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# The Analytic Assessment of Online Portfolios in Undergraduate Technical Communication: A Model

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## ABSTRACT

This paper describes an innovative model for assessing the technical communication course by analytically scoring online portfolios, open to the internet, for ten separate (analytic) variables and one overall (holistic) score. The model is a statistically verifiable and sustainable method that strengthens the curriculum and fosters consensus within the teaching community. We achieved construct validity by redefining the elements of the course to incorporate communication in the digital age and then by creating new criteria for evaluation related to that construct. We achieved inter-reader reliability by beginning each assessment with a calibrated reading and by adjudicating non-adjacent scores. After using the model successfully for three semesters, we can see increased consistency in teaching among sections and semesters, more communication among instructors, and we are beginning a database with which we can test further change. The theory and method behind this model can be applied to other disciplines as well.

**Keywords:** technical communication, assessment, portfolios, online

## I. INTRODUCTION

Communication skills are increasingly important in engineering in which specific knowledge must be transferred between culturally different and (sometimes) geographically distant groups. Communication is a large part of the engineering profession, and the future success of students depends on whether they can work with knowledge transfer and knowledge generation. The methods by which engineers communicate are also changing: in addition to using written language, students need to learn electronic and visual methods of communication [1]. Because of these changes, we updated our traditional curriculum, and, at the same time, created a model to assess it. Our assessment process has already fostered more interaction among the students, instructors, and administration and has added consistency to the course. It also provides us with a statistical tool that we can use to query individual components of the course as we seek to continually improve it.

Although we assess individual student outcomes in the portfolios, the results are entered into a database that reflects the program

as a whole. The purpose of our program assessment is continual improvement. The ability to incorporate change is essential in a rapidly changing technological environment and this database will help us to monitor the changes that we make. The Accreditation Board for Engineering Technology (ABET) pioneered the idea of program assessment using outcomes as input for further change and thereby provided us with a theoretical model for our cyclic assessment. Our model is based on the ABET *Criteria for Accrediting Engineering Programs* that mandates each program to have published educational objectives, regular assessment, and evidence that the results of the assessment are applied to the further development of the program [2].

However, to make program assessment sustainable, all parties—faculty, instructors, administrators, and students—must have an active role. In order for assessment to be authentically undertaken, teachers must be involved in the planning and design [3]. Involving multiple stakeholders in the process creates more work for everyone, but the results are worthwhile: it creates consensus among faculty and instructors, yields valuable information to administrators, and ultimately benefits students [4]. Thus, program assessment must be site-based and locally controlled in order to be successful [5]. Each program in each discipline could theorize and implement a homegrown assessment thereby rendering third-party accountability testing unnecessary.

In our case, technical communication students create an individual online portfolio that contains their work for the semester. These portfolios are open to the internet and hosted on university servers. Each semester, faculty and instructors gather together to read and assess a random sampling of the portfolios. We score the portfolios analytically for ten separate communication criteria and holistically for one overall portfolio score. Creating and implementing this model took place gradually, since the faculty and instructors had to change their curriculum to include basic web work and, in so doing, often had to learn basic web design and posting skills themselves. This form of online portfolio assessment, using both analytic and holistic scoring with portfolios open to the internet, is new and holds promise for future development in multiple disciplines.

## II. BACKGROUND

New Jersey Institute of Technology (NJIT) is a comprehensive technological university that offers 34 undergraduate degrees, 40 master's degrees and 19 doctoral programs. Undergraduate enrollment in 2004 was 5,336, the majority of whom were in engineering or computing sciences. Our university is one of the most diverse in the nation: undergraduate enrollment in 2004 was only 34%

Caucasian, and the number of American students who speak English as a second language is approximately half [6]. Thus, we face a dual challenge: we must teach students from a variety of linguistic backgrounds to communicate effectively across cultures, in addition to the usual task of teaching them to communicate their disciplinary knowledge clearly.

NJIT has 499 faculty (423 full-time and 76 adjuncts), 8 of whom teach technical communication (4 full-time lecturers, 1 assistant professor, and 3 adjuncts). There are 16 sections of the course taught each year, each with 24 students, most of whom are juniors. Some of the students are required to take the course and others use it to fulfill an elective. We have traditionally assessed the best papers with a holistic reading (rating the paper with a rubric on a scale from 1 to 6 for a total score of 2 to 12), but in 2004, as we began to create the new curriculum, we began to develop an analytic online portfolio assessment as well. In the fall of 2004 we had our first successful reading and have been repeating the procedure in subsequent semesters.

