable to Winona State because they also underscore the values that are contained in the university's mission statement. In this sense, then, Winona State remains committed to core values that touch the lives of every student.

"Unity and Diversity" constitutes the third major category of the new University Studies Program, and it is designed in part to respond to the site visitors' request that the faculty consider reflecting upon current national trends in liberal education as they make their recommendations for change. For this section of the University Studies Program, students take one class in each of the following categories. One class must meet the objective of "develop(ing) students' abilities to effectively use the process of critical analysis." Another course teaches students to "improve their understanding of the interrelated concerns of society and the sciences." A third set of classes meets the goal of improving students' understanding of the "growing inter-relatedness of nations, people, and the environment," or to develop "students' understanding of diversity." Finally, the last category of courses are those that promote contemporary citizenship or democratic institutions and get students to "participate as effective citizens." Again, these new sets of courses are consistent with Winona State University's mission statement, and additionally, are grounded in contemporary issues. The faculty and administration strongly believe that introducing students to these new issues will make them more aware of contemporary issues and better citizens of our world.

A system of "flagged" courses is designed to meet one of the other concerns of the NCA site visitors. Flagged courses, usually in a student's major field of study, are designed to reinforce the "basic skills" component of the University Studies Program. In their upper-division coursework, then, students will take two classes that offer an intensive writing experience; one class in which they have to undertake a significant oral presentation, and one class in which they have to demonstrate the use of data or critical thinking techniques in a meaningful way. The flagged courses are but one example of how the university has moved from a system that required all courses to be taken at

the elementary introductory level to one which not only permits, but also encourages, greater depth of study. Prerequisites are permitted so that a student may fulfill the requirements of a category from a single department.

The new program discourages the compartmentalization of liberal studies and encourages its integration with the student's major area of study. This is especially the case in the Unity and Diversity area. For example, students may take their critical analysis course within their major or a biology student may take an upper-division major seminar to satisfy the science and social policy requirement while non-specialists may study similar issues at a more basic level in an introductory course. Thus the specialist and the non-specialist satisfy the same requirement at very different levels of sophistication. In the old curriculum the same solution had to fit every student. As stated above, the faculty reached these goals through an arduous, soul-searching process. In 1998-1999, the faculty adopted a set of specific goals and outcomes that outlined the objectives of the general education program. During the next year, the faculty discussed the mechanics of the categories, and the rules by which departments could propose individual courses. In the 2000-2001 academic year, the faculty approved the courses that would become the University Studies Program. The administration encouraged the faculty to be consistent with their own guidelines and to follow the suggestions that NCA had made in its previous visit. In response, the University Studies Subcommittee (USS) spent countless hours correctly placing courses within specific categories, and also not allowing courses to proliferate without thought.

In sum, the University Studies Program that is in place currently for this site visit is very different from the one that existed in 1991. The new program boasts not only of its internal coherence but also its consistency with national curricular standards and, to a reasonable degree, the Minnesota Transfer Curriculum. The faculty are particularly proud to have implemented one of the reforms that the NCA suggested in 1991; reinforcing essential basic skills in upper-division offerings. Not only does this fact demonstrate that these are indeed "basic skills," but also our commitment to the idea that these are valuable tools every student ought to have when they graduate from the university. As the later sections discussing the Seven Principles will suggest, the success of the University Studies Program is vital to the WSU's ability to deliver a sound educational experience taking advantage of the wisdom those Principles offer.

From the section "Proposed Plan of Action":

The University Studies Program, even though it retains some classes and distribution requirements from the previous general education system, promises considerable change and opportunity. While long overdue, its more ambitious scope and academic rigor provide WSU with a unique opportunity: to raise the standard of general education by promoting higher-level learning, by reinforcing basic skills in the upper division, and by preparing students to make responsible decisions and contributions in their future roles as workers, learners, and citizens. The review of courses comprising the program has been rigorous, with faculty and departments expected to make the case for the value of each course to the greater curriculum: no course has been given a "free ride" by virtue of existing general education or departmental status. The same rigor that has been exacted in the development of the program should then be applied to its assessment as the program is initiated and as it matures.

Recommended action:

- Develop a comprehensive assessment plan for University Studies, one that involves teaching faculty, the University Studies Director and Subcommittee, the Office of Assessment and Institutional Research, and other key constituencies (e.g. Faculty Development).
- Implement the University Studies assessment plan as the program is implemented over the next four years, in particular tracking student learning and student development as new entering students proceed through Basic Skills, core courses, and upper-division flag courses.
- Report on the progress of University Studies, both to the university community and to NCA, after a period of five years (fall of 2006).

Appendix B. NCA/HLC Request for 2006 Progress Report

Excerpts from the Assurance Section (Section Two) of the HLC's 2001 Comprehensive Evaluation Visit:

V FULFILLMENT OF THE CRITERIA

V-C Criterion Three: The institution is accomplishing its educational and other purposes.

V-C1 Evidence that demonstrates fulfillment of the criterion:

[…] The newly implemented University Studies Program was designed to respond directly to concerns raised in the 1991 NCA review. Requirements were created that allow students to reinforce basic skills learned in entry classes in upper division classes, generally within the major. Rather than taking a series of courses all aimed at the entry level, students may choose to take two courses in the same discipline which are designed so that the second course builds upon the prior course, thus creating greater depth of study than previously available. The Unity and Diversity requirement allows students to gain knowledge and hone skills in courses that are generally beyond the entry level, and which, in combination, allow the students to integrate knowledge both within and outside of their own discipline. The new University Studies program constituted an identifiable and coherent undergraduate general education component.

V-C2 Evidence that needs strengthening:

[…] The institution's plan for University Studies has incorporated assessment and oversight for the program, and it has been required for first year students entering WSU in the 2001-2002 academic year. The Flag courses need to be identified to complete the University Studies Program, and the extent to which the University Studies Program results in student achievement of the expected outcomes needs to be assessed.

COMMISSION FOLLOW-UP:

Progress Report due (3 of 3):

Update on the completion, implementation, and assessment of the University Studies Program, due September 1, 2006.

Rationale and Expectations:

The team agrees with the university's Proposed Plan of Action and recommends a progress report that includes:

- A plan for the assessment of academic achievement of the University Studies program objectives, including both direct and indirect indicators; plans for data collection and management; and a description of the structure for using assessment results to lead to curricular and/or instructional changes which should result in improvement of student learning in the University Studies Program.
- Evidence that indicates that the assessment plan has been implemented including a description of the types of data that have been collected and how they have been used to make changes that should lead to improved learning within the program; along with a list of the changes that have been implemented.
- A list of the courses that are identified to fulfill Flag courses requirements in the General Studies program.

Appendix C. WSU Office of AIR on Current and Proposed Assessment Data

From Susan Hatfield, WSU Assessment Coordinator, 10/03

1. ***Data that is currently collected:***

   Indirect measures (Self-Report) – 3 years
   Study Habits for USP Courses
   Perception of the Quality of Instruction in USP Courses
   Perceived Skill Development as the result of USP Courses
   - All of these can be compared to Habits/Perceptions in the major, or by Gender, GPA, College, Year

   Direct Measures
   ACT – Collegiate Assessment of Academic Proficiency (CAAP)
   Test Areas:
   Reading
   Critical Thinking
   Scientific Literacy
   Mathematics
   Writing

2. ***What the HLC is looking for:***

   Commitment: Resources have been committed to the assessment of the program
   Momentum: Evidence that the report is not the end of the effort
   Intentionality: Focus is on specific, stated learning outcomes
   Progress: Direct measures of stated student learning outcomes already collected by time of report
   Consequence:
   a. process (who/how/when) for interpreting data and how gaps between performance and outcomes will be addressed
   b. proof of changes as a result of analysis of student learngin outcome data

3. ***What needs to happen:***

   a. Identified **student learning outcomes** for each of the USP areas
   b. **Documentation** that courses approved for USP areas address these outcomes
   c. **Core Components** for each objective have been identified and agreed upon
   d. **Characteristics** of achievement have been identified for each component
   e. **Faculty Development** activities to enhance reliability of faculty assessment
   f. A systematic **Plan for Implementation**, which includes a timeline for implementation, data collection methodology, structure or reporting results, and feedback mechanism

Appendix D. WSU's Position Statement on Academic Assessment Programs

Guidelines for Assessment

1. The purpose of the academic assessment program is to support and improve student learning by developing methods to
   - articulate the goals of each academic program and support service,
   - gain feedback on each unit's progress towards achieving those goals, and
   - use the feedback to modify the academic programs and support services to ensure that the goals are effectively achieved.
2. There are many valid approaches to quality enhancement, including the use of both quantitative and qualitative assessment measures. The faculty and staff of each academic program and support service area will identify or create assessment methods and instruments appropriate to their specific programs or units.
3. Student assessment will not be used as entrance or exit requirements from academic programs.
4. Quality assessment results are for the exclusive use of WSU. The integrity and level of support for campus-wide quality assessment requires that the confidentiality of the data be maintained.
5. Academic assessment data will not be used to make comparisons among faculty, departments, colleges, or other units within the university. Comparisons between current and previous performance of a unit is appropriate.
6. Assessment data *will not be used for faculty or staff evaluation and, in particular, will not be used in making retention, tenure, and promotion recommendations or decisions by supervisors or administrators*. Individuals may choose to use assessment data compiled on their own classes or services for documentation purposes.
7. The faculty and support service staff will receive assistance and financial support to implement their individual program/service quality enhancement and assessment programs.
8. Quality improvement is a long-range process. The goal for each program and service area is to establish and implement systems for ongoing program assessment. (WSU, 1989)

Appendix E. Excerpts from NCA Statements on Assessment Programs

North Central Association's "Statement on Assessment of Student Academic Achievement"

from North Central Association of Colleges and Schools. *Handbook of Accreditation.* Chicago, IL: North Central Association of Colleges and Schools, 1997*:*

> The program to assess student learning should emerge from and be sustained by a faculty and administrative commitment of excellent teaching and effective learning; provide explicit and public statements regarding the institution's expectations for student learning; and use the information gained from the systematic collection and examination of assessment data both to document and improve student learning. A strong assessment program is founded on a plan that is widely accepted and routinely updated, it is ongoing, and it is related to other planning and budgeting processes.

