

Programmatic Research in Technical Communication: An Interpretive Framework for Writing Program Assessment

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Abstract. Important advances have been demonstrated in the assessment of writing programs. In this paper, we identify an application of programmatic research based on an accountability framework for writing program assessment. A form of relational modeling that allows a postsecondary institution to identify and fashion the variables that impact the writing program, the application is termed Design for Assessment (DFA). To demonstrate its benefits, we review contemporary views of program assessment, explicate the interpretative features of the framework, and describe a case study application. We close with heuristic questions for program assessment attentive to stakeholder contributions. A postscript from the current program director at our institution provides a reflective statement on the need for evidence-based responsiveness in writing program design.

Keywords. Design for Assessment (DFA); empirical methods; program assessment; technical, scientific, and professional communication; variable modeling

“What gets measured gets done.” This management meme is often passed around an organization when it is time to make decisions about company performance, value, or worth.

Higher education is no stranger to this maxim as its institutions must find ways to measure, monitor, and validate the college experience. We need look no farther than the performance ratings of post-secondary institutions provided by the United States Department of Education College Scorecard (2016) for evidence of a system that takes into account access, affordability, and student outcomes. In post-secondary education, the Every Student Succeeds Act (ESSA, 2015)—the most recent re-authorization of the Elementary and Secondary Education Act signed into law in 1965—allows states to develop their own college-and-career-ready standards to assess student performance. So radical is this legislation that it forbids the Secretary of Education to coerce the states to adopt the Common Core State Standards Initiative (2016) or assessments tied to them (ESSA, 2105, SEC. 1111, j, 1). ESSA legislation will require teachers and administrators to have an even more sophisticated grasp of assessment metrics and meanings to provide required information about the performance of their students. A promising signal for localism, contextually-based accountability is critical to all of us who contribute to measuring, monitoring, and validating writing program value.

Doubts nevertheless remain: Are we hitting the target but missing the point? In professional, technical, and scientific communication (hereafter referred to as technical communication), the target is small and errors are costly. The Bureau of Labor Statistics (BLS) reports that in 2014 there were approximately 52,000 jobs for technical writers with an above average projected rate of growth at 10 percent for the following year and a median salary of \$69,030 per year (United States Department of Labor, 2016b). When compared to the 1,114,000 jobs for software developers at a 17 percent growth job outlook with salaries of \$97,990 per year, we quickly realize that the decisions we make in educating our students have consequences for the existence and growth of our relatively small profession (United States Department of Labor, 2016a).

This article proposes an evidence-centered, principled approach for using program assessment research to guide curriculum development, administrative practice, program identity, and sustainable development. Termed Design for Assessment (DFA), the accountability framework is a form of relational modeling that allows a postsecondary institution to identify the variables that impact the writing program and to ecologically model the variables to increase student success (White, Elliot, & Peckham, 2015). Because assessment is a problem-solving activity within contexts that are complex, multifaceted, and contingent, the framework we present is designed to serve as a heuristic to create opportunity structures for students, instructors, administrators, and workforce leaders. With this

aim, our work may therefore be viewed as an extension of the Outcome Survey conducted by the Council for Programs in Technical and Scientific Communication for revising assessment both descriptively and analytically so that programs “improve our instruction and contribute to increased professionalism” (Barker, 2012, p. 206).

Our paper begins with a discussion of contemporary program assessment, with special emphasis on the creation and advancement of opportunity structures. We then turn to a brief exposition of the DFA interpretive framework and its evidential categories. To demonstrate the generalization force of the framework in terms of construct inference, we present a case study that illustrates the value of DFA in terms of empirical analysis of traditional and new variables driving the Master of Science in Professional and Technical Communication (MS-PTC) at our home institution, New Jersey Institute of Technology (NJIT). To demonstrate the extrapolation force of the framework as it is extended to new construct domains, we offer a heuristic intended to encourage shared program responsibility among key stakeholders. In the postscript, the new program director discusses the sustainability of the DFA model and future directions for the graduate program—directions that hold implications for other similar programs in our field.

Contemporary Program Assessment: From Accountability to Structured Opportunity

How do we measure a program’s value? According to *The Program Evaluation Standards* (Yarbrough, Shulha, Hopson, & Caruthers, 2011) developed by the Joint Committee on Standards for Educational Evaluation, an educational program’s worth is best authenticated according to five key attributes of evaluation quality: utility, feasibility, propriety, accuracy, and accountability. The 30 standards, developed from the input of 400 stakeholders over six years, give us exemplary ways to collect program evaluation information that could demonstrate our program’s quality.

Yet many program leaders in our field would think of information presented in standards of any type as an ideal concept, an abstraction perhaps too standardized that fails to provide the unique pathways needed to provide assessment research for an individual program. Jo Allen’s important bibliography (1993) of technical communication assessment was the first work that moved our field beyond basic discussions of standardization to examine aims, criteria, and concerns. A more recent annotated bibliography (St.Amant, et al., 2015) demonstrates that program assessment has received our scholarly

attention, an observation confirmed by Tracey Bridgeford, Karla S. Kitalong, and Bill Williamson (2014) who note that “program administrators have benefited greatly from colleagues’ expertise [in program assessment] which is often gained through lengthy experimentation and trial and error” (p.12). Innovation aside, program assessment often remains a speculative chore accompanied by well documented faculty reluctance—the single biggest impediment to the adoption of systematic assessment of learning outcomes (Katz, 2010). Making program assessment more complicated and time consuming is often the result of a systematized metaparadigm and its resultant static methodology—in essence, bureaucratized default choices from a drop-down menu.

