GENERAL EDUCATION ASSESSMENT COMMITTEE
ANNUAL REPORT, 2003

2003 General Education Assessment Committee membership

Jeff Hattey (chair, Plant & Soil Sciences), John Gelder (Chemistry), Frances Griffin (Business Management), Ed Walkiewicz (English), Rick Rohrs (History), Greg Wilber (Civil Engineering), Brenda Masters (ex officio, Statistics), Julie Wallin (ex officio, Office of University Assessment)

General Education Assessment Committee history

Assessment of OSU's general education program is required by the Higher Learning Commission of the North Central Association (HLC, OSU's accrediting body) and by the Oklahoma State Regents for Higher Education, and OSU's general education assessment efforts have been motivated by these requirements. The Assessment Council and Office of University Assessment formed a faculty General Education Assessment Task Force in May 2000 for the purpose of developing and implementing a new plan to assess the effectiveness of OSU's general education program. Although general education and 'mid-level' assessment methods such as standardized tests and surveys had been conducted intermittently at OSU since 1993, no sustainable approach to evaluating the general education curriculum had been established. The task force formed in 2000 was the first group of OSU faculty members who were paid to work on this university-wide assessment project and marked a renewed commitment to general education assessment at OSU.

Following the assessment standard of articulating desired student outcomes first, the Task Force started in 2000 by revising OSU's *Criteria and Goals for General Education Courses* document and identifying 'assessable' outcomes for the general education program. After studying general education assessment practices at other institutions, the task group developed the following guidelines for effective and sustainable general education assessment for OSU:

- the process must not be aimed at individual faculty members or departments,
- the process should be led by faculty members, and faculty participation should be voluntary
- the process should use student work already produced in courses, and
- the process should assess all undergraduates, including transfer students, because general education outcomes describe qualities expected for all OSU graduates.

After summer-long study and discussion, the 2000 task group agreed to initiate two assessment methods to evaluate general education that were consistent with these guidelines: institutional portfolios and a course-content database. Institutional portfolios directly assess student achievement of the expected learning outcomes for the general education program, and the course database evaluates how each general education course contributes to student achievement of those articulated outcomes. In 2001-2003, the Committee developed and began implementing these assessment methods. In addition to these two primary assessment tools, student surveys such as the National Survey of Student Engagement and OSU Alumni Surveys also contribute to the general education assessment process and are considered in reviewing general education assessment results.

Institutional Portfolios. The Committee has developed institutional portfolios to assess students' written communication skills (data collection in 2001, 2002, and 2003), math problem solving skills (data collection in 2002 and 2003), and science problem solving skills (data collection in 2003). Separate portfolios are developed to evaluate each general education learner goal, and each portfolio includes students' work from course assignments collected throughout the undergraduate curriculum. Faculty members (including Committee members and additional faculty members involved in undergraduate teaching) work in groups to evaluate the work in each portfolio and assess student achievement of relative to the learner goal that is being assessed by using standardized scoring rubrics. The results provide a measure of the extent to which students are achieving OSU's general education learning goals, and results

are shared with faculty and administrators across campus via an annual newsletter. The Committee plans to continue to develop institutional portfolios to assess the learner goals for general education as described in the *Criteria and Goals for General Education Courses*.

General Education Course Database. The General Education Course Database is a tool for evaluating how each general education course is aligned with the overall expected learning outcomes for the general education program as a whole. Instructors are asked to submit their course information online via a web-based form, and the General Education Advisory Council reviews the submitted information during regular course reviews. The database form requests information about what general education learning goals are associated with the course and how the course provides students with opportunities to achieve those learning goals. Instructors are also asked to describe how student achievement of those goals is assessed within the course. When completed, the database will provide a useful tool for holistically evaluating general education course offerings and the extent to which the overall general education goals are targeted across the curriculum.

In 2003, the Assessment Council and General Education Advisory Council approved the task force's name change to the General Education Assessment Committee. The Committee is charged with continuing to develop and implement general education assessment and reports to the Assessment Council and General Education Advisory Council; membership in these committees is intentionally overlapped. Committee members serve rotating 3-year terms, are extensively involved in undergraduate teaching at OSU, represent a range of disciplines, and are paid summer stipends for their work on general education assessment.

Committee goals for 2003:

A. The Committee projected continuation of the creation of the institutional portfolio for assessing student written communication skills as in previous years. To increase the number of observations in the dataset, the committee recommended that the number of portfolio-scoring groups be increased from two to three and that each group review about 70 samples of randomly collected student work demonstrating written communication skills. Because each group consists of three faculty members, this required nine faculty reviewers for the 2003 written communication skills portfolio (two Committee members and seven additional faculty reviewers).

B. The committee also projected continuation of the institutional portfolio for evaluating students' math problem solving skills as pilot-tested in 2002. The committee recommended that two portfolio-scoring groups, each consisting of three faculty members, be appointed to evaluate the math skills portfolio (two Committee members and four additional faculty reviewers). It was expected that each group of reviewers could review about 200 samples of student work demonstrating math problem solving skills.

C. The Committee planned to develop and pilot-test an institutional portfolio to evaluate student science problem solving skills along the same lines as the math problem-solving portfolio. Two Committee members worked on this portfolio with assistance from one additional faculty reviewer.

D. The Committee planned to work on revising the *General Education Criteria and Goals* document to address concerns that had been raised in the course review process by the General Education Advisory Council.