North Central Association's Assessment Initiative

from Lopez, Cecilia. *A Decade of Assessing Student Learning: What Have We Learned; What's Next?* Chicago, IL: North Central Association of Colleges and Schools, 1999:

> Assessment is not an end in itself, but a means of gathering information that assists institutions in making useful decisions about improvement.
>
> An effective assessment program should be structured, systematic, ongoing, and implemented. It also

clearly stated that an acceptable assessment program should be based on explicit statements published by the institution regarding its faculty's expectations for student achievement and should provide evidence that it uses the information gained from the systematic collection and examination of assessment data gathered at the academic program level both to document and to improve student learning.

The motivation for NCA's assessment initiative was to help colleges and universities carry out their respective educational missions and reach their own goals for the improvement of student learning. NCA does not have nor will it every have a policy that could link assessment with decisions about faculty promotion, tenure, or compensation.

Appendix F. CCCC Statement on Writing Assessment

Writing Assessment: A Position Statement

Available: <http://www.ncte.org/about/over/positions/category/write/107610.htm>.

Prepared by the Conference on College Composition and Communication

Background

In 1993, the CCCC Executive Committee charged the CCCC Committee on Assessment with developing an official position statement on assessment. Prior to that time, members of CCCC had expressed keen interest in having a document available that would help them explain writing assessment to colleagues and administrators and secure the best assessment options for students.

Beginning in 1990 at NCTE in Atlanta, Georgia, open forums were held at both NCTE and CCCC conventions to discuss the possibility of a position statement: its nature, forms, and the philosophies and practices it might espouse. At these forums, at regular meetings, and through correspondence, over one hundred people helped develop the current document.

An initial draft of the statement was submitted to the CCCC Executive Committee at its March 1994 meeting, where it was approved in substance. The Executive Committee also reviewed a revised statement at its November 1994 meeting. An announcement in the February 1995 issue of College Composition and Communication invited all CCCC members to obtain a draft of the statement and to submit their responses to the Assessment Committee. Copies of the draft statement were mailed to all 1995 CCCC convention preregistrants, and the final draft was presented in a forum at the 1995 CCCC Convention in Washington, DC. Changes based on discussions at that session, and at a later workshop, were incorporated into the position statement, which was subsequently approved for publication by the CCCC Executive Committee.

Introduction

More than many issues within the field of composition studies, writing assessment evokes strong passions. It can be used for a variety of appropriate purposes, both inside the classroom and outside: providing assistance to students; awarding a grade; placing students in appropriate courses; allowing them to exit a course or sequence of courses; and certifying proficiency, to name some of the more obvious. But writing assessment can be abused as well: used to exploit graduate students, for instance, or to reward or punish faculty members. We begin our position statement, therefore, with a foundational claim upon which all else is built: it is axiomatic that in all situations calling for writing assessment in both two-year and four-year institutions, the primary purpose of the specific assessment should govern its design, its implementation, and the generation and dissemination of its results.

It is also axiomatic that in spite of the diverse uses to which writing assessment is put, the general principles undergirding writing assessment are similar:

> *Assessments of written literacy should be designed and evaluated by well-informed current or future teachers of the students being assessed, for purposes clearly understood by all the participants; should elicit from student writers a variety of pieces, preferably over a period of time; should encourage and reinforce good teaching practices; and should be solidly grounded in the latest research on language learning.*

These assumptions are explained fully in the first section below; after that, we list the rights and responsibilities generated by these assumptions; and in the third section we provide selected references that furnish a point of departure for literature in the discipline.

Assumptions

All writing assessments--and thus all policy statements about writing assessment--make assumptions about the nature of what is being assessed. Our assumptions include the following.

FIRST, language is always learned and used most effectively in environments where it accomplishes something the user wants to accomplish for particular listeners or readers within that environment. The assessment of written literacy must strive to set up writing tasks, therefore, that identify purposes appropriate to and appealing to the particular students being tested. Additionally, assessment must be contextualized in terms of why, where, and for what purpose it is being undertaken; this context must also be clear to the students being assessed and to all others (i.e., stakeholders/participants) involved.

Accordingly, there is no test which can be used in all environments for all purposes, and the best "test" for any group of students may well be locally designed. The definition of "local" is also contextual; schools with common goals and similar student populations and teaching philosophies and outcomes might well form consortia for the design, implementation, and evaluation of assessment instruments even though the schools themselves are geographically separated from each other.

SECOND, language by definition is social. Assessment which isolates students and forbids discussion and feedback from others conflicts with current cognitive and psychological research about language use and the benefits of social interaction during the writing process; it also is out of step with much classroom practice.

THIRD, reading--and thus, evaluation, since it is a variety of reading--is as socially contextualized as all other forms of language use. What any reader draws out of a particular text and uses as a basis of evaluation is dependent upon how that reader's own language use has been shaped and what his or her specific purpose for reading is. It seems appropriate, therefore, to recognize the individual writing program, institution, consortium, and so forth as a community of interpreters who can function fairly--that is, assess fairly--with knowledge of that community.

FOURTH, any individual's writing "ability" is a sum of a variety of skills employed in a diversity of contexts, and individual ability fluctuates unevenly among these varieties. Consequently, one piece of writing--even if it is generated under the most desirable conditions--can never serve as an indicator of overall literacy, particularly for high stakes decisions. Ideally, such literacy must be assessed by more than one piece of writing, in more than one genre, written on different occasions, for different audiences, and evaluated by multiple readers. This realization has led many institutions and programs across the country to use portfolio assessment.

FIFTH, writing assessment is useful primarily as a means of improving learning. Both teachers and students must have access to the results in order to be able to use them to revise existing curricula and/or plan programs for individual students. And, obviously, if results are to be used to improve the teaching-learning environment, human and financial resources for the implementation of improvements must be in place in advance of the assessment. If resources are not available, institutions should postpone these types of assessment until they are. Furthermore, when assessment is being conducted solely for program evaluation, all students should not be tested, since a representative group can provide the desired results. Neither should faculty merit increases hinge on their students' performance on any test.

SIXTH, assessment tends to drive pedagogy. Assessment thus must demonstrate "systemic validity": it must encourage classroom practices that harmonize with what practice and research have demonstrated to be effective ways of teaching writing and of becoming a writer. What is easiest to measure--often by means of a multiple choice test--may correspond least to good writing, and that in part is an important point: choosing a correct response from a set of possible answers is not composing. As important, just because students are asked to write does not mean that the "assessment instrument" is a "good" one. Essay tests that ask students to form and articulate opinions about some important issue, for instance, without time to reflect, to talk to others, to read on the subject, to revise and so forth--that is, without taking into account through either appropriate classroom practice or the assessment process itself--

encourage distorted notions of what writing is. They also encourage poor teaching and little learning. Even teachers who recognize and employ the methods used by real writers in working with students can find their best efforts undercut by assessments such as these.

SEVENTH, standardized tests, usually developed by large testing organizations, tend to be for accountability purposes, and when used to make statements about student learning, misrepresent disproportionately the skills and abilities of students of color. This imbalance tends to decrease when tests are directly related to specific contexts and purposes, in contrast to tests that purport to differentiate between "good" and "bad" writing in a general sense. Furthermore, standardized tests tend to focus on readily accessed features of the language--on grammatical correctness and stylistic choice--and on error, on what is wrong rather than on the appropriate rhetorical choices that have been made. Consequently, the outcome of such assessments is negative: students are said to demonstrate what they do "wrong" with language rather than what they do well.

EIGHTH, the means used to test students' writing ability shapes what they, too, consider writing to be. If students are asked to produce "good" writing within a given period of time, they often conclude that all good writing is generated within those constraints. If students are asked to select--in a multiple choice format--the best grammatical and stylistic choices, they will conclude that good writing is "correct" writing. They will see writing erroneously, as the avoidance of error; they will think that grammar and style exist apart from overall purpose and discourse design.

NINTH, financial resources available for designing and implementing assessment instruments should be used for that purpose and not to pay for assessment instruments outside the context within which they are used. Large amounts of money are currently spent on assessments that have little pedagogical value for students or teachers. However, money spent to compensate teachers for involvement in assessment is also money spent on faculty development and curriculum reform since inevitably both occur when teachers begin to discuss assessment which relates directly to their classrooms and to their students.

TENTH, and finally, there is a large and growing body of research on language learning, language use, and language assessment that must be used to improve assessment on a systematic and regular basis. Our assumptions are based on this scholarship. Anyone charged with the responsibility of designing an assessment program must be cognizant of this body of research and must stay abreast of developments in the field. Thus, assessment programs must always be under review and subject to change by well-informed faculty, administrators, and legislators.

Rights and Responsibilities

Students should:

1. demonstrate their accomplishment and/or development in writing by means of composing, preferably in more than one sample written on more than one occasion, with sufficient time to plan, draft, rewrite, and edit each product or performance;
2. write on prompts developed from the curriculum and grounded in "real-world" practice;
3. be informed about the purposes of the assessment they are writing for, the ways the results will be used, and avenues of appeal;
4. have their writing evaluated by more than one reader, particularly in "high stakes" situations (e.g., involving major institutional consequences such as getting credit for a course, moving from one context to another, or graduating from college); and
5. receive response, from readers, intended to help them improve as writers attempting to reach multiple kinds of audiences.

Faculty should:

1. play key roles in the design of writing assessments, including creating writing tasks and scoring guides, for which they should receive support in honoraria and/or release time; and should appreciate and be responsive to the idea that assessment tasks and procedures must be sensitive to cultural, racial, class, and gender differences, and to disabilities, and must be valid for and not penalize any group of students;

2. participate in the readings and evaluations of student work, supported by honoraria and/or release time;
3. assure that assessment measures and supports what is taught in the classroom;
4. make themselves aware of the difficulty of constructing fair and motivating prompts for writing, the need for field testing and revising of prompts, the range of appropriate and inappropriate uses of various kinds of writing assessments, and the norming, reliability, and validity standards employed by internal and external test-makers, as well as share their understanding of these issues with administrators and legislators;
5. help students to prepare for writing assessments and to interpret assessment results in ways that are meaningful to students;
6. use results from writing assessments to review and (when necessary) to revise curriculum;
7. encourage policymakers to take a more qualitative view toward assessment, encouraging the use of multiple measures, infrequent large-scale assessment, and large-scale assessment by sampling of a population rather than by individual work whenever appropriate; and
8. continue conducting research on writing assessment, particularly as it is used to help students learn and to understand what they have achieved.