A corrective to this view of program assessment is gained from the perspective that the writing construct is best understood as “a complex social participatory performance in which the writer asserts meaning, goals, actions, affiliations, and identities within a constantly changing, contingently organized social world, relying on shared texts and knowledge” (Bazerman, 2016, p. 18). Writing assessment and the evaluation of programs that support it are both most meaningful when site-based and locally controlled (Broad, 2003; Gallagher, 2011; Huot, 2002; White & Wright, 2016)—an acknowledgement that each program is unique in its design and its barriers (Scott & Brannon, 2013). The Technical Communication Body of Knowledge (TCBOK) (2016) through its early development in 2007 (Coppola, 2010) to its redevelopment in 2012 (Hart & Baehr, 2013) has attempted to bring together our disciplinary core competencies as a codified collection of knowledge assets for the profession to be used in contextualized instruction and assessment of the writing construct.

Reflection on the TCBOK yields an important link between programs of research and program assessment. As is the case with theory development, programs of research need not be fully articulated by anyone, as Adam Morton (1980) observes. The key to consensus in a program of research is twofold: Those participating in the program must act as if the concepts refer to objective realities; and participants must act as if the possibility of increasing knowledge lies within the grasp of designated traditions, boundaries, and processes. Linking both concepts together is a single premise: *as if*. Psychometric theorists Frederic Lord and Melvin R. Novick (1968) long ago demonstrated the value of *as if* thinking to psychological theory itself. As they write, “[N]owhere is there any necessary implication that traits exist in any physical or physiological sense. It is sufficient that a person behave as if he were in possession of a

certain amount of each of a number of relevant traits and that he behave as if these amounts substantially determined his behavior” (pp, 358-359). While disarming, this notion of the hypothetical well serves those who perform research in communication where sociological (Mehan, 2008) and sociocultural (Gee, 2008) perspectives inform the contingent interpretations we make.

When programs of research are present in educational settings, a recurrent outcome is assurance that those programs continue from one generation of researchers to another. In post-secondary settings, researchers create undergraduate and graduate degree programs which, in turn, may be investigated by the very same research methods that increase knowledge in the field. In the case of degree programs in technical communication, this impulse to inquiry means that the family of theories and techniques used to investigate phenomenon in non-academic settings are equally useful in studying the very academic programs in which those same researchers hope to create others like themselves.

There is, however, an important difference in the development of programs of research and the occasion of program assessment. While there are many aims of research in our field, as demonstrated in the literature, program assessment is most focused—and therefore most meaningful—when the aim is to advance learning. While the concept of exigence is popular as a way to investigate context—Lloyd Bitzer (1968) famously defined an exigence as “an imperfection marked by urgency...a defect, an obstacle, something to be done, a thing which is other than it should be” (p. 6)—nothing is more harmful to program assessment than viewing its existence under this framework. The advent of program assessment viewed solely as occasions of reporting renders it an occasion for static methodology and default claims.

If the aim of program assessment is solely to rid ourselves of exigence, then little good can come from it. Conversely, if assessment is defined as learning—that is, *as a form of research, undertaken in the service of opportunity structure identification, and for the purpose of advancing the scholarship of teaching and learning*—then the authentic aims that underlie programs of research are manifested in the genre of program assessment (Hayward, 2015). The aim of program assessment and the desire for programmatic research is thus strengthened by reference to the concept of opportunity structures—creation of authentic, realizable means of success demonstrably open to all (Cloward, 1959; Merton, 1938, 1996).

Program Assessment: An Interpretive Framework

Survey methods such as those described in the case study to follow are but one way of re-examining program and course outcomes in order to guide curricular development, establish administrative practices, and renew program identity. Further evidence would be drawn from institutional data (such as admission scores) and performance assessment (such as EPortfolio scores), as well as review by program advisory boards (on planned annual visits). While the case study attends to curricular changes that hold the potential to substantially shift the orientation and direction of the program, identification of sources of evidence situates assessment episodes such as this within a capacious, meaningful framework providing aim and evidence under specified categories ranging, as we will show, from the consequences of our inferences to the sustainability of program infrastructure.

If we look at the assessment incidents diachronically as histories, we see the origins of program review, with audit of enrollments and evaluations, as a traditional accountability model. Emphasis on student outcomes and relational modeling advances synchronic analysis. In this new phase, we turn to a new evaluative model for writing programs that flips the idea of assessment so that sources of evidence are planned in detail in advance of the assessment itself. Inspired by evidence-centered design (Mislevy, Steinberg, & Almond, 2002), Edward M. White, Norbert Elliot, and Irvin Peckham (2015) have called this concept Design for Assessment (DFA). Their conceptual model (Table 5.1, p.155) establishes assessment aims “to assure that, in advance, those responsible for the writing program anticipate evidence collection and widespread participation as part of the assessment cycle” (p. 9). In turn, these aims become sources of evidence that can be used to advance opportunity for all assessment stakeholders. Under this model, the survey described in the case study becomes a source of evidence ready for interpretation and use (Kane, 2013). Use of the conceptual model before an assessment begins allows principled investigation aimed at the creation of opportunity structures *as*, *of*, and *for* learning. Integration of aim and evidence renders DFA uniquely suited to advance learning opportunities for all stakeholders.

We have applied DFA assessment aims and sources of evidence here for technical communication to help program leaders identify assessment aims. This application to the program at hand, representative of other degree programs