Assessment of Written Communication Skills

2003 collection of writing samples

The University Assessment Office supervised the collection of student writing artifacts for the Written Communication Skills Institutional Portfolio in fall 2002 using methods described in previous annual reports. Instructors from the following undergraduate courses contributed random samples of student work to the 2003 written communication skills institutional portfolio:

Course No.	Course Name	General Education Designation (if any)	Number of artifacts randomly collected from one assignment	Number of articats reviewed[a]	Number of artifacts used in data analysis[b]
AGEC 4703	American Ag Policy	S	10	5	5
AGEC3323	Ag Marketing & Sales		10	5	5
AGEC4101	Ag Econ Senior Seminar		10	5	5
AGED 3203	Planning Community Programs in Ag Education		10	8	8
AMST 2103	Intro to American Studies	H	10	10	10
ART 3663	History of American Art	H	6	6	6
ART 4653	History of Indian Art	H,I	10	8	8
BCOM 3113	Written Communication		20	10	10
BIOC 4113	Biochemistry		10	8	8
CIVE 3813	Environmental Engineering Science		10	8	8
ECON 3823	American Economic History	S	10	10	9
ENGL 2413	Introduction to Literature	H	10	10	10
ENGL 3323	Technical Writing		10	10	10
GEOG 1113	Introduction to Cultural Geography	S,I	10	10	10
HDFS 3453	Management of Human Services		10	9	9
HHP 2213	Introduction to Health Promotion		10	8	8
HHP 3713	Principles of Epidemiology		10	8	8
HIST 1103	Survey of American History		10	10	9
JB 1143	Media & Society	S	10	10	10
PHIL 3803	Business Ethics	H	10	10	10
PHIL 4733	Philosophy of Biology	H	10	9	7
POLS 3193	Gov & Pol in Latin America	S,I	10	8	8
POLS 3953	Minorities in the American Political System	S	10	8	8
SOC 1113	Introduction to Sociology	S	10	10	10
TH2413	Intro to the Theatre	H	10	10	10
ED	Elementary Education Student Portfolios		10	8	8
ED	Secondary Education Student Portfolios		10	8	8
	Total Number of Writing Artifacts (samples)		**276**	**229**	**225**

[a]The number of artifacts reviewed in 2003 was less than the number collected because more artifacts were collected than the reviewers determined could be reasonably reviewed in the given time period. Also, in one instance, an artifact was not reviewed because it was obviously plagiarized.

[b]Some artifacts had to be dropped from data analysis the student information could not be found in OSU Student Information System databases (n=1), the student was determined to be a graduate student (n=1), or a consensus score could not be reached by the reviewers (n=2).

Artifacts were collected as in previous years. Before putting the artifacts into the Institutional Portfolio, they were coded and all identifying information was removed from the samples. Demographic data were collected for each artifact using the OSU student database; these data were collected for analysis purposes only and the information cannot be used to identify an individual. The student demographic information associated with the samples was not shared with reviewers prior to the reviews.

2003 written communication skills portfolio reviews

Nine faculty reviewers for the written communication skills institutional portfolio met and completed their work in May and June 2003. The portfolio reviewers included Francis Griffin (Business Management), Rick Rohrs (History), Jon Comer (Geography), Sarah Price (Physical Education), Doren Recker (Philosophy), Ravi Sheorey (English), Maria Spicer (Nutritional Science), Denise Tillery (English), and Charlene Yauch (Industrial Engineering),

All portfolio reviewers met for three 'training' sessions where they received background information on the procedure and practiced scoring samples of student work using the written communication skills scoring rubric developed for this purpose in 2001. During these three initial sessions, reviewers discussed questions and concerns regarding use of the rubric, discussed scores given to samples of student work, and developed a common approach for evaluating student writing samples. As with past groups of reviewers, by the end of three sessions with all reviewers present, the reviewers were scoring fairly consistently with little variation among individual members. The scoring committee then divided into three sub-groups, each of which undertook to score approximately 70 artifacts. Scoring was done individually, and each sub-group then met to reach consensus scores where there was variation in individual scores. Review Group #3 determined that they could not develop consensus scores for two of the artifacts. The final scores were then submitted to the Assessment Office for compilation and interpretation.

Written communication skills scores from each review group

Review Group	Artifact Score	Number of Artifacts	Percent of Artifacts
#1 (70 artifacts scored)	1	4	6%
	2	18	26%
	3	25	36%
	4	21	30%
	5	2	3%
#2 (70 artifacts scored)	1	0	0%
	2	15	21%
	3	30	43%
	4	22	31%
	5	3	4%
#3 (68 artifacts scored)	1	4	6%
	2	26	38%
	3	32	47%
	4	5	7%
	5	1	1%

The distribution of scores from individual review groups was similar to the scores distribution from review groups in previous years.

Rubric for evaluating student written communication skills

The General Education Assessment Committee developed the following rubric for evaluating samples of student writing in 2001. Reviewers score the artifacts independently and then meet to develop a consensus score for each artifact; each artifact receives a whole-number score from 1 to 5.