### III. DEFINITIONS

Validity and reliability were central in the development of our model: we agree with the precepts determined by the field of educational assessment that they are the most fundamental issues [7]. In writing assessment, inter-reader reliability is achieved by having two readers score each portfolio on a scale from one to six; if the scores are not adjacent, the portfolio is given to a third or fourth reader. The adjudicated scores are then added together for a total range of two to twelve. Before each reading, we have a calibration session, or normative discussion, in which we analyze sample portfolios to agree on standards. During the calibration session, we read sample papers, score them independently, then compare our scores and discuss why we chose to score each paper as we did. This brings us into close accord during the reading and helps define our expectations from semester to semester (each session is also recorded). Then each reader scores each portfolio separately, without knowledge of the other's score. We score ten separate (independent) predictor variables and an overall (dependent) outcome portfolio score. This process gives numerical value to a complex and shifting goal—the quality of human communication—from instructors who are trained to judge it.

In our case, validity is achieved by carefully defining our goals in the technical communication course and building an assessment model that is specific to those goals. According to the American Educational Research Association standards, validity is delineating the knowledge, skills, abilities, processes, or characteristics to be assessed and developing a method of assessing them [8]. In the past, validity in writing assessment has often been sacrificed to reliability—such as in the case of using multiple choice items to assess writing ability—in order to achieve high rates of reliability [9]. Now that inter-reader reliability has become established in direct writing assessment, we can focus on the assessment's underlying goals. The ten criteria that we score analytically are the criteria by which we define successful technical communication; we also score the portfolio holistically.

Holistic scoring was developed and publicized by the Educational Testing Service (ETS) in 1966 [10]. It was a breakthrough in writing assessment because it was able to provide high rates of inter-

reader reliability. Since then, holistic scoring has become an established norm in writing assessment. However, since holistic scoring records an overall impression of an essay or portfolio, it is not useful for assessing specific components of the curriculum. Thus, we began analytically scoring online portfolios, using the score sheet seen in Figure 1 that records scores for separate criteria. In the fall of 2004, we held our first successful analytic scoring of online technical communication portfolios.

### IV. A NEW CONSTRUCT OF THE ELEMENTS OF TECHNICAL COMMUNICATION

Due to the changing nature of technical communication in a digital age, our goals have changed: in addition to teaching standard written and spoken English, we also teach basic visual and online communication. The creation of the new construct for teaching technical communication was a group endeavor. After an initial discussion with the instructors and members of the Society for Technical Communication, we arrived at a common core of teaching modules. We agreed that the students would write a procedure, a proposal, and a technical marketing brochure, make a presentation, and create the online portfolio website (instructors were free to use other assignments as well). Then, in a group discussion that began in formal emails and ended in a recorded meeting, the professors who taught technical communication formally agreed on the criteria to use in the assessment. These criteria, which provide the basis for the scoring sheets in Figure 1, are as follows:

Criteria	Descriptors
Writing and Editing	<ul style="list-style-type: none"> <li>• Exhibits clear style (readable, concise, cohesive).</li> <li>• Demonstrates accurate language usage (grammar, punctuation, spelling).</li> </ul>
Substance and Content	<ul style="list-style-type: none"> <li>• Exhibits clear understanding of assignments.</li> <li>• Demonstrates accurate, thorough, relevant, and coherent content and ideas.</li> <li>• Can respond to different rhetorical situations.</li> </ul>
Audience Awareness	<ul style="list-style-type: none"> <li>• Can adapt content to audience and purpose.</li> <li>• Can adapt tone for audience and purpose.</li> </ul>
Document Design	<ul style="list-style-type: none"> <li>• Demonstrates cohesion by graphic means (headings, white space) in documents.</li> <li>• Uses parallel structure with heading and sub-headings.</li> <li>• Includes basic graphics.</li> </ul>
Textual Attribution	<ul style="list-style-type: none"> <li>• The contents of this portfolio demonstrate the ability to differentiate between sources and one's own text.</li> <li>• The contents of this portfolio demonstrate uniform textual citation.</li> </ul>

The final criterion on this list—that regarding textual attribution—was optional during the scoring process because we were unable to reach consensus about the preferred method for textual attribution (MLA, APA, Chicago, or IEEE).