Administrators and Higher Education Governing Boards should:

1. educate themselves and consult with rhetoricians and composition specialists teaching at their own institutions, about the most recent research on teaching and assessing writing and how they relate to their particular environment and to already established programs and procedures, understanding that generally student learning is best demonstrated by performances assessed over time and sponsored by all faculty members, not just those in English;
2. announce to stakeholders the purposes of all assessments, the results to be obtained, and the ways that results will be used;
3. assure that the assessments serve the needs of students, not just the needs of an institution, and that resources for necessary courses linked to the assessments are therefore available before the assessments are mandated;
4. assure opportunities for teachers to come together to discuss all aspects of assessments: the design of the instruments; the standards to be employed; the interpretation of the results; possible changes in curriculum suggested by the process and results;
5. assure that all decisions are made by more than one reader; and
6. not use any assessment results as the primary basis for evaluating the performance of or rewards due a teacher; they should recognize that student learning is influenced by many factors such as cognitive development, personality type, personal motivation, physical and psychological health, emotional upheavals, socioeconomic background, family successes and difficulties which are neither taught in the classroom nor appropriately measured by writing assessment.

Legislators should:

1. not mandate a specific instrument (test) for use in any assessment; although they may choose to answer their responsibility to the public by mandating assessment in general or at specific points in student careers, they should allow professional educators to choose the types and ranges of assessments that reflect the educational goals of their curricula and the nature of the student populations they serve;
2. understand that mandating assessments also means providing funding to underwrite those assessments, including resources to assist students and to bring teachers together to design and implement assessments, to review curriculum, and to amend the assessment and/or curriculum when necessary;
3. become knowledgeable about writing assessment issues, particularly by consulting with rhetoricians and composition specialists engaged in teaching, on the most recent research on the teaching of writing and assessment;
4. understand that different purposes require different assessments and that qualitative forms of assessment can be more powerful and meaningful for some purposes than quantitative measures are,

and that assessment is a means to help students learn better, not a way of unfairly comparing student populations, teachers, or schools;

5. include teachers in the drafting of legislation concerning assessments; and
6. recognize that legislation needs to be reviewed continually for possible improvement in light of actual results and ongoing developments in writing assessment theory and research.

Assessment of Writing

Assessment of writing is a legitimate undertaking. But by its very nature it is a complex task, involving two competing tendencies: first, the impulse to measure writing as a general construct; and second, the impulse to measure writing as a contextualized, site- and genre-specific ability. There are times when re-creating or simulating a context (as in the case of assessment for placement, for instance) is limited. Even in this case, however, assessment--when conducted sensitively and purposefully--can have a positive impact on teaching, learning, curricular design, and student attitudes. Writing assessment can serve to inform both the individual and the public about the achievements of students and the effectiveness of teaching. On the other hand, poorly designed assessments, and poorly implemented assessments, can be enormously harmful because of the power of language: personally, for our students as human beings; and academically, for our students as learners, since learning is mediated through language.

Students who take pleasure and pride in using written language effectively are increasingly valuable in a world in which communication across space and a variety of cultures has become routine.

Writing assessment that alienates students from writing is counterproductive, and writing assessment that fails to take an accurate and valid measure of their writing even more so. But writing assessment that encourages students to improve their facility with the written word, to appreciate their power with that word and the responsibilities that accompany such power, and that salutes students' achievements as well as guides them, should serve as a crucially important educational force.

Appendix G: National Communication Association Statements on Assessment

from <http://www.natcom.org/Instruction/assessment/Assessment/CriteriaAssessment.htm>.

Criteria for Assessment of Oral Communication

Historical Background

Assessment received increasing attention beginning in the 1970s and continuing into the 1990s and the new millennium. Initially appearing in the standards developed by state departments of education, by 1980 over half of the states had adopted statewide student-testing programs. In *Educational Standards in the 50 States: 1990*, the Educational Testing Service reported that by 1990 statewide student-testing programs existed in 47 states. By 1996, standards programs were established in every state in the country and assessment of student learning was required to qualify for national, state, and local funding.

As standards and assessment programs expanded, the number of different subjects and skills being tested increased, with additional attention devoted to assessment processes and testing methods. Organizations, such as the National Assessment of Educational Progress, intensified and expanded the scope of their assessment procedures and publicized the results of their findings nationally and annually.

By the end of 1989, the public recognized the significance of the national educational assessment movement. In the Phi Delta Kappan-Gallup poll reported in the September 1989 issue of *Phi Delta Kappan*, 77 percent of survey respondents favored "requiring the public schools in this community to use standardized national testing programs to measure academic achievement of students" and 70 percent favored "requiring the public schools in this community to conform to national achievement standards and goals."

Also toward the end of the 1980s, colleges and universities began to realize that formal assessment issues were to affect them. In its 1989-1990 *Criteria for Accreditation*, the Southern Association of Colleges and Schools—which provides institutional certification for over 800 colleges and universities in the South—held that "complete requirements for an associate or baccalaureate degree must include competence in reading, writing, oral communications and fundamental mathematical skills." They also held that the general education core of colleges and universities "must provide components designed to ensure competence in reading, writing, oral communication and fundamental mathematical skills." Similarly, the other regional accreditation associations began mandating campus-wide assessment programs in all academic units concerned with student learning, as an integral component of the accreditation process in higher education.

In 1990, a series of reports confirmed that systematic and comprehensive assessment should be a national educational objective. The National Governors' Association stated that, "National education goals will be meaningless unless progress toward meeting them is measured accurately and adequately, and reported to the American people." *The National Education Goals: A Report to the Nation's Governors* reinforced that line of reasoning and the Governors' Association elaborated its commitment to assessment in *Educating America: State Strategies for Achieving the National Education Goals: Report of the Task Force on Education*. Additionally in 1990, in their report *From Gatekeeper to Gateway: Transforming Testing in America*, the National Commission on Testing and Public Policy recommended eight standards for assessment, arguing for more humane and multicultural assessment systems.

By the end of the 1990's, assessment of student learning became a permanent fixture at all grade levels, K through 16-18. It is now institutionalized in the accreditation and accountability processes that take place with regularity at academic institutions through the country. Additionally, oral communication is now more extensively included in the curriculum, K-18, and therefore it has a presence in assessment programs as well.

NCA's Role in Assessment

The evaluation and assessment of public address has been of central concern to the discipline of communication since its inception and to the National Communication Association when it was organized in 1914. In 1970, NCA formalized its commitment to assessment when it created the Committee on Assessment and Testing (now known by the acronym CAT) for "NCA members interested in gathering, analyzing and disseminating information about the testing of speech communication skills."

As the assessment movement evolved, NCA has convened conferences and produced publications exploring methods for assessing oral communication. These publications began to appear in the 1970s, proliferated during the 1990s, and now include in print the following: *Large Scale Assessment in Oral Communication: Assessing College Student Competency in Speech Communication: 1994 NCA Summer Conference Proceedings; K-12 and Higher Education; Program Assessment in Speech Communication; The Conversational Skills Rating Scale: An Instructional Assessment of Interpersonal Competence; The Competent Speaker Speech Evaluation Form;* and *Assessing Motivation to Communicate*.

Standards and Conferences

In 1979, in *Standards for Effective Oral Communication Programs*, NCA adopted its first set of "standards for assessment." Those standards called for "school-wide assessment of speaking and listening needs of students," "qualified personnel" to "utilize appropriate evaluation tools," and a "variety of data" and "instruments" which "encourage" "students' desire to communicate."

In 1986, in *Criteria for Evaluating Instruments and Procedures for Assessing Speaking and Listening*, NCA adopted an additional 15 "content" and "technical considerations" dealing "primarily with the substance of speaking and listening instruments" and "matters such as reliability, validity and information on administration." These criteria included among other concerns, the importance of focusing on "demonstrated" speaking skills rather than "reading and writing ability."

In 1987, at an NCA Wingspread Conference, "conference participants recommended that any chosen instrument conform to NCA guidelines for assessment instruments," and they specifically suggested that "strategies for assessing speaking skills" should be directly linked to the content of oral communication performances and student speaking competencies. Additionally, the Wingspread Conference participants considered strategies for assessing listening and for training assessors (see: *Communication Is Life: Essential College Sophomore Speaking and Listening Competencies*, Annandale, Va.: National Communication Association, 1990].

In 1988, an NCA Flagstaff Conference generated a series of resolutions calling for a "national conference" and "task force on assessment" because "previous experience in developing standardized assessment has met with problems of validity, reliability, feasibility, ethics, and cultural bias."

In July 1990, NCA and its Committee on Assessment and Testing convened a national working conference on oral communication and its assessment. The Conference generated resolutions, which reaffirmed existing NCA assessment policies and provided criteria for resolving new issues in assessment. A revision of those assessment criteria is contained in this publication. The 1990 assessment conference also resulted in NCA's publication of assessment instruments, for public speaking and for interpersonal communication.

In July 1994, NCA convened another assessment conference, focusing on oral competence assessment in higher education. The proceedings of that conference examine the philosophy, methods, and progress of assessment around the country and at a variety of academic institutions.

Presently, a set of recommendations for engaging in oral communication assessment is available on the NCA home page at www.natcom.org. The recommendations include suggestions for developing successful assessment programs by institutions and academic departments, as well as recommended methods and techniques.