Score:	Characteristics:	
5	Content & Organization	Topic/thesis is clearly stated and well developed; details/wording is accurate, specific, appropriate for the topic & audience, with no digressions; evidence of effective, clear thinking; completely accomplishes the goals of the assignment
		Paragraphs are clearly focused and organized around a central theme; clear beginnings and endings; appropriate, coherent sequences and sequence markers
	Style & Mechanics	Word choice appropriate for the task; precise, vivid vocabulary; variety of sentence types; consistent and appropriate point of view and tone
		Standard grammar, spelling, punctuation; no interference with comprehension or writer's credibility
4	Exhibits all characteristics of '3' and some characteristics of '5'	
3	Content & Organization	Topic is evident; some supporting detail; wording is generally clear; reflects understanding of topic and audience; generally accomplishes goals of the assignment
		Most paragraphs are focused; discernible beginning and ending paragraphs; some sequence markers
	Style & Mechanics	Generally appropriate word choice; variety in vocabulary and sentence types; appropriate point of view and tone
		Some non-standard grammar, spelling, and punctuation; errors do not generally interfere with comprehension or writer's credibility
2	Exhibits all characteristics of '1' and some characteristics of '3'	
1	Content & Organization	Topic is poorly developed; support is only vague or general; ideas are trite; wording is unclear, simplistic; reflects lack of understanding of topic and audience; minimally accomplishes goals of the assignment
		Most paragraphs are rambling and unfocused; no clear beginning or ending; inappropriate or missing sequence markers
	Style & Mechanics	Inappropriate or inaccurate word choice; repetitive words and sentence types; inappropriate or inconsistent point of view and tone
		Frequent non-standard grammar, spelling, punctuation interferes with comprehension and writer's credibility

Student demographics associated with the written communication skills artifacts, 2001- 2003

		2001		2002		2003		All Years	
		no. of artifacts	pct	no. of artifacts	pct	no. of artifacts	pct	no. of artifacts	pct
Number of Artifacts	# collected	130	-	115	-	276	-	521	-
	# scored	89	-	113	-	229	-	431	-
	#used in analysis	86	-	111	-	225	-	422	-
Class	freshman	15	17.4%	23	20.7%	31	13.8%	69	16.4%
	sophomore	20	23.3%	14	12.6%	48	21.3%	82	19.4%
	junior	20	23.3%	34	30.6%	52	23.1%	106	25.1%
	senior	31	36.0%	40	36.0%	94	41.8%	165	39.1%
College	CAS	35	40.7%	42	37.8%	81	36.0%	158	37.4%
	CASNR	4	4.7%	20	18.0%	28	12.4%	52	12.3%
	CBA	17	19.8%	14	12.6%	36	16.0%	67	15.9%
	COE	5	5.8%	14	12.6%	35	15.6%	54	12.8%
	CEAT	7	8.1%	8	7.2%	19	8.4%	34	8.1%
	CHES	17	19.8%	8	7.2%	18	8.0%	43	10.2%
	UAS	1	1.2%	5	4.5%	8	3.6%	14	3.3%
Gender	female	54	62.8%	57	51.4%	115	51.1%	226	53.6%
	male	32	37.2%	54	48.6%	110	48.9%	196	46.4%
Admit Type	Regular (A, AR)	51	59.3%	66	59.5%	139	61.8%	256	60.7%
	Alternative Admit (F)	1	1.2%	4	3.6%	13	5.8%	18	4.3%
	Adult Admit (G)	0	0.0%	2	1.8%	2	0.9%	4	0.9%
	"Third Door" Admit (K)	2	2.3%	0	0.0%	1	0.4%	3	0.7%
	International (J)	1	1.2%	1	0.9%	0	0.0%	2	0.5%
	Transfer (M, MR)	22	25.6%	37	33.3%	64	28.4%	123	29.1%
	Other or Blank	9	10.5%	1	0.9%	6	2.7%	16	3.8%
ACT	<22	10	14.5%	30	34.1%	58	28.4%	98	27.8%
	22 to 24	19	27.5%	13	14.8%	65	31.9%	97	27.5%
	25 to 27	18	26.1%	24	27.3%	39	19.1%	81	22.9%
	28 to 30	15	21.7%	12	13.6%	25	12.3%	52	14.7%
	>30	7	10.1%	9	10.2%	9	4.4%	25	7.1%
OSU GPA	<2.0	4	4.7%	7	6.3%	14	6.2%	25	5.9%
	2.0 to 2.49	10	11.6%	15	13.5%	33	14.7%	58	13.7%
	2.50 t0 2.99	9	10.5%	29	26.1%	51	22.7%	89	21.1%
	3.00 to 3.49	34	39.5%	35	31.5%	72	32.0%	141	33.4%
	3.50 to 4.00	29	33.7%	25	22.5%	55	24.4%	109	25.8%

Student demographics associated with the written communication skills artifacts, 2001- 2003
(continued)

College	Major	No. of Artifacts
CASNR	AGBU	12
	AGCM	2
	AGEC	7
	AGED	9
	ANSI	13
	BIMB	6
	ENVR	2
	PASS	1
	all	52
CAS	AMSD	1
	ART	15
	BIOC	5
	BIOL	6
	CDIS	3
	CHEM	3
	CLML	1
	CS	3
	ENGL	25
	GEOL	3
	HIST	3
	JB	16
	MATH	2
	MUSC	1
	PHIL	2
	PHSL	1
	PHYS	1
	POLS	15
	PREP	2
	PSYC	5
	SOC	4
	SPAN	1
	UND	37
	ZOOL	3
	all	158
UAS	UAAA	7
	UAAD	3
	UAAS	1
	UACC	1
	UATP	1
	UAUN	1
	all	14