English 352 (Technical Communication) Portfolio Assessment  
Spring 2005

Student's Name	
Reader's Name	

**Writing and Editing**

1. The contents of this portfolio exhibit clear style (readable, concise, cohesive)

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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2. The contents of this portfolio demonstrate accurate language usage (grammar, punctuation, spelling)

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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**Substance and Content**

3. The contents of this portfolio exhibit clear understanding of assignments.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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4. The contents of this portfolio demonstrate accurate, thorough, relevant, and coherent content and ideas.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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5. The contents of this portfolio demonstrate that the author can respond to different rhetorical situations

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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**Audience Awareness**

6. The contents of this portfolio demonstrate that the author can adapt content to audience and purpose.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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7. The contents of this portfolio demonstrate that the author can adapt tone for audience

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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**Document Design**

8. The contents of this portfolio demonstrate cohesion by graphic means (headings, white space) in documents.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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9. The contents of this portfolio demonstrate use of parallel structure with heading and subheadings.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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10. The contents of this portfolio demonstrate use of basic graphics.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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**Textual Attribution**

11. The contents of this portfolio appear to include writing from other sources.

Yes  No

12. If yes, the contents of this portfolio demonstrate proper attribution.

Very Strongly Agree	Strongly Agree	Agree	Disagree	Strongly Disagree	Very Strongly Disagree
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**13. Overall Portfolio Score**

The materials in the portfolio demonstrate <b>superior</b> work in the class.	The materials in the portfolio demonstrate <b>average</b> work in the class.	The materials in the portfolio demonstrate <b>below average</b> work in the class.	The materials in the portfolio demonstrate work that is at a level of <b>near failure</b> in the class.	The materials in the portfolio demonstrate work that is at a level of <b>failure</b> in the class.
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Figure 1. New criteria on portfolio scoring sheet.



Figure 2. Sample online technical communication portfolio.

## V. ONLINE PORTFOLIOS AND WRITING ASSESSMENT

The State University of New York at Stony Brook first used portfolios in writing assessment in 1983 and Washington State University first embedded portfolio assessment within a university-wide writing program in 1991 [11]. Portfolio assessment has become a widely-used method of writing assessment since it situates writing within a context and provides examples written over time. Many now regard portfolio assessment as the best way to assess writing, since it provides the richest data in regard to student writing [3, 12]. Portfolio assessment has been widely used in other disciplines as well [13].

For writing assessment, most universities use paper portfolios or closed databases, both of which have drawbacks. Paper portfolios are difficult to store or return and closed databases offer no visible benefit to the student, making it difficult to get them to participate. For instance, a 2001 progress report in the Washington State University program concludes that student compliance continues to be the most pressing issue to be addressed [12]. Online portfolio assessment, with portfolios open to the internet, overcomes both of these problems: since students have a stake in the outcome (their portfolios are visible to family, friends, and future employers), they are willing to contribute the time and effort to create the portfolio. And, unlike paper portfolios, these portfolios can be downloaded and digitally stored.

Online portfolios are different from written portfolios not only because they are easily viewed but because they contain graphics, hypertext media and navigation systems. Online portfolios can resemble a gallery [14]. Since each portfolio is open to the internet, students care about its appearance and need little persuasion to complete it in a timely and thorough manner. By giving the students a stake in the assessment, online portfolio assessment is more easily sustainable.

Most of the instructors did not have any experience in creating websites or online portfolios. However, while testing the process of teaching online web skills, we discovered that most students need minimal instruction; they could be taught enough basic HTML in one class session to be able to complete the project themselves. Some instructors give a short initial lecture and then break the students into groups so that they can help each other. They develop and modify the portfolio throughout the semester. No special pro-

grams are required to do this, only a connection to the internet and university server space. We require students to make web pages with their names and links to their procedure, proposal, and their technical marketing brochure. Figure 2 is an example of an online portfolio that fulfills the basic requirements. At the end of the semester, each instructor submits a list of URLs (rather than a stack of portfolios).

During the assessment at the end of the semester, we first have a calibration session in which we individually score and then discuss a range of sample portfolios taken from that semester. After the calibration session, each instructor scores portfolios individually. When each portfolio is scored twice, an administrator checks for discrepancies (any difference greater than one). If there are discrepancies the portfolio is assigned to a third reader who resolves the discrepancy. After the assessment, the program coordinator compiles and analyzes the data. The results from the data are distributed to the instructors and form the basis for a meeting at the beginning of the following semester in which we discuss changes, methods and goals. Thus, online portfolios have allowed us to have a sustainable method of monitoring and updating the course.