General Criteria for Assessing Oral Communication

1. Assessment of oral communication should view competence in oral communication as a gestalt of several interacting dimensions. At a minimum, all assessments of oral communication should include an assessment of knowledge (understanding communication process, comprehension of the elements, rules, and dynamics of a communication event, awareness of what is appropriate in a communication situation), an assessment of skills (the possession of a repertoire of skills and the actual performance of skills), and an evaluation of the individual's attitude toward communication (e.g., value placed on oral communication, apprehension, reticence, willingness to communicate, readiness to communicate).
2. Because oral communication is an interactive and social process, assessment should consider the judgment of a trained assessor as well as the impressions of others involved in the communication act (audience, interviewer, other group members, conversant), and may include the self-report of the individual being assessed.
3. Assessment of oral communication should clearly distinguish speaking and listening from reading and writing. While some parts of the assessment process may include reading and writing, a major portion of the assessment of oral communication should require speaking and listening. Directions from the assessor and responses by the individual being assessed should be in the oral/aural mode.
4. Assessment of oral communication should be sensitive to the effects of relevant physical and psychological disabilities on the assessment of competence. (e.g., with appropriate aids in signal reception, a hearing impaired person can be a competent empathic listener.)
5. Assessment of oral communication should be based in part on atomistic/analytic data collected and on a holistic impression.

Criteria for the Content of Assessment

1. Assessment of oral communication for all students should include assessment of both verbal and nonverbal aspects of communication and should consider competence in more than one communication setting. As a minimum assessment should occur in the one-to-many setting (e.g. public speaking, practical small group discussion) and in the one-to-one setting (e.g., interviews, interpersonal relations).
2. Assessment of speech majors and other oral communication specialists could include in addition assessment in specialized fields appropriate to the course of study followed or the specialty of the person being assessed.

Criteria for Assessment Instruments

1. The method of assessment should be consistent with the dimension of oral communication being assessed. While knowledge and attitude may be assessed in part through paper and pencil instruments, speaking and listening skills must be assessed through actual performance in social settings (speaking before an audience, undergoing an interview, participating in a group discussion, etc.) appropriate to the skill(s) being assessed.
2. Instruments for assessing oral communication should describe degrees of competence. Either/or descriptions such as "competent" or "incompetent" should be avoided, as should attempts to diagnose reasons why individuals demonstrate or fail to demonstrate particular degrees of competence.
3. Instruments for assessing each dimension of oral communication competence should clearly identify the range of responses, which constitute various degrees of competence. Examples of such responses should be provided as anchors.
4. Assessment instruments should have an acceptable level of reliability, e.g. test/retest reliability, split-half reliability, alternative forms reliability, inter-rater reliability, and internal consistency.

5. Assessment instruments should have appropriate validity: content validity, predictive validity, and concurrent validity.
6. Assessment instruments must meet acceptable standards for freedom from cultural, sexual, ethical, racial, age, and developmental bias.
7. Assessment instruments should be suitable for the developmental level of the individual being assessed.
8. Assessment instruments should be standardized and detailed enough so that individual responses will not be affected by an administrator's skill in administering the procedures.

Criteria for Assessment Procedures and Administration

1. Assessment procedures should protect the rights of those being assessed in the following ways: administration of assessment instruments and assessment and the uses of assessment results should be kept confidential and be released only to an appropriate institutional office, to the individual assessed, or if a minor, to his or her parent or legal guardian.
2. Use of competence assessment as a basis for procedural decisions concerning an individual should, when feasible, be based on multiple sources of information, including especially a) direct evidence of actual communication performance in school and/or other contexts, b) results of formal competence assessment, and c) measures of individual attitudes toward communication (e.g., value placed on oral communication, apprehension, reticence, willingness to communicate, and readiness to communicate).
3. Individuals administering assessment procedures for oral communication should have received sufficient training by speech communication professionals to make their assessment reliable. Scoring of some standardized assessment instruments in speaking and listening may require specialized training in oral communication on the part of the assessor.

Criteria for Assessment Frequency

Periodic assessment of oral communication competency should occur annually during the educational careers of students. An effective systematic assessment program minimally should occur at educational levels K, 4, 8, 12, 14, and 16.

Criteria for the Use of Assessment Results

The results of student oral communication competency assessment should be used in an ethical, non-discriminatory manner for such purposes as:

1. Diagnosing student strengths and weaknesses;
2. Planning instructional strategies to address student strengths and weaknesses;
3. Certification of student readiness for entry into and exit from programs and institutions;
4. Evaluating and describing overall student achievement;
5. Screening students for programs designed for special populations;
6. Counseling students for academic and career options; and
7. Evaluating the effectiveness of instructional programs.

No single assessment instrument is likely to support all these purposes. Moreover, instruments appropriate to various or multiple purposes typically vary in length, breadth/depth of content, technical rigor, and format.

A Conceptual Framework For Assessing Student Learning Based on Three Domains of Learning:

Cognition, Behaviors, and Affect

The North Central Accreditation Commission on Institutions of Higher Education suggests that **ALL** assessment of student learning be based on the conceptual framework established in the communication field as a model for communication competence:

"Evaluators recommend that every academic department or other academic unit determine the extent to which it actually contributes to the incremental learning of its students within three domains: cognitive (knowledge acquisition), behavioral (skills acquisitions), and affective (attitudinal development)." (Cecelia Lopez, 1995)

Accordingly, communication departments should:

"build upon or redesign existing activities and identify comprehensive measures or quality indicators of student achievement in these areas:

1. Cognitive outcomes (general and specific knowledge)
2. Skills outcomes (basic, higher order, and occupational)
3. Attitudes/values outcomes (personal goals, attitudes, motivational factors)

Cognitive Learning: Knowledge Acquisition

The cognitive domain of learning is concerned with knowledge and understanding. At the lowest level, this domain focuses on specific facts. At the middle level, the cognitive domain focuses on principles and generalizations. At the highest level of cognitive learning, the focus is on synthesis and evaluation based on learning that has already taken place at the lower levels. This domain of learning encompasses the content of a field.

EXAMPLE

Some examples of direct measures of cognitive learning would be: pre and post-testing in a general education program using a measure of critical thinking such as the Watson-Glasser Critical Thinking Test; in a department of music, faculty-juried exams on studio instruction; comprehensive written exams in bachelors, masters, and doctoral programs, and the writing of and defense of the thesis or dissertation. In any major, a paper-and-pencil test of the cognitive content essential to the discipline could be pre and post-administered at the beginning and end of the student's tenure in the program, as an entrance test of freshmen and an exit test of graduating seniors.

Behavioral Learning: Skills Acquisition

The behavioral domain of learning is concerned with psychomotor skills. Skills are viewed as the ability of an individual to perform certain behaviors. Skills can be learned and possessed by the learner, then they can be demonstrated through performance as observable behaviors. This domain encompasses the ability to perform as a function of cognitive learning.

Inferences about cognition and affect can be made through observing behaviors.

EXAMPLE

Examples typically associated with this domain include oral communication skills such as interpersonal, group interaction, and presentational skills; leadership; managerial skills; written communication abilities demonstrated in essay writing, etc.; or problem solving skills. Examples of measures of incremental behavioral learning include faculty-juried recitals in music or dance and pre and post standardized measures of general skill acquisition for specific content areas such as mathematical reasoning (e.g. Academic Profile).

Affective Learning: Attitudinal Development

The affective domain of learning is concerned with the attitudes and feelings of the learner in regard to knowledge and behaviors acquired in the other two domains. In most learning environments, affective learning is incidental to both cognitive and behavioral learning. This domain encompasses attitudes toward what has been learned cognitively and motivation to perform learned behaviors.

EXAMPLE

Most exemplary of this domain are self-report instruments and surveys. These types of tools are the most common type of measures used to evaluate the attitudinal development of students. They do not evidence cognitive learning, but the information yielded is useful in determining change and growth in what students perceive or others perceive students have learned. Examples of these measures include: student satisfaction and attitude surveys, alumni surveys, and employer surveys. The Student Goals Exploration Survey and the Cooperative Institutional Research Program Question, which measures attitudes and opinions of students entering graduate programs are typical examples.

Criteria for Assessing Student Achievement of Communication Competence

General Description of the Goals/Objectives of the Unit

1. Unit has written goals and objectives.
2. Goals and objectives have been operationalized; terms and concepts have been defined in terms of identifiable and repeatable operations.
3. Unit goals and objectives are linked to institutional mission.
4. Goals and objectives are measurable.
5. Goals and objectives are appropriate to unit.
6. Faculty were involved in developing goals and objectives.

General Description of the Goal's Assessment Processes

1. Unit's assessment process emerges from a conceptual framework.
2. Unit has long-term, ongoing timelines and completion dates for student assessment, data collection and analysis, and expected improvement.
3. Unit has clear, well-defined, and appropriate assessment techniques to measure <u>every</u> goal and objective.
4. A specific administrator is responsible to implement, oversee, and evaluate assessment processes.
5. Unit's assessment techniques:

    - Use reliable and valid measures.
    - Use quantitative methods.
    - Use qualitative methods.
    - Assess cognition (general and specific knowledge).
    - Assess skills (basic, higher order, and occupational).

6. Assess observable behaviors.
7. Assess affect (personal goals, attitudes, and values).
8. Use representative sample populations.
9. Evidence of appropriate intervals between data-collection points.
10. Use state (dynamic) measures as opposed to trait (static) measures.
11. Incorporate multiple judgments; e.g., faculty groups, external reviewers, community, parents, etc.
12. Use multiple assessment measures (not just FCQ's, grades, program reviews, GPA's, classes taken, and/or course availability).
13. Link regularly-scheduled Academic Program Reviews to unit-specific assessment activities.

Description of Results Generated by the Unit's Assessment Process

1. Results exist for each technique.
2. Data integrity exists; e.g., data are valid, reliable, and free of bias.
3. Interpretability of data (ability to inform) is evident.
4. Information is timely; results are available in time to be useful.

How Assessment Results are Interpreted

1. Interpretation exists for every goal and objective, result, and technique.
2. Interpretation demonstrates longitudinal comparisons of results (year-to-year comparisons).
3. Interpretation of data is appropriate for results.
4. Interpretation is valuable in determining change.