College	Major	No. of Artifacts
CBA	ACCT	12
	ECON	8
	FIN	3
	GNBU	8
	INBU	4
	MGMT	4
	MIS	3
	MKTG	8
	UND	17
	all	67
COE	ATRN	1
	AVED	3
	EDUCncrt	1
	ELEM	13
	HLTH	12
	HPRO	6
	LEIS	2
	PHED	2
	SCED	13
	UND	1
	all	54
CEAT	ARCE	1
	ARCH	7
	BAE	1
	CHEN	2
	CIVE	8
	ELEN	3
	ET	1
	FPST	4
	IEM	1
	MEEN/AERS	4
	MET	2
	all	34
CHES	DHM	4
	FRCD/HDFS	17
	HRAD	5
	NSCI	16
	UND	1
	all	43

Written communication skills scores, 2001 - 2003 (years combined)

			Score						
			1	**2**	**3**	**4**	**5**	**Avg**	**n**
Overall Scores	Overall	n	21	118	188	83	12	2.87	422
		%	5.0%	28.0%	44.5%	19.7%	2.8%		
By Class	Freshmen	n	7	25	28	8	1	2.58	69
		%	10.1%	36.2%	40.6%	11.6%	1.4%		
	Sophomores	n	5	23	40	13	1	2.78	82
		%	6.1%	28.0%	48.8%	15.9%	1.2%		
	Juniors	n	6	26	45	24	5	2.96	106
		%	5.7%	24.5%	42.5%	22.6%	4.7%		
	Seniors	n	3	44	75	38	5	2.99	165
		%	1.8%	26.7%	45.5%	23.0%	3.0%		
By Class, (reg admit only)	Freshmen	n	3	21	23	7	1	2.67	55
		%	5.5%	38.2%	41.8%	12.7%	1.8%		
	Sophomores	n	2	14	29	9	1	2.87	55
		%	3.6%	25.5%	52.7%	16.4%	1.8%		
	Juniors	n	2	9	28	11	2	3.04	52
		%	3.8%	17.3%	53.8%	21.2%	3.8%		
	Seniors	n	0	21	42	27	4	3.15	94
		%	0%	22.3%	44.7%	28.7%	4.3%		
By Transfer Status	Native Students* (domestic only)	n	13	77	129	54	8	2.88	281
		%	4.6%	27.4%	45.9%	19.2%	2.8%		
	Transfer Students	n	6	39	52	23	3	2.82	123
		%	4.9%	31.7%	42.3%	18.7%	2.4%		

*all domestic native students, regardless of admit type

*Native students refers to freshmen who started at OSU as first-time freshmen

Key Findings:

- Writing scores for samples from freshmen had significantly lower scores than writing samples for juniors or seniors (n=422, $p<0.05$); 46% of the freshmen writing samples had scores of '1' or '2' and 54% had scores of '3' or higher. In contrast, 72% of writing samples from seniors received a score of '3' or higher. When only regularly admitted students were included in the analysis (i.e., excluding transfer, international, and alternatively admitted students), the contrast was even more pronounced. Considering only regularly admitted students, 78% of work produced by seniors received scores of 3 or higher.

- Although students who start their career at OSU ('native' OSU students) are slightly more likely to receive high scores on their writing samples, there is no statistically significant difference between the writing scores of native and transfer students, even when only regularly admitted native students are considered in the comparison.

- Writing scores from the institutional portfolio were significantly correlated with OSU gpa and ACT English sub-score. The scores were also significantly correlated with college; students from UAS (University Academic Services) had lower writing scores than students from other colleges.

Assessment of Math Problem Solving Skills

2003 collection of math samples

Over the course of the Spring 2003 semester, the OSU Office of University Assessment collected artifacts from a number of math courses. Artifacts are examples of student work that can be used to demonstrate their level achievement of the course's objectives. For the math assessment, all of the artifacts were final exams, which were collected and copied before the instructor graded them. The courses selected represent a variety of freshman- and sophomore-level math courses required of OSU students. As such, artifacts from these courses should represent a baseline of student mathematical problem solving skills following completion of at least one OSU math course. The artifacts were made anonymous by covering the students name and/or ID number from the exam copy, though each artifact was numbered and referenced to a database with basic information about the student. This information was not available to the committee but was used only for the subsequent statistical analysis of the assessment results.

Several instructors from the following courses contributed artifacts to the 2003 math problem solving skills institutional portfolio:

Course No.	Course Name	General Education Designation (if any)	Number of artifacts randomly collected	Number of artifacts reviewed	Number of artifacts used in data analysis
MATH 1483	Mathematical Functions and Their Uses	A	76	55	55
MATH 1493	Applications of Modern Mathematics	A	93	0	0
MATH 1513	College Algebra	A	159	157	155
MATH 2103	Elementary Calculus	A	39	37	34
MATH 2144	Calculus I	A	28	28	25
	Total Number of Math Artifacts (samples)		395	277	269

The reviewers determined that samples collected from MATH 1493 could not be used to evaluate college-level, general education math problem solving skills, and these samples were not included in the reviews or analysis. Exams collected from MATH 1493 focused primarily on students' ability to memorize methods (e.g., apportionment, quotas, Webster Method, Hill-Huntington Method, Hamilton Method, etc.) and plug numbers into given formulas; the reviewers determined that these samples did not adequately demonstrate students' abilities to use college-level mathematics to solve problems.

As in the writing portfolio, some artifacts could not be reviewed because they were incomplete and some samples were dropped from data analysis because the student information could not be found in OSU Student Information System databases.