## VI. SAMPLE SIZE

Our goal was to assess the components of the course described in our model. We wanted to have as much security as we could that our sampling plan represented the total population of students taking the course in any given semester, so we worked with statisticians from our Institutional Research Office. We made every attempt to reach a 95 percent confidence interval but meeting such a level is not sustainable because it requires more dual readings that we can support; thus, we elected to use a 90 percent confidence interval, remembering that we are assessing our program effectiveness and not the skills of individual students. We used a sampling plan, shown in Formula 1, that is sensitive to shifts in the standard deviation and standard error based on the calculations from the previous semester's reading [15].

In Formula 1,  $Z_{\alpha/2}$  is 1.65, the Z-value associated with a 90 percent confidence interval;  $\alpha$  is the Type-1 error rate;  $\sigma$  is 1.44, the population estimated standard deviation based the overall portfolio

$$n = \left[ \frac{Z_{\alpha/2} * \sigma}{E} \right]^2$$

*Formula 1. Using standard deviation and standard error from the previous assessment to establish a sample with a 90 percent confidence interval.*

score standard deviation from the previous semester; and  $\Sigma$  is 0.204, the estimated margin of error based on the overall portfolio score standard error from the previous semester.

In the fall of 2004, we scored 61 portfolios for the ten independent (predictor) variables and one dependent (outcome) variable; that sample was based on the previous semester's best-paper reading. In the spring of 2005, the formula resulted in  $n = 50$ , so we scored 50 portfolios. In the fall of 2005, shifts in standard deviation and standard error resulted in a higher number of portfolios to read,  $n = 136$ , which was too large a number to score in one day. Thus, we developed a new procedure: we read 25 percent of the portfolios twice (with a minimum of 35) to establish inter-reader reliability; then we read the remainder once. This basic rule assures that we are checking our reliability on a representative sample larger than 30, the smallest sample size that should be used when applying parametric statistics. Following this basic rule, in the fall of 2005 we used a standard table of random numbers and selected 35 portfolios to be read twice. We read an additional random sample once for a total of 124 scored portfolios.

## VII. A MODEL FOR WRITING ASSESSMENT

In order to ensure reliability, we used both Pearson's correlation and Cronbach's Alpha to analyze the inter-reader agreement each semester. The analysis in Table 1 presents the adjudicated scores over three semesters. In the two-tailed Pearson's correlation, we assumed the null hypothesis unless the level of agreement reached the 0.05 confidence level (95 percent)—a guard against Type 1 error. The reliability increased steadily from semester to semester: we were becoming more comfortable with the assessment process and more calibrated as a group. (An analysis of the unadjudicated scores shows a similar pattern). These results show that our inter-reader reliability is solid enough to ensure that we could agree on and sustain standards for evaluation of the online portfolios.

Not only did we read reliably, but through the creation of our new criteria, we met the conditions of content validity (our definition of technical writing articulated in the scoring sheet shown in Figure 1) and construct validity (the relationship of the variables in Figure 1 to the overall holistic score). A cause and effect relationship between the independent and dependent variables cannot be assumed because analytic components differ in relation to the holistic reading score (some parts contribute more than others, and there may be other variables impacting this overall score.). However, in the model we created, the majority of the components (criteria) were significantly related to the overall portfolio score (see Appendix). The regression analysis of fall 2004 relating the independent variables (criteria) to the dependent variable (overall portfolio score) revealed a high coefficient of determination ( $r^2 = 0.734$ ,  $F(11, 49) = 12.287$ ,  $p = 0.000$ ). The regression analysis of spring 2005 was

higher ( $r^2 = 0.785$ ,  $F(10, 39) = 14.274$ ,  $p = 0.000$ ) and that of the fall 2005 was even higher ( $r^2 = 0.865$ ,  $F(10, 113) = 72.181$ ,  $p = 0.000$ ). Such high coefficients of determination showed that our model accounted for no less than 73 percent of the variance within the model; we had devised a suitable assessment mechanism for our construct of technical communication. The Appendix shows the correlation results for the predictor variables, most of which reached a confidence level of 0.05 or 0.01 (95 percent or 99 percent). From this data, we know that our construct of technical communication assessment is accurately reflected in the variables of technical communication that we are measuring at our university.