How Assessment Results are Used

1. Unit evaluates assessment processes on a regular basis and makes indicated changes based upon results.
2. Unit uses assessment resources efficiently.
3. Assessment provides feedback to students.
4. Assessment provides feedback to the institution.
5. Assessment initiates changes to the curriculum.
6. Assessment initiates changes to student learning.
7. Assessment initiates changes to teaching.
8. Department follows up changes to see if they resulted in student improvement.
9. Student achievement assessment is tied to strategic or long-range goals/planning.
10. Assessment results are used in unit-specific decision making, planning, and budgeting processes (e.g., initiatives, rewards, penalties for failure to perform appropriate assessment activities).
11. Unit routinely shares assessment activities/results with faculty, staff, and students.

Suggested Assessment Techniques & Methods

Assessment techniques should: (1) Be linked to unit's goals, (2) Generate data that effects change, (3) Involve multiple methods as outlined below and (4) Be based on conceptual model of learning, as follows.

C = Possible Cognition Assessment Technique

B = Possible Behavior Assessment Technique

A = Possible Affect Assessment Technique

N/A = Not directly applicable to conceptual framework but can be used as an additional measure

Stress Direct Measures of Student Learning

C/B entrance (pre-) and exit (post-) tests (course-specific and program-specific)
C/B placement tests
C/B portfolio assessment;
C/B capstone experiences (e.g., course, thesis, field project);
C/B respected standardized tests and internally/externally-designed comprehensive (written and oral) exit tests and examinations;
C/B senior thesis (multiple reviewers)
C/B oral defense of senior thesis or project (multiple reviewers)

C/B required oral presentations (multiple raters)
C/B national tests and examinations
C/B performance on licensure, certification, or professional exams;
C essay questions (blind scored by multiple faculty);
B/C required papers and research projects (multiple reviewers)
B/C internal and external juried review of comprehensive senior projects;
B/C externally reviewed exhibits and performances;
B/C external evaluation of internship performance.

Enhance with Indirect Measures of Student Learning

C/A exit interviews of graduates and focus groups;
A surveys of alumni, employers, and students;
N/A retention, persistence, graduation, and transfer rates and studies;
N/A length of time to degree (years/hours to completion);
N/A grade distributions;
N/A SAT scores;
N/A course enrollments and profiles;
N/A job placement data.

Limited Measures to Evidence Student Learning

A questionnaires asking students if their personal goals for course, major, or program have been met;
N/A instruments that collect data on indirect facts that can affect student success such as curriculum review reports or evaluation reports of program submitted by visiting committees of external peer experts (accreditation reports);
N/A faculty publications and recognition;
N/A courses selected by majors, grades, GPAs, and FCQs.
N/A faculty-student ratio;
N/A percentage of students who study abroad;
N/A enrollment trends;
N/A student diversity.

Appendix H: CUPM Guidelines for Assessment of Student Learning

Reprint of "Assessment of Student Learning for Improving the Undergraduate Major in Mathematics" (from <http://www.maa.org/saum/index.html>.

Prepared by The Mathematical Association of America, Subcommittee on Assessment, Committee on the Undergraduate Program in Mathematics

Approved by CUPM at the San Francisco meeting, January 4, 1995

Preface

Recently there has been a series of reports and recommendations about all aspects of the undergraduate mathematics program. In response, both curriculum and instruction are changing amidst increasing dialogue among faculty about what those changes should be. Many of the changes suggested are abrupt breaks with traditional practice; others are variations of what has gone on for many decades. Mathematics faculty need to determine the effectiveness of any change and institutionalize those that show the most promise for improving the quality of the program available to mathematics majors. In deciding which changes hold the greatest promise, student learning assessment provides invaluable information. That assessment can also help departments formulate responses for program review or other assessments mandated by external groups.

The Committee on the Undergraduate Program in Mathematics established the Subcommittee on Assessment in 1990. This document, approved by CUPM in January 1995, arises from requests from departments across the country struggling to find answers to the important new questions in undergraduate mathematics education. This report to the community is suggestive rather than prescriptive. It provides samples of various principles, goals, areas of assessment, and measurement methods and techniques. These samples are intended to seed thoughtful discussions and should not be considered as recommended for adoption in a particular program, certainly not in totality and not exclusively.

Departments anticipating program review or preparing to launch the assessment cycle described in this report should pay careful attention to the MAA Guidelines for Programs and Departments in Undergraduate Mathematical Sciences [1]. In particular, Section B.2 of that report and step 1 of the assessment cycle described in this document emphasize the need for departments to have

a. A clearly defined statement of program mission; and

b. A delineation of the educational goals of the program.

The Committee on the Undergraduate Program in Mathematics urges departments to consider carefully the issues raised in this report. After all, our programs should have clear guidelines about what we expect students to learn and have a mechanism for us to know if in fact that learning is taking place.

I. Introduction

The most important indicators of effectiveness of mathematics degree programs are what students learn and how well they are able to use that learning. To gauge these indicators, assessment — the process of gathering and interpreting information about student learning — must be implemented. This report seeks to engage faculty directly in the use of assessment of student learning, with the goal of improving undergraduate mathematics programs.

Assessment determines whether what students have learned in a degree program is in accord with program objectives. Mathematics departments must design and implement a cycle of assessment activity that answers the following three questions:

- What should our students learn?
- How well are they learning?
- What should we change so that future students will learn more and understand it better?

Each step of an ongoing assessment cycle broadens the knowledge of the department in judging the effectiveness of its programs and in preparing mathematics majors. This knowledge can also be used for other purposes. For example, information gleaned from an assessment cycle can be used to respond to demands for greater accountability from state governments, accrediting agencies, and university administrations. It can also be the basis for creating a shared vision of educational goals in mathematics, thereby helping to justify requests for funds and other resources.

This report provides samples of various principles, goals, areas of assessment, and measurement methods and techniques. Many of the items in these lists are extracted from actual assessment documents at various institutions or from reports of professional organizations. These samples are intended to stimulate thoughtful discussion and should not be considered as recommended for adoption in a particular program, certainly not in totality and not exclusively. Local considerations should guide selection from these samples as well as from others not listed.

II. Guiding Principles

An essential prerequisite to constructing an assessment cycle is agreement on a set of basic principles that will guide the process, both operationally and ethically. These principles should anticipate possible problems as well as ensure sound and effective educational practices. Principles and standards from several sources (see references 2,3,4,5,and 6) were considered in the preparation of this document, yielding the following for consideration:

a. Objectives should be realistically matched to institutional goals as well as to student backgrounds, abilities, aspirations, and professional needs.

b. The major focus of assessment (by mathematics departments) should be the mathematics curriculum.

c. Assessment should be an integral part of the academic program and of program review.

d. Assessment should be used to improve teaching and learning for all students, not to filter students out of educational opportunities.

e. Students and faculty should be involved in and informed about the assessment process, from the planning stages throughout implementation.

f. Data should be collected for specific purposes determined in advance, and the results should be reported promptly.

III. The Assessment Cycle

Once the guiding principles are formulated and understood, an assessment cycle can be developed:

1. Articulate the learning goals of the mathematics curriculum and a set of objectives that should lead to the accomplishment of those goals.

2. Design strategies (e.g., curriculum and instructional methods) that will accomplish the objectives, taking into account student learning experiences and diverse learning styles, as well as research results on how students learn.

3. Determine the areas of student activities and accomplishments in which quality will be judged. Select assessment methods designed to measure student progress toward completion of objectives and goals.

4. Gather assessment data; summarize and interpret the results.

5. Use the results of the assessment to improve the mathematics major.

Steps 1 and 2 answer the first question in the introduction — what should the students learn? Steps 3 and 4, which answer the second question about how well they are learning, constitute the assessment. Step 5 answers the third question on what improvements are possible.

Step 1. Set the Learning Goals and Objectives

There are four factors to consider in setting the learning goals of the mathematics major: institutional mission, background of students and faculty, facilities, and degree program goals. Once these are well understood, then the goals and objectives of the major can be established. These goals and objectives of the major must be aligned with the institutional mission and general education goals and take into account the information obtained about students, faculty, and facilities.

Institutional Mission and Goals. The starting point for establishing goals and objectives is the mission statement of the institution. Appropriate learning requirements from a mission statement should be incorporated in the departments goals. For example, if graduates are expected to write with precision, clarity, and organization within their major, this objective will need to be incorporated in the majors goals. Or, if students are expected to gain skills appropriate for jobs, then that must be a goal of the academic program for mathematics majors.

Information on Faculty, Students, and Facilities. Each institution is unique, so each mathematics department should reflect those special features of the institutional environment. Consequently, the nature of the faculty, students, courses, and facilities should be studied in order to understand special opportunities or constraints on the goals of the mathematics major. Questions to be considered include the following:

- What are the expectations and special needs of our students?
- Why and how do our students learn?
- Why and how do the faculty teach?
- What are the special talents of the faculty?
- What facilities and materials are available?
- Are mathematics majors representative of the general student population, and if not, why not?

Goals and Objectives of Mathematics Degree Program. A degree program in mathematics includes general education courses as well as courses in mathematics. General education goals should be articulated and well-understood before the goals and objectives of the mathematics curriculum are formulated. Of course, the general education goals and the mathematics learning goals must be complementary and consistent [6, pages 183-223]. Some examples of general education goals that will affect the goals of the degree program and what learning is assessed include the following:

Graduates are expected to speak and write with precision, clarity, and organization; to acquire basic scientific and technological literacy; and to be able to apply their knowledge.

Degree programs should prepare students for immediate employment, graduate schools, professional schools, or meaningful and enjoyable lives.

Degree programs should be designed for all students with an interest in the major subject and encourage women and minorities, support the study of science, build student self-esteem, ensure a common core of learning, and encourage life-long learning.

Deciding what students should know and be able to do as mathematics majors ideally is approached by setting the learning goals and then designing a curriculum that will achieve those goals. However, since most curricula are already structured and in place, assessment provides an opportunity to review curricula, discern the goals intended, and rethink them. Curricula and goals should be constructed or reviewed in light of recommendations on the mathematics major as contained in the 1991 CUPM report on the Undergraduate Major in the Mathematical Sciences [6, pages 225-247].