2003 math problem solving skills portfolio reviews

In May 2003, the committee met to prepare for the math problem-solving skills assessment process. The objective of the first meeting was primarily planning for the summer's activities, to form two review groups, and to discuss the overall math assessment process. In addition to scheduling activities, the group reviewed the rubric to be used for evaluating the math problem solving artifacts. This rubric, which had been developed the previous year by the committee, defined six criteria or aspects of a math artifact. For each aspect, a level from 1 to 5 was defined, characterizing the relative level of achievement of that aspect. For example, one aspect is "Calculations", with a level 1 defined as "No evidence of manipulation of mathematical expressions; arithmetic errors prevalent in the work" and level 5 defined as "Fully arithmetically accurate; clearly represented with various computation steps shown", etc. The intermediate levels were defined by levels of achievement in between these two extremes. The rubric is shown on the next page.

The primary objective of the second meeting was to "calibrate" the groups in terms of their use of the rubric, to ensure each group member had a similar definition of each of the levels of achievement (1 through 5). A random sample of the artifacts was distributed to the groups. Within these groups, specific problems were selected for evaluation. The problems selected for evaluation were those that exhibited the most aspects specified in the rubric. That is, problems that were simple calculations, or "plug-and-chug" were discarded. Ideal were those problems with multiple parts, requiring not only calculations, but perhaps graphing and an explanation as well. In the process of making this evaluation, it was determined that the artifacts collected from MATH 1493 were of limited value for assessment purposes and as such, were omitted from the artifact set.

Once the committee agreed upon a set of problems, each group member scored each problem 1 through 5. These scores are composites of each of the aspects shown in Figure 1. That is, each aspect is not scored individually. The groups then met to compare scores and develop a consensus. In this way, a fairly consistent understanding of what level 1 through level 5 meant was established. Once this was accomplished, the complete set of artifacts was distributed to the two groups for evaluation. Each group, which consisted of three faculty members, received a different set of artifacts, which represented a total of five different math courses. In total, approximately 250 artifacts were distributed for evaluation.

The groups then met separately to determine which problems within each artifact set would be evaluated, using the same criteria described above. Once this had been done, each individual group member evaluated the artifacts, determining a single score for each one. The group then later reconvened to compile their results and reconcile and differences in the scoring. As such, in the end, each artifact had assigned to it a single score, 1 to 5, representing its level of achievement as defined by the rubric. These consensus scores were then provided to the Office of University Assessment for analysis.

Math problem solving skills scores from each review group

Review Group	Artifact Score	Number of Artifacts	Percent of Artifacts
#1 (151 artifacts scored)	1	14	9.3%
	2	48	31.8%
	3	48	31.8%
	4	31	20.5%
	5	10	6.6%
#2 (126 artifacts scored)	1	10	7.9%
	2	34	27.0%
	3	31	24.6%
	4	40	31.7%
	5	11	8.7%

Rubric for evaluating student math problem solving skills

The General Education Assessment Committee developed the following rubric for evaluating students' math problem solving skills in 2002. Reviewers score the artifacts independently and then meet to develop a consensus score for each artifact; each artifact receives a whole-number score from 1 to 5.

	Poor (1)	Acceptable (3)	Excellent (5)
Understanding of problem	No clear understanding indicated; Lack of comprehension of the basic parts of the problem; Didn't understand enough to start to work the problem;	Able to glean basic parts of the problem and the general framework; No serious misconceptions; Adequate to work most of the problem;	Full grasp of concepts and relationships between concepts; Identifies all the important elements of the problem;
Use of terms and symbols	Unable to communicate any math concepts though terminology; Absent of technical or mathematical terms, or used inappropriately; Mathematical symbols are not used, or used incorrectly;	Uses most terminology and symbols correctly; Evidence of reasonable understanding of terms and symbols;	Clear, concise communication of ideas; Thoughts thoroughly explained with the correct terminology and clearly displayed appropriate symbols; Demonstrates superior knowledge of the language of mathematics/science
Calculations	No evidence of manipulation of mathematical expressions; Arithmetic errors prevalent in the work;	Mainly accurate with some minor arithmetic errors; Appropriate to work the problem, but not a sophisticated presentation;	Fully arithmetically accurate; Clearly represented with various computation steps shown; Executes algorithms completely and correctly;
Solution	Shows significant misunderstanding of the process; Does not correctly apply or even make attempt to apply appropriate solution; Reflects inappropriate strategy for solving the problem; Attempts to use irrelevant information; No (or incorrect) graphical representation of the mathematical thought process;	Reflects reasonable strategy for solving most of the problem; Displayed in a rote manner showing simple conceptualization; Shows understanding of some of the problem's mathematical concepts; Presented in an orderly manner, but lacking some details; Represented graphically with only minor flaws;	Represented with detail through logical sequence and systematic progression; Reflects excellent problem-solving skills; Presents strong supporting arguments; Use of relevant outside information; Results are represented graphically in clear and illuminating way;
Answer	No expression of any empirical finding; Units if stated are incorrect; Conclusion is not valid;	Expressed empirical findings but limited in identification of related issues; Answer is stated in correct units;	Complete response with a clear, unambiguous, accurate explanation; Fully described findings in words; Stated in correct units with any unit changes clearly illustrated;
Difficulty of Problem	Values plug directly into equation; No mathematical manipulation;	Combines two related concepts;	Requires multiple steps with development of concepts evolving into the solution;

Student demographics associated with the math problem solving skills artifacts, 2002- 2003