In our writing assessment range, we determined that on a scale of 2 to 12, 7 (or above) is an acceptable score. As seen in Figure 3, all of our criteria reached that level and thus we knew that our outcomes matched our goals. Although there were no significant differences in the scores between adjacent semesters, there was a significant difference in the overall portfolio scores between the fall of 2004 and the fall of 2005. Students in the fall of 2004 scored lower ( $M = 7.82$ ,  $SD = 1.40$ ) than in the fall of 2005 ( $M = 8.45$ ,  $SD = 1.20$ ,  $t(162) = -0.250$ ,  $p = 0.014$ ). This improvement was likely due to our growing competence teaching the new curriculum, which, in turn, was reflected in the student outcomes.

## VIII. CONCLUSIONS

Creating this model has accomplished demonstrable outcomes for our instructors, our program, our institution, and our students. We, as instructors, reached consensus on our methods (modules) and goals (criteria). We have a time set aside each semester to get together to study and discuss student work. We have a process in place that helps us to update the course and monitor change. This makes the program stronger as a whole and makes the goals of the program clearer to the university community. Thus, we can easily document our outcomes for accreditation agencies such as ABET [2] and the Middle States Commission on Higher Education [16] without creating new work, since the process is embedded in our program. Our students benefit because they are not only learning to write, but they are learning to communicate in the medium they use the most—electronic communication on the internet. They will leave the program with state-of-the-art skills and can update their portfolio continuously. This collaborative endeavor has benefited all involved and made our outcomes more consistent, determined, and reliable.

The main problem with this form of assessment is that it takes serious commitment from multiple stakeholders—it takes time to create the criteria, plan the assessment, conduct the reading, enter the scores into a database, analyze the scores, and theorize and discuss curricular change. For many programs, it requires that at least one stakeholder either already knows, or can learn, statistics. It requires the cooperation of many people—instructors, administrators, students, and university statisticians. We began the process with a great deal of effort and uncertainty. It took two semesters to enable the instructors to teach the students how to create online portfolios. The first reading we attempted failed due to a network virus. However, after three years the assessment became an embedded activity within our teaching cycle.

Thus far, we have held the online portfolio assessment for three semesters. We have the beginnings of a data set which, in the

Criteria	Descriptors	Inter-reader Reliability <sup>1</sup>						Overall Portfolio Scores					
		Adj. Pearson's $r^2$			Cronbach's Alpha			Mean			Standard Deviation		
		2004 <sup>3</sup>	2005 <sup>4</sup>	2006 <sup>5</sup>	2004	2005	2006	2004	2005	2006	2004	2005	2006
Writing and Editing	Exhibits clear style (readable, concise, cohesive)	0.449	0.473	0.821	0.686	0.792	0.898	7.77	7.94	8.19	1.283	1.476	1.948
	Demonstrates accurate language usage (grammar, punctuation, spelling)	0.564	0.639	0.876	0.816	0.808	0.919	7.54	7.76	7.77	1.409	1.572	2.163
Substance and Content	Exhibits clear understanding of assignments	0.276	0.555	0.860	0.709	0.773	0.921	8.00	8.32	8.20	1.225	1.377	2.048
	Demonstrates accurate, thorough, relevant, and coherent content and ideas	0.642	0.509	0.828	0.747	0.807	0.887	7.93	7.84	8.25	1.195	1.530	1.885
	Can respond to different rhetorical situations	0.308	0.645	0.839	0.756	0.779	0.912	7.95	7.96	8.22	1.359	1.511	1.945
Audience Awareness	Can adapt content to audience and purpose	0.418	0.603	0.816	0.695	0.751	0.907	8.02	7.90	8.29	1.359	1.542	1.920
	Can adapt tone for audience	0.468	0.607	0.801	0.747	0.785	0.885	7.82	7.94	8.19	1.272	1.434	1.928
Document Design	Demonstrates cohesion by graphic means (headings, white space) in documents	0.565	0.616	0.840	0.769	0.855	0.912	7.84	8.00	8.10	1.529	1.666	1.977
	Uses parallel structure with heading and subheadings	0.466	0.579	0.841	0.769	0.769	0.907	7.59	8.08	8.05	1.407	1.455	1.950
	Includes basic graphics	0.379	0.456	0.813	0.664	0.728	0.891	8.34	8.82	8.56	1.250	1.273	1.791
	Overall Portfolio Score	0.584	0.707	0.839	0.782	0.746	0.912	7.82	8.08	8.45	1.397	1.441	1.997

<sup>1</sup> In all cases, the correlation is significant at the 0.01 level (2-tailed).