Goal setting should move from general to specific, from program goals to course goals to assessment goals. Goals for student learning can be statements of knowledge students should gain, skills they should possess, attitudes they should develop, or requirements of careers for which they are preparing. The logical starting place for discerning goals for an existing curriculum is to examine course syllabi, final examinations, and other student work.

Some samples of learning goals are:

Mathematical Reasoning. Students should be able to perform complex tasks; explore subtlety; discern patterns, coherence, and significance; undertake intellectually demanding mathematical reasoning; and reason rigorously in mathematical arguments.

Personal Potential. Students should be able to undertake independent work, develop new ideas, and discover new mathematics. Students should possess an advanced level of critical sophistication; knowledge and skills needed for further study; personal motivation and enthusiasm for studying and applying mathematics; and attitudes of mind and analytical skills required for efficient use, appreciation, and understanding of mathematics.

Nature of Mathematics. Students should possess an understanding of the breadth of the mathematical sciences and their deep interconnecting principles; substantial knowledge of a discipline that makes significant use of mathematics; understanding of interplay among applications, problem-solving, and theory; understanding and appreciation of connections between different areas of mathematics and with other disciplines; awareness of the abstract nature of theoretical mathematics and the ability to write proofs; awareness of historical and contemporary contexts in which mathematics is practiced; understanding of the fundamental dichotomy of mathematics as an object of study and a tool for application; and critical perspectives on inherent limitations of the discipline.

Mathematical Modeling. Students should be able to apply mathematics to a broad spectrum of complex problems and issues; formulate and solve problems; undertake some real-world mathematical modeling project; solve multi-step problems; recognize and express mathematical ideas imbedded in other contexts; use the computer for simulation and visualization of mathematical ideas and processes; and use the process by which mathematical and scientific facts and principles are applied to serve society.

Communication and Resourcefulness. Students should be able to read, write, listen, and speak mathematically; read and understand technically-based materials; contribute effectively to group efforts; communicate mathematics clearly in ways appropriate to career goals; conduct research and make oral and written presentations on various topics; locate, analyze, synthesize, and evaluate information; create and document algorithms; think creatively at a level commensurate with career goals; and make effective use of the library. Students should possess skill in expository mathematical writing, have a disposition for questioning, and be aware of the ethical issues in mathematics.

Content Specific Goals. Students should understand theory and applications of calculus and the basic techniques of discrete mathematics and abstract algebra. Students should be able to write computer programs in a high level language using appropriate data structures (or to use appropriate software) to solve mathematical problems.

Topic or thematic threads through the curriculum are valuable in articulating measurable objectives for achieving goals. Threads also give the curriculum direction and unity, with courses having common purposes and reinforcing one another. Each course or activity can be assessed in relation to the progress achieved along the threads. Possible threads or themes are numerous and varied, even for the mathematics major. Examples include mathematical reasoning, communication, scientific computing, mathematical modeling, and the nature of mathematics. The example of a learning goal and instructional strategy in the next section gives an idea of how the thread of mathematical reasoning could wind through the undergraduate curriculum.

Step 2. Design Strategies to Accomplish Objectives

Whether constructing a curriculum for predetermined learning goals or discerning goals from an existing curriculum, strategies for accomplishing each learning goal should be designed and identified in the curricular and co-curricular activities. Strategies should respect diverse learning styles while maintaining uniform expectations for all students.

Strategies should allow for measuring progress over time. For each goal, questions such as the following should be considered.

- Which parts of courses are specifically aimed at helping the student reach the goal?
- What student assignments help reach the goal?
- What should students do outside their courses to enable them to reach the goal?
- What should the faculty do to help the students reach the goal?
- What additional facilities are needed?
- What does learning research tell us?

The following example of a goal and strategy can be made more specific by referencing specific courses and activities in a degree program.

Learning goal. Students who have completed a mathematics major should be able to read and understand mathematical statements, make and test conjectures, and be able to construct and write proofs for mathematical assertions using a variety of methods, including direct and indirect deductive proofs, construction of counterexamples, and proofs by mathematical induction. Students should also be able to read arguments as complex as those found in the standard mathematical literature and judge their validity.

Strategy. Students in first year mathematics courses will encounter statements identified as theorems which have logical justifications provided by the instructors. Students will verify the need for some of the hypotheses by finding counterexamples for the alternative statements. Students will use the mathematical vocabulary found in their courses in writing about the mathematics they are learning. In the second and third years, students will learn the fundamental logic needed for deductive reasoning and will construct proofs of some elementary theorems using quantifiers, indirect and direct proofs, or mathematical induction as part of the standard homework and examination work in courses. Students will construct proofs for elementary statements, present them in both written and oral form, and have them critiqued by a mathematician. During the third and fourth years, students will formulate conjectures of their own, state them in clear mathematical form, find methods which will prove or disprove the conjectures, and present those arguments in both written and oral form to audiences of their peers and teachers. Students will make rational critiques of the mathematical work of others, including teachers and peers. Students will read some mathematical literature and be able to rewrite, expand upon, and explain the proofs.

Step 3. Determine Areas and Methods of Assessment

Learning goals and strategies should determine the areas of student accomplishments and departmental effectiveness that will be documented in the assessment cycle. These areas should be as broad as can be managed, and may include

curriculum (core and major), instructional process, co-curricular activities, retention within major or within institution, and success after graduation. Other areas such as advising and campus environment may be areas in which data on student learning can be gathered.

Responsibility for each chosen area of assessment should be clearly assigned. For example, the mathematics faculty should have responsibility for assessing learning in the mathematics major, and the college may have responsibility for assessment in the core curriculum.

Assessment methods should reflect the type of learning to be measured. For example, the Graduate Record Examination (GRE) may be appropriate for measuring prepara tion for graduate school. On the other hand, an attitude survey is an appropriate tool for measuring an aptitude for life-long learning. An objective paper-and-pencil examination may be selected for gauging specific content knowledge.

Eight types of assessment methods are listed below, with indications of how they can be used. Departments will typically use a combination of methods, selected in view of local program needs.

1. *Tests.* Tests can be objective or subjective, multiple-choice or free-response. They can be written or oral. They can be national and standardized, such as the GRE and Educational Testing Service Major Field Achievement Test, or they can be locally generated. Tests are most effective in measuring specific knowledge and its basic meaning and use.

2. *Surveys.* These can be written or they can be compiled through interviews. Groups that can be surveyed are students, faculty, employers, and alumni. Students can be surveyed in courses (about the courses), as they graduate (about the major), or as they change majors (about their reasons for changing).

3. *Evaluation reports.* These are reports in which an individual or group is evaluated through a checklist of skills and abilities. These can be completed by faculty members, peers, or employers of recent graduates. In some cases, self-evaluations may be used, but these tend to be of less value than more objective evaluations. Grades in courses are, of course, fundamental evaluation reports.

4. *Portfolios.* Portfolios are collections of student work, usually compiled for individual students under faculty supervision following a standard departmental protocol. The contents may be sorted into categories, e.g., freshman or sophomore, and by type, such as homework, formal written papers, or examinations. The work collected in a student's portfolio should reflect the student's progress through the major. Examples of work for portfolios include homework, examination papers, writing samples, independent project reports, and background information on the student. In order to determine what should go in a portfolio, one should review what aspects of the curriculum were intended to contribute to the objectives and what work shows progress along the threads of the curriculum. Students may be given the option of choosing what samples of particular types of work are included in the portfolio.

5. *Essays.* Essays can reveal writing skills in mathematics as well as knowledge of the subject matter. For example, a student might write an essay on problem-solving techniques. Essays should contribute to learning. For example, students might be required to read four selected articles on mathematics and, following the models of faculty-written summaries of two of them, write summaries of the other two. Essays can be a part of courses and should be candidates for inclusion in portfolios.

6. *Summary courses.* Such courses are designed to cover and connect ideas from across the mathematics major. These may be specifically designed as summary courses and as such are usually called capstone courses, or they may be less specific, such as senior seminars or research seminars. Assessment of students performances in these courses provides good summary information about learning in the major.

7. *Oral presentations.* Oral presentations demonstrate speaking ability, confidence, and knowledge of subject matter. Students might be asked to prepare an oral presentation on a mathematics article. If these presentations are made in a summary course setting, then the discussion by the other students can serve both learning and assessment.

8. *Dialogue with students.* Student attitudes, expectations, and opinions can be sampled in a variety of ways and can be valuable in assessing learning. Some of the ways are student evaluations of courses, interviews by faculty members or administrators, advising interactions, seminars, student journals, and informal interactions. Also, in-depth interviews of individual students who have participated in academic projects as part of a group can provide insights into learning from the activities.

Student cooperation and involvement are essential to most assessment methods. When selecting methods appropriate to measuring student learning, faculty should exercise care so that all students are provided varied opportunities to show what they know and are able to do. The methods used should allow for alternative ways of presentation and response so that the diverse needs of all students are taken into account, while ensuring that uniform standards are supported. Students need to be aware of the goals and methods of the departmental assessment plan, the goals and objectives of the mathematics major and of each course in which they enroll, and the reason for each assessment measurement. In particular, if a portfolio of student work is collected, students should know what is going to go into those portfolios and why. Ideally, students should be able to articulate their progress toward meeting goals — in each course and in an exit essay at the end of the major.

Since some assessment measures may not affect the progress of individual students, motivation may be a problem. Some non-evaluative rewards may be necessary.

Step 4. Gather Assessment Data

After the assessment areas and methods are determined, the assessment is carried out and data documenting student learning are gathered. These data should provide answers to the second question in the introduction — how well are the students learning?

Careful record keeping is absolutely essential and should be well-planned, attempting to anticipate the future needs of assessment. Additional record storage space may be needed as well as use of a dedicated computer database. The data need to be evaluated relative to the learning goals and objectives. Evaluation of diverse data such as that in a student portfolio may not be easy and will require some inventiveness. Standards and criteria for evaluating data should be set and modified as better information becomes available, including longitudinal data gathered through tracking of majors through the degree program and after graduation. Furthermore, tracking records can provide a base for longitudinal comparison of information gathered in each pass through the assessment cycle.