		2002		2003		All Years	
		no. of artifacts	pct	no. of artifacts	pct	no. of artifacts	pct
Number of Artifacts	# collected	300	-	395	-	695	-
	# scored	76	-	277	-	353	-
	#used in analysis	76	-	269	-	345	-
Class	freshman	32	42.1%	208	77.3%	240	69.6%
	sophomore	17	22.4%	36	13.4%	53	15.4%
	junior	12	15.8%	17	6.3%	29	8.4%
	senior	15	19.7%	8	3.0%	23	6.7%
College	CAS	16	21.1%	78	29.0%	94	27.2%
	CASNR	35	46.1%	30	11.2%	65	18.8%
	CBA	11	14.5%	79	29.4%	90	26.1%
	COE	1	1.3%	16	5.9%	17	4.9%
	CEAT	6	7.9%	31	11.5%	37	10.7%
	CHES	2	2.6%	16	5.9%	18	5.2%
	UAS	5	6.6%	19	7.1%	24	7.0%
Gender	female	33	43.4%	141	52.4%	174	50.4
	male	43	56.6%	128	47.6%	171	49.6
Admit Type	Regular (A, AR)	46	60.5%	204	75.8%	250	72.5%
	Alternative Admit (F)	4	5.3%	10	3.7%	14	4.1%
	Adult Admit (G)	2	2.6%	3	1.1%	5	1.4%
	"Third Door" Admit (K)	0	0.0%	0	0%	0	0%
	International (J)	0	0.0%	12	4.5%	12	3.5%
	Transfer (M, MR)	24	31.6%	31	11.5%	55	15.9%
	Other or Blank	0	0.0%	9	3.3%	9	2.6%
ACT	<22	28	36.8%	74	33.0%	102	35.9%
	22 to 24	17	22.4%	70	31.3%	87	25.2%
	25 to 27	9	11.8%	46	20.5%	55	19.4%
	28 to 30	6	7.9%	26	11.6%	32	11.3%
	>30	0	0.0%	8	3.6%	8	2.8%
OSU GPA	<2.0	8	10.5%	41	15.2%	49	14.2%
	2.0 to 2.49	15	19.7%	28	10.4%	43	12.5%
	2.50 t0 2.99	12	15.8%	66	24.5%	78	22.6%
	3.00 to 3.49	25	32.9%	60	22.3%	85	24.6%
	3.50 to 4.00	16	21.1%	74	27.5%	90	33.5%

Student demographics associated with the math problem solving skills artifacts, 2002 - 2003
(continued)

College	Major	No. of Artifacts
CASNR	AGBU	12
	AGCM	1
	AGEC	6
	AGED	2
	ANSI	2
	BIMB	2
	ENVR	1
	HORT	2
	LA	1
	PASS	1
	ALL	30
CAS	ART	1
	CS	2
	GEOL	1
	HIST	1
	MUSC	3
	POLS	1
	PSYC	5
	UND	63
	WLDL	1
	all	78
UAS	UAAA	10
	UAAD	3
	UACC	6
	all	19
CBA	ACCT	3
	ECON	3
	FIN	2
	INBU	1
	MIS	3
	MKTG	7
	UND	60
	all	79
COE	ATRN	3
	AVED	3
	ELEM	7
	SCED	1
	UND	2
	all	16
CEAT	ARCE	2
	ARCH	1
	CIVE	3
	ELEN	7
	FPST	1
	CMT	3
	MEEN/AERS	12
	MET	1
	UND	1
	all	31
CHES	DHM	8
	FRCD/HDFS	2
	HRAD	3
	NSCI	2
	UND	1
	all	16

Math problem solving skills scores, 2002 - 2003 (years combined)

			Score						
			1	**2**	**3**	**4**	**5**	**Avg**	**n**
Overall Scores	Overall	n	26	100	102	88	29	2.98	345
		%	7.5	29.0	29.6	25.5	8.4		
By Class	Freshmen	n	20	68	70	60	22	2.98	240
		%	8.3%	28.3%	29.2%	25.0%	9.2%		
	Sophomores	n	3	16	13	17	4	3.06	53
		%	5.7%	30.2%	24.5%	32.1%	7.5%		
	Juniors	n	3	11	8	6	1	2.69	29
		%	10.3%	37.9%	27.6%	20.7%	3.4%		
	Seniors	n	0	5	11	5	2	3.17	23
		%	0%	21.7%	47.8%	21.7%	8.7%		
By Class, (regular admits only)	Freshmen	n	15	53	60	54	21	3.06	203
		%	7.4%	26.1%	29.6%	26.6%	10.3%		
	Sophomores	n	0	7	8	12	2	3.31	29
		%	0%	24.1%	27.6%	41.4%	6.9%		
	Juniors	n	1	1	1	3	1	3.29	7
		%	14.3%	14.3%	14.3%	42.9%	14.3%		
	Seniors	n	0	2	6	2	1	3.18	11
		%	0%	18.2%	54.5%	18.2%	9.1%		
By Transfer Status	Native Students* (domestic only)	n	17	78	80	73	25	3.04	273
		%	6.2%	28.6%	29.3%	26.7%	9.2%		
	Transfer Students	n	8	18	15	11	3	2.69	55
		%	14.5%	32.7%	27.3%	20.0%	5.5%		

*all domestic native students, regardless of admit type

*Native students refers to freshmen who started at OSU as first-time freshmen

Key Findings:

- Unlike the written communication skills portfolio, the math problem solving skills portfolio is limited to assessing math problem solving skills of students, primarily freshmen, in entry-level mathematics courses. The overall distribution of scores indicates that 64% of students in entry-level math courses demonstrate math problem solving skills at the mid-point of the rubric (a score of '3') or higher.