<sup>2</sup> Adjudicated scores include third readings for discrepancies.

<sup>3</sup> Fall 2004 (n=61).

<sup>4</sup> Spring 2005 (n=50).

<sup>5</sup> Fall 2005 (n=136).

Table 1. Inter-reader reliability for Fall 2004 to Fall 2005.

future, will allow us to test hypotheses about how to continue to improve our curriculum and teaching. As the numbers of observations grow, we will be able to address such issues as the relative performance of full-time, first-time freshmen and transfer students, comparisons between distance learning and face-to-face learning and the correlation of our portfolio scores to other data, such as students' course grades, SAT scores and GPAs. If other institutions were to implement similar programs, databases could be shared and compared.

While we are creating our own methods of cyclic program assessment, we need to remember that, although proof is normally associated with research methods in the natural sciences, those

methods are not considered possible in educational research. As Martin Hollis has written, "we have found no single and commanding analysis of causal explanation in the philosophy of the natural sciences which social scientists are bound to accept" [17]. It is up to us to define the constructs of knowledge in our disciplines and to create procedures and models for assessment that are specific to our disciplines. It is a difficult and time-consuming task, but it is worth the effort: as Samuel Messick has proposed, "[Assessments] are not just measurement principles, they are social values that have meaning and force outside of measurement wherever evaluative judgments and decisions are made" [18]. By assessing our programs we can also assess—and demystify—the basic