Consistency in interpreting data, especially over periods of time, may be facilitated by assigning responsibility to a core group of departmental faculty members.

Ways to evaluate data include comparisons with goals and objectives and with preset benchmarks; comparisons over time; comparisons to national or regional norms; comparisons to faculty, student, and employer expectations; comparisons to data at similar institutions; and comparisons to data from other majors within the same institution.

If possible, students should be tracked from the time they apply for admission to long after graduation. Their interests at the time of application, their high school records, their personal expectations of the college years, their curricular and extracurricular records while in college, their advanced degrees, their employment, and their attitudes toward the institution and major should all be recorded. Only with such tracking can the long-term effectiveness of degree programs be documented. Comparisons with national data can be made with information from such sources as Cooperative Institutional Research Program's freshman survey data [7] and American College Testing's College Outcomes Measures project [8].

Step 5. Use the Assessment Results to Improve the Mathematics Major

The payoff of the assessment cycle comes when documentation of student learning and how it was achieved point the way for improvements for future students. Assessment should help guide education, so this final step in the cycle is to use the results of assessment to improve the next cycle. This is answering the third assessment question — what should be changed to improve learning? However, this important step should not be viewed solely as a periodic event. Ways to improve learning may become apparent at any point in the assessment cycle, and improvements should be implemented whenever the need is identified.

The central issue at this point is to determine valid inferences about student performances based on evidence gathered by the assessment. The evidence should show not only what the students have learned but what processes contributed to the learning. The faculty should become better informed because the data should reveal student learning in a multidimensional fashion.

When determining how to use the results of the assessment, faculty should consider a series of questions about the first four steps—setting goals and objectives, identifying learning and instructional strategies, selecting assessment methods, and documenting the results. The most critical questions are those about the learning strategies:

- Are the current strategies effective?
- What should be added to or subtracted from the strategies?
- What changes in curriculum and instruction are needed?

Secondly, questions should be raised about the assessment methods:

- Are the assessment methods effectively measuring the important learning of all students?
- Are more or different methods needed?

Finally, before beginning the assessment cycle again, the assessment process itself should be reviewed:

- Are the goals and objectives realistic, focused, and well-formulated?
- Are the results documented so that the valid inferences are clear?
- What changes in record-keeping will enhance the longitudinal aspects of the data?

IV. Conclusion

During an effective assessment cycle, students become more actively engaged in learning, faculty engage in serious dialogue about student learning, interaction between students and faculty increases and becomes more open, and faculty build a stronger sense of responsibility for student learning. All members of the academic community become more conscious of and involved in the way the institution works and meets its mission.

References

[1] *Guidelines for Programs and Departments in Undergraduate Mathematical Sciences*, Mathematical Association of America, Washington, DC, 1993.

[2] *Measuring What Counts*, Mathematical Sciences Education Board, National Research Council, National Academy Press, Washington, DC, 1993.

[3] *Assessment Standards for School Mathematics*, National Council of Teachers of Mathematics, Reston, VA, circulating draft, 1993.

[4] *Principles of Good Practice for Assessing Student Learning*, American Association for Higher Education, Washington, DC, 1992.

[5] "Mandated Assessment of Educational Outcomes," *Academe*, November-December, 1990, pp. 34-40.

[6] Steen, L.A., ed. *Heeding the Call for Change,* The Mathematical Association of America, Washington, DC, 1992.

[7] Astin, A.W., Green, K.C., and Korn, W.S. *The American Freshman: Twenty Year Trends*, Cooperative Institutional Research Program, American Council on Education, University of California, Los Angeles, 1987. (Also annual reports on the national norms of the college freshman class.)

[8] *College Level Assessment and Survey Services*, The American College Testing Program, Iowa City, 1990.

Frequently Asked Questions (FAQs) on Assessment in Undergraduate Mathematics

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1. **What is assessment?**

   Assessment can apply to various components and activities of colleges and universities. As used in SAUM, assessment applies to student learning and is comparing student learning with the learning goals of an academic program or curricular block of an academic program.

   The MAA's CUPM guidelines on assessment define assessment as the "process of gathering and interpreting information about student learning." One source* expands this definition and emphasizes assessment's roots in program evaluation and improvement: "as a systematic process of gathering, interpreting, and using information about student learning, assessment is a powerful tool for educational improvement."

   Both of the above statements emphasize the fact that assessment can be applied to both individual students and to academic programs.

   *American Association Of Higher Education (AAHE), *Principles Of Good Practice For Assessing Student Learning*, Washington DC: AAHE, 1992.

2. **Why is assessment done?**

   Improving student learning -- for both current and future students -- is the best reason to do assessment. However, assessment is often done to satisfy some mandate from within an institution or from some governing or accrediting unit outside the institution

3. **Why is assessment called assessment?**

   The process that is called assessment in higher education had early roots at Alverno College. An account* of those early developments of assessment contains the following.

   "Though the word assessment did not emerge from classroom or campus, it derives from an idea important to educators -- *that of sitting down beside or together* (from late Latin *ad+sedere*). In the seventeenth century an assessor was one 'who sits beside' or 'who shares another's position.' Early uses of the word focused primarily on determining the worth or value of something in monetary terms, but underlying those uses was the idea of expert judgement made on the basis of careful observation. 'Assessment' was thus a word destined for the tongues of educators -- whether humanists or scientists."

For a lighter look at this issue, see "Assessment: The Burden of a Name" by Bernard L. Madison.

*Loacker, Georgine, Lucy Cromwell, and Kathleen O'Brien, "Assessment in Higher Education: To Serve the Learner," from *Assessment in Higher Education*, edited by Clifford Adelman, Office of Educational Research and Improvement, U. S. Department of Education, Washington, DC, 1986.

4. What is the difference between assessment and evaluation?

Evaluation and assessment are sometimes thought of as the same, but there are differences when applied to individual students or academic programs. Evaluation of students is often by grading and may use the results of assessments. Similarly, the results of assessments can be used as part of evaluations of programs. Evaluation is typically a broader concept than assessment as it deals with all aspects of a program including resources, staffing, organization, operations, and efficiency. Assessment is typically used to describe processes used to examine the student learning that results from academic programs. Assessment is an ongoing process aimed at improving student learning, more so than evaluation, which is usually a final (or summative) result. Improving learning from assessment sometimes occurs immediately in classrooms or later because of changes for future students.

For a discussion of this and related issues, see Ewell, Peter, "An Emerging Scholarship: A Brief History of Assessment" in *Building a Scholarship of Assessment* (Banta, Trudy W. et. al.). San Francisco: Jossey-Bass, 2002.

5. How does assessment differ from testing and grading?

Testing is a form of assessment, usually done in classrooms in individual courses. Grading is a form of evaluation and may use the results of assessment. The reverse is also true: assessment may use both test results and grades. Assessment often uses multiple methods, including testing, to allow students to demonstrate what they have learned and how they can use the knowledge. Assessment can address student learning in more than a single course, which testing and grading could do, but most testing and grading focuses on a single course.

Assessment also emphasizes consistency of judgment across individual students in a way that grading does not because grading is done by individual faculty members, each having his or her own standards.

6. How does assessment differ from measurement?

Very often in education one speaks of testing and measurement. Measurement likely refers to a process with a numerical or quantitative result while assessment is likely to yield a broader description that includes narrative analysis.

Here is how one source* contrasts assessment with measurement. "When we narrow testing to measurement, it answers the question "How am I doing?" with a quantitative response that says, "You did a certain percent of what was asked on a given occasion" or "You did as well as a certain percent of all those who tried or might try to do the same." Assessment answers the question with a descriptive account of precisely what the individual person has done on a given occasion.

*Loacker, Georgine, Lucy Cromwell, and Kathleen O'Brien, "Assessment in Higher Education: To Serve the Learner," from *Assessment in Higher Education*, edited by Clifford Adelman, Office of Educational Research and Improvement, U. S. Department of Education, Washington, DC, 1986.

7. How does one get started with assessment?

Start small and grow. Very often, successful assessment programs grow from classroom assessments by a single faculty member. Such efforts often lead to questions about how to improve student learning, and these questions provide ways to interest fellow faculty members. Remember, assessment is answering the student's questions: "How am I doing?" and "How can you help me to do better?"

It is also useful to inventory all of the information that you already have about students and their learning that has not been used before, and by carefully examining your curriculum for opportunities where additional information about students and their learning might be collected. Sometimes assessment merely involves keeping records systematically and then regularly taking time to reflect on their significance.

Sometimes, assessment programs begin with an external mandate that prompts creation of a structure for an entire institution. This approach often results in assessment activities that are separate from teaching and learning activities.

8. Where can I find descriptions of assessment programs?

The best source for descriptions of assessment programs in undergraduate mathematics is the SAUM website, http://www.maa.org/saum, where you will find numerous case studies of assessment programs, including more than seventy in MAA Notes #49, *Assessment Practices in Undergraduate Mathematics*. The bibliography on this site lists many sources that describe a single or multiple assessment programs or processes.

The following* consists of 82 documented cases of successful applications of assessment in a variety of disciplinary and campus settings, presented in a common format; cases are cross-referenced according to a number of topical variables to enable them to be compared. Other references are given in the bibliography on the SAUM website.

* Banta, Trudy W.; Lund, Jon P.; Black, Karen E.; and Oblander, Frances W. (1996). *Assessment in Practice: Putting Principles to Work on College Campuses*. San Francisco: Jossey-Bass.

9. What are examples of assessment programs that are carried out by many mathematics departments?

A college mathematics placement program is an assessment aimed at determining how entering students can use their school mathematics in college mathematics courses. Tools in such assessments include placement tests, high school records, student interviews, and standardized test scores (e.g. SAT or ACT).

Another example of a multi-dimensional comprehensive assessment activity is associated with most doctoral programs in mathematics. Assessing the learning of doctoral candidates usually employs multiple measures, including faculty and student interactions, seminar presentations, written and oral comprehensive examinations, and a major capstone experience -- the dissertation. Grades in courses are a part of this assessment, but usually not determining. The process often continues beyond the granting of the degree to include the scholarly publication record.

10. Does it help to know about assessment in disciplines other than mathematics?

Yes. The fundamental ideas and purposes of assessment are similar for most academic disciplines. Very often, assessment practices in one discipline are adaptable for other disciplines. Sometimes, assessment data gathered in other disciplines is relevant to assessment in mathematics. This is especially true when assessing general education. In mathematics, for example, the kinds of rubrics originally developed by English departments can be adapted to help judge student performance in writing about mathematics or in delivering oral presentations.

11. How do you finance an assessment program?

Assessment should be financed as part of the instructional program. Since organized assessment programs are relatively new to most academic programs, financing must be added to or carved out of existing resources. Financing that is clearly designated for assessment helps keep efforts focused.

Some campuses have found that small mini-grant programs can really help when launching an assessment program. Recipients of such grants can undertake a small project or attend a conference, then report back to their peers about lessons learned. Even small amounts of money will signal an administration's commitment, which is often critical in getting started.

12. What is classroom assessment?

Classroom assessment is assessment of student learning in an class during the class meeting time, undertaken by individual faculty to help improve their own teaching. See Angelo, Thomas. A. and Cross, K.P. (1993). *Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd ed. Jossey-Bass, San Francisco, 1993. This book describes and provides samples of fifty in-class techniques that instructors can use to determine student reactions to teaching and engagement with classroom learning and activities.

13. What is summative assessment?

Summative assessment is assessment aimed at determining the learning outcomes of an academic program at the end of the program or at the end of a particular phase of the program. It is used to inform periodic "high stakes" judgments such as whether a student should move on or receive a credential, or whether a given academic program should be discontinued or awarded a mark of quality. This should be viewed in contrast with formative assessment, which is assessment to feed back into an ongoing program in order to improve it. Summative assessment can be undertaken by outside authorities, while formative assessment is usually undertaken by a program's own faculty.

14. What is formative assessment?

Formative assessment is assessment that provides feedback into an on-going academic program to be used to modify the program to improve student learning. This should be viewed in contrast with summative assessment which is used to inform periodic "high stakes" judgments such as whether a student should move on or receive a credential, or whether a given academic program should be discontinued or awarded a mark of quality.

15. What is alternative assessment?

Alternative assessment usually means assessment that does not use the usual tools of paper and pencil testing. An example might be a group presentation by students centered on their approach to a particular problem, judged by faculty using a pre-designed rubric or scoring guide.

16. What is large-scale assessment?

Assessment can be large-scale because it assesses learning of many students in an academic program that is usually more extensive that a single course. Large-scale assessment is often accomplished by assessing the learning of a sample of students in a program.

The actual term, large-scale assessment, is usually applied in k-12 settings to standardized testing programs

designed to be part of evaluating the effectiveness of schools or districts. Large-scale assessment is virtually always "summative" assessment.

17. What is outcomes-based assessment?

Outcomes-based assessment focuses on where the student winds up, that is, what has been learned. Most assessment programs include outcomes-based assessment but also note what processes occur along the way. In an assessment program, one compares the outcomes with the learning goals and reflects on processes that might be changed so that more learning results.

18. What is an assessment cycle?

An assessment cycle is a sequence of steps or phases of an assessment process that is repeated once the sequence is finished. A simple version of such a cycle is answering three questions: What do we want our students to learn? How well are they learning it? What should we change so that they will learn more?

For a more detailed assessment cycle, see the CUPM Guidelines on http://www.maa.org/SAUM.

19. What could cause an assessment cycle to be short-circuited? Are there any epicycles?

At any point in an assessment cycle, there may be a need to modify a previous step before completing the cycle. For example, if you determine that a learning goal is flawed, you may not want to measure progress toward that goal. Return to the goal-setting stage and fix that before proceeding. Similarly, many have found that the process of more precisely defining learning goals in itself suggests changes in curriculum. For example, simply setting the explicit goal that students should be able to explain a concept in mathematics to a non-mathematician raises the question of where this skill is actually taught in the curriculum and where students get a chance to practice it.

In situations like the one above, one has smaller cycles -- epicycles -- inside the larger assessment cycle. These epicycles may not need to be repeated in future trips through the assessment cycle.

20. When is assessment finished?

Never. Assessment is an integral part of teaching and learning. Assessment for a particular purpose, say summative assessment at the end of a course for the purpose of evaluating students, is finished when the purpose is met. However, assessment for the purpose of program improvement and enhanced student learning should be an on-going process.

21. How does one establish learning goals?

The faculty who have stewardship of an academic program should articulate the goals of the program with due consideration for the program's clients and sponsors. Very often, an initial list of goals is long and overlapping. Creating that initial list is usually not difficult. Paring the list and making it efficient, understandable, and realistic usually requires considerable discussion and thought. As goals are developed, thought should be given to how progress toward the goals will be measured and what curricular and extracurricular strategies will be employed.

22. How does one decide what assessment tools to use?

Assessment tools should be chosen so that they will provide students with good opportunities to demonstrate their learning. For example, if students are expected to be able to communicate with others

about mathematics, then the assessment tool should allow them to demonstrate communication. Consequently, the tool could be an interview, an essay, or an oral presentation. If students are expected to know certain derivatives, then the tool might be a written test.

One way to summarize the above is that assessment tools should promote valid inferences. In addition, assessment tools should be practical to use, balanced with their ability to measure what is worth measuring, not simply what is easy to measure.

23. What data should be gathered and what kinds of records should be kept?

The results of the application of any assessment tool should be recorded. Examples include test scores, faculty judgements of student portfolios, and student self-assessments. All data should be carefully identified as to purpose, date, and populations involved. Interpretations of data and any actions take as a result of those interpretations should be recorded. Complete and thorough records that can be used over time are essential. Much of assessment merely involves keeping records systematically and then regularly taking time to reflect on their significance.

One of the six guiding principles of assessment in the CUPM Guidelines is: "Data should be collected for specific purposes determined in advance, and the results should be reported promptly."

24. What do you do with the data from assessment?

You interpret assessment data in the context of learning goals and objectives and make curricular decisions about changes that the interpretations imply. If the data are to be used for evaluations or accountability, then they should be provided to the appropriate entity.

Any sharing of assessment data should respect relevant legal and privacy issues.

One of the six guiding principles of assessment in the CUPM Guidelines is: "Data should be collected for specific purposes determined in advance, and the results should be reported promptly."

25. What are common uses of assessment data?

The most important use is for improving academic programs and enhancing student learning. Other uses are in evaluation of students, programs, and institutions, often for accountability or accreditation.

26. How do you get your colleagues to help with assessment?

Developing good assessment tasks that truly reflect the broad goals of mathematics is difficult work that requires mathematical creativity. Further, assessment documents student progress toward those goals. Getting colleagues to understand this and that assessment is a part of learning and teaching will go a long way toward recruiting them to help.

Faculty members should know why assessment is done, how the results will be used, and that they are stewards of the process. Uses of assessment results for program or institutional evaluation and accountability should be viewed as secondary, much as analogous uses of faculty publications and grants are viewed.

27. What should students know about assessment programs?

One of the five principles of assessment in the CUPM Guidelines is: "Students and faculty should be involved in and informed about the assessment process, from the planning stages throughout implementation." This implies that students should know the purposes, the processes, and how the results will be used.

28. What should faculty members know about assessment programs?

One of the five principles of assessment in the CUPM Guidelines is: "Students and faculty should be involved in and informed about the assessment process, from the planning stages throughout implementation." This implies that faculty should know the purposes, the processes, how the results will be used, and that they are stewards of assessment.

29. What is a rubric?

Used in the context of assessment, rubric (often scoring rubric) refers to a scoring guide for some demonstration of student learning.

From *Mathematics Assessment: A Practical Guide for Grades 9-12*, Reston, VA: NCTM, 1999, "For practical purposes, we will define a rubric to mean a hierarchy of standards used to score student work. … Well-designed rubrics allow students to see descriptions of the requirement of their performance."

Rubrics are sometimes divided into two types: holistic and analytic. Holistic rubrics often use a scale such as 1 - 5 to capture the overall quality of a work while analytic rubrics assign values to parts of a work.

Rubric comes from Latin *rubrica* meaning red earth and Middle English *rubrike* red ocher, heading in red letters of part of a book. Rubric can refer to a title, heading or directions for a book or manuscript that is printed in red or otherwise distinguished from the rest of the text. The meaning of rubric consistent with its use in assessment is any rule of conduct or procedure.

30. Where can I find information on constructing rubrics?

Some of the case studies in MAA Notes #49, Assessment Practices in Undergraduate Mathematics have information about rubrics. The National Council of Teachers of Mathematics (NCTM) publishes two books on assessment that include information on and examples of rubrics.

Mathematics Assessment: Cases and Discussion Questions for Grades 6-12, Reston, VA: NCTM, 2000.
Mathematics Assessment: A Practical Guide for Grades 9-12, Reston, VA: NCTM, 1999

31. Are there example rubrics available?

Yes. Some can be found in the following:

MAA Notes #49, Assessment Practices in Undergraduate Mathematics
(http://www.maa.org/saum/MAANotes49/index.html)

Mathematics Assessment: A Practical Guide for Grades 9-12, Reston, VA: NCTM, 1999

The AP Program of the College Board creates rubrics for all free-response items on the annual AP examinations. The scoring rubrics for the AP Calculus free-response items (9-10 per year) are analytic rubrics and are released each year after the examinations are scored. Some of the AP courses use holistic rubrics. (See http://www.apcentral.collegeboard.com/)

32. What is the difference between a learning objective and a learning outcome?

When used in the context of assessment, learning goal and learning outcome are usually synonymous, but more general than learning objective. A learning goal may be very general. For example, a learning goal of the mathematics major might be that graduates will be able to apply mathematics to solve real world problems. In order to measure progress toward that goal and to design curricular strategies for achieving the goal, objectives need to be developed. One such objective might be to use definite integrals to model real world problems. That objective might be reached early in the mathematics major, and would be a step along the way to reaching the general goal.

Goal, objective, and outcome are used in different ways in different contexts and by different people. Consequently, making precise distinctions is difficult.