- Math scores from the institutional portfolio were significantly correlated with student's OSU gpa, ACT math sub-score, and college. Students from UAS had consistently lower math scores than students from other colleges.

- Math scores from the institutional portfolio were also significantly correlated with course, where artifacts from MATH 1483 had significantly higher portfolio scores than artifacts from MATH 1513 or MATH 2103. This is probably because the problems from the MATH 1483 samples were easier than those from the other courses, and the Committee should consider weighting rubric scores based on the level of difficulty of the problems being assessed.

Assessment of Science Problem-Solving Skills

2003 collection of science samples

The University Assessment Office supervised the collection of student writing artifacts for the Written Communication Skills Institutional Portfolio in fall 2002 using methods described in previous annual reports. As with the math portfolio, the artifacts were collected from introductory-level sciences courses that are part of the general education course offerings. Several instructors from the following courses contributed artifacts to the 2003 science problem solving skills institutional portfolio:

Course No.	Course Name	General Education Designation (if any)	Number of artifacts randomly collected	Number of artifacts reviewed	Number of artifacts used in data analysis
CHEM 1314	General Chemistry	N,L	24	5	5
CHEM 1515	General Chemistry	N,L	14	14	14
PHYS 1014	Descriptive Physics	N,L	29	29	29
PHYS 1313	Inquiry-Based Physics	N,L	35	20	20
PHYS 1214	General Physics	N,L	24	0	0
HORT 1013	Principles of Horticultural Science	N,L	39	0	0
	Total Number of Math Artifacts (samples)		165	68	68

The particular artifacts collected from HORT 1013 and PHYS 1214 were determined to not be appropriate for analyzing science problem solving skills and were not scored or included in analysis.

Rubric for evaluating students' science problem solving skills

The General Education Assessment Committee developed the following rubric for evaluating students' science problem solving skills in 2002. Reviewers score the artifacts independently and then meet to develop a consensus score for each artifact; each artifact receives a whole-number score from 1 to 5.

Aspects	Poor (1)	Acceptable (3)	Excellent (5)
Understanding of problem	No clear understanding indicated; Little comprehension of the important elements of the problem; Didn't understand enough to start to work the problem.	Able to glean basic parts of the problem and the general framework; No misconceptions that lead to wrong answers; Adequate to work most of the problem; Can make a diagram to demonstrate some understanding of the model; Can demonstrate some conceptualization of the model.	Full grasp of concepts and relationships between concepts; Identifies all the important elements of the problem; Organization of the response demonstrates clarity of understanding.
Use of terms, and symbols	Unable to communicate any scientific concepts though terminology; Absent of technical, mathematical or scientific terms, or used inappropriately; Symbols are not used, or used incorrectly.	Uses most terminology and symbols correctly; Evidence of reasonable understanding of terms and symbols.	Thoughts thoroughly explained with correct terminology and clearly displayed appropriate symbols; Clear, concise communication of ideas; Demonstrates superior knowledge of the language of science and symbolic usage; Knows the symbols and terms in a mathematical relationship and their association with the scientific model of interest.
Solution and graphical data interpretation	Shows significant misunderstanding of the process; Does not correctly apply or even make attempt to apply appropriate solution; Reflects inappropriate strategy for solving the problem; Attempts to use irrelevant information; No (or incorrect) graphical representation of the mathematical thought process;	Shows understanding of the process; Reflects reasonable strategy for solving most of the problem; Displayed in a rote manner showing simple conceptualization; Shows understanding of some of the problem's concepts; Presented in an orderly manner, but lacking some details; Represented graphically with minor flaws;	Shows mastery of the process; Represented with detail through logical sequence and systematic progression; Reflects excellent problem-solving skills; Presents strong supporting arguments; Use of relevant outside information; Results are represented graphically in clear and illuminating way; Results can be interpreted and applied in a new or modified situation
Answer and conclusions	Units absent or stated incorrectly; Conclusion is not valid; No expression of any empirical finding;	Answer is stated in correct units; Expressed empirical findings but limited in identification of related issues; Unable to demonstrate complete understanding of the scientic result and its relationship to the conceptual model.	Stated in correct units with any unit changes clearly illustrated; Complete response with a clear, unambiguous, accurate explanation; Fully described findings in words; Good connection demonstrated between the results and the conceptual model.
Evidence of higher-level thinking	Unable to plug values directly into equation; No mathematical manipulation;	Combines two related concepts; Correct values are substituted and equation is manipulated but still some difficulty with more complicated relationships or model; Some difficulty in developing a mathematical relationship from the written form.	Requires multiple steps with development of concepts evolving into the solution; Can clearly synthesize information and organize it in a path through multiple steps to arrive at the solutions; No difficulty connecting mathematical relationships or expressing ideas mathematically.