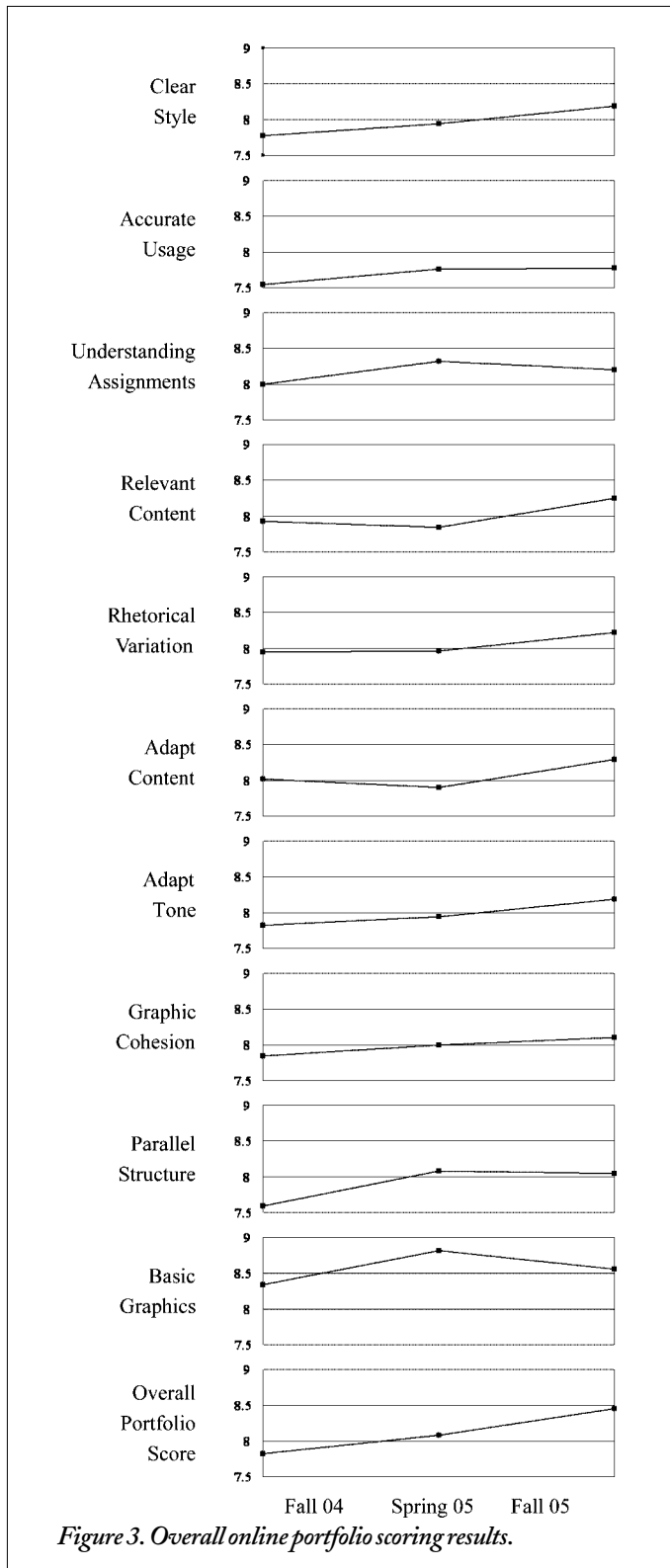


Figure 3. Overall online portfolio scoring results.

assumptions under which we operate. We can define and control our goals within the larger educational system.

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APPENDIX — ASSOCIATIVE ANALYSIS (PEARSON'S CORRELATIONS) FOR FALL 2004 TO 2005

	1 Overall		2 Style		3 Usage		4 Underst.		5 Relevant		6 Rhetoric		7 Content		8 Tone		9 Cohesion		10 Parallel		11 Graphics										
	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5	F4	S5			
1	—	—	.674**	.714**	.465**	.630**	.695**	.789**	.834**	.642**	.728**	.872**	.505**	.723**	.837**	.509**	.730**	.826**	.535**	.713**	.786**	.548**	.765**	.775**	.428**	.708**	.744**	.542**	.698**	.753**	
2	.674**	.674**	—	—	.568**	.785**	.797**	.612**	.622**	.479**	.764**	.722**	.385**	.764**	.625**	.323**	.679**	.666**	.413**	.788**	.653**	.354**	.572**	.637**	.399**	.477**	.528**	.424**	.505**	.513**	
3	.465**	.630**	.674**	.714**	—	—	—	.290*	.564**	.417**	.790**	.722**	.362**	.790**	.568**	.236	.663**	.609**	.232	.781**	.624**	.227	.522**	.606**	.240	.410**	.542**	.214	.620**	.476**	
4	.663**	.789**	.834**	.834**	.465**	.630**	.695**	.789**	.834**	—	.683**	.771**	.804**	.481**	.771**	.822**	.474**	.736**	.764**	.674**	.723**	.409**	.667**	.674**	.368**	.629**	.639**	.425**	.744**	.638**	
5	.642**	.728**	.872**	.505**	.723**	.837**	.509**	.730**	.826**	.535**	.713**	.786**	.548**	.765**	.775**	.428**	.708**	.744**	.542**	.698**	.753**	.476**	.513**	.542**	.214	.620**	.476**	—	—	—	
6	.505**	.723**	.837**	.505**	.723**	.837**	.509**	.730**	.826**	.535**	.713**	.786**	.548**	.765**	.775**	.428**	.708**	.744**	.542**	.698**	.753**	.476**	.513**	.542**	.214	.620**	.476**	—	—	—	
7	.509**	.730**	.826**	.535**	.713**	.786**	.548**	.765**	.775**	.428**	.708**	.744**	.542**	.698**	.753**	.476**	.513**	.542**	.214	.620**	.476**	.513**	.542**	.214	.620**	.476**	—	—	—	—	
8	.535**	.713**	.786**	.548**	.765**	.775**	.428**	.708**	.744**	.542**	.698**	.753**	.476**	.513**	.542**	.214	.620**	.476**	.513**	.542**	.214	.620**	.476**	.513**	.542**	.214	.620**	.476**	—	—	—
9	.548**	.713**	.775**	.354**	.572**	.637**	.227	.522**	.639**	.420**	.574**	.722**	.434**	.614**	.685**	.296	.668**	.702**	.415**	.648**	.700**	.665**	.699**	.819**	.665**	.699**	.819**	.623**	.597**	.756**	
10	.428**	.708**	.744**	.399**	.477**	.528**	.240	.410**	.639**	.368**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**	.639**	.629**
11	.542**	.698**	.753**	.424**	.505**	.513**	.214	.410**	.638**	.350**	.635**	.724**	.635**	.590**	.679**	.461**	.698**	.720**	.491**	.531**	.679**	.623**	.597**	.756**	.461**	.548**	.819**	.461**	.548**	.819**	—

\*  $p \leq .05$  (2-tailed)

\*\*  $p \leq .01$  (2-tailed)