Student demographics associated with the science problem solving skills artifacts, 2003

		2003	
		no. of artifacts	pct
Number of Artifacts	# collected	165	-
	# scored	68	-
	#used in analysis	68	-
Class	freshman	27	39.7%
	sophomore	21	30.9%
	junior	14	20.6%
	senior	6	8.8%
College	CAS	19	27.9%
	CASNR	17	25.0%
	CBA	0	0%
	COE	22	32.4%
	CEAT	6	8.8%
	CHES	2	2.9%
	UAS	2	2.9%
Gender	female	45	66.2
	male	23	33.8
Admit Type	Regular (A, AR)	47	69.1%
	Alternative Admit (F)	4	5.9%
	Adult Admit (G)	0	0%
	"Third Door" Admit (K)	0	0%
	International (J)	1	1.5%
	Transfer (M, MR)	15	22.1%
	Other or Blank	1	1.5%
ACT	<22	18	31.0%
	22 to 24	16	27.5%
	25 to 27	13	22.4%
	28 to 30	6	10.3%
	>30	5	8.6%
OSU GPA	<2.0	3	4.4%
	2.0 to 2.49	11	16.1%
	2.50 t0 2.99	16	23.5%
	3.00 to 3.49	20	29.4%
	3.50 to 4.00	18	26.4%

Science problem solving skills scores 2003

			Score						
			1	**2**	**3**	**4**	**5**	**Avg**	**n**
Overall Scores	Overall	n	1	30	28	8	1	2.68	68
		%	1.5%	44.1%	41.2%	11.8%	1.5%		
By Class	Freshmen	n	0	15	10	2	0	2.52	27
		%	0%	55.6%	37.0%	7.4%	0%		
	Sophomores	n	1	7	9	4	0	2.76	21
		%	4.8%	33.3%	42.9%	19.0%	0%		
	Juniors	n	0	4	8	1	1	2.93	14
		%	0%	28.6%	57.1%	7.1%	7.1%		
	Seniors	n	0	4	1	1	0	2.50	6
		%	0%	66.7%	16.7%	16.7%	0%		
By Class, (regular admits only)	Freshmen	n	0	13	9	2	0	2.54	24
		%	0%	54.2%	37.5%	8.3%	0%		
	Sophomores	n	1	6	4	3	0	2.64	14
		%	7.1%	42.9%	28.6%	21.4%	0%		
	Juniors	n	0	2	3	1	1	3.14	7
		%	0%	28.6%	42.9%	14.3%	14.3%		
	Seniors	n	0	1	0	1	0	3.00	2
		%	0%	50.0%	0%	50.0%	0%		
By Transfer Status	Native Students* (domestic only)	n	1	25	18	7	1	2.65	52
		%	1.9%	48.1%	34.6%	13.5%	1.9%		
	Transfer Students	n	0	5	9	1	0	2.73	15
		%	0%	33.3%	60.0%	6.7%	0%		

*all domestic native students, regardless of admit type

*Native students refers to freshmen who started at OSU as first-time freshmen

Key Findings:

- As with the math problem solving skills portfolio, the science problem solving skills portfolio is limited to assessing math problem solving skills of students, primarily freshmen and sophomores, in entry-level science courses. The pilot test data are too limited at this point to make generalizations about students' science problem-solving skills, but this approach appears to be promising for this type of assessment.

General education institutional portfolios OVERVIEW

The numbers of samples scored and used in analysis for each institutional portfolio developed in 2001, 2002, and 2003 are shown below. Institutional Portfolios for written communication skills assessment were developed in 2001 (pilot test year), 2002, and 2003; portfolios for math problem solving skills were developed in 2002 (pilot test year) and 2003, and a portfolio for science problem solving skills was pilot tested in 2003. Samples sizes have been increased in each year of portfolio development to allow sufficient samples sizes for data analysis.

Number of samples in each portfolio, 2001 – 2003:

	Portfolio Type			
Year:	**Written Communication Skills**	**Math Problem-Solving Skills**	**Science Problem-Solving Skills**	**Total number of samples - all portfolios**
2001	86	-	-	86
2002	111	76	-	187
2003	225	269	68	562
All Years	**422**	**345**	**68**	**835**

Overall portfolio scores for subject-area portfolios, years combined:

		Score:				
	Artifacts:	**1**	**2**	**3**	**4**	**5**
Written Communication Skills (2001, 2002, 2003)	n	21	118	188	83	12
	%	5.0%	28.0%	44.5%	19.7%	2.8%
Math Problem-Solving Skills (2002, 2003)	n	26	100	102	88	29
	%	7.5%	29.0%	29.6%	25.5%	8.4%
Science Problem-Solving Skills (2003)	n	1	30	28	8	1
	%	1.5%	44.1%	41.2%	11.8%	1.5%

The written communication skills institutional portfolio is developing into an effective assessment tool. The general consensus among the faculty reviewers indicates that this as a reasonable way to holistically evaluate undergraduate students' written communication skills, and the increased sample size in the portfolio has allowed more confidence in the analysis and implications of the results. The math- and science-problem solving skills portfolios, though, are more limited in value because they are limited evaluating student performance in entry-level courses. Further, the variation in the level of difficulty of the problems presented to students in these courses adds to the difficulty in holistically evaluating these skills using work produced in a range of courses. The General Education Assessment Committee will further consider these constraints in the continued development of these and other institutional portfolios.

Proposed General Education Assessment Activity for 2004

A. The Committee will meet in early 2004 to determine committee membership for work to be completed in summer 2004. Although a 3-year rotating membership cycle has been articulated for the Committee, flexibility in this schedule may be required.

B. The Committee will evaluate the recent changes to the *General Education Criteria and Goals* document to determine how institutional portfolio should continue to be developed to evaluate the student learning outcomes articulated within that document. Based on this information, the Committee will determine what institutional portfolios will be continued and developed for evaluation in 2004.

C. The task force will continue to oversee the development and modification of the general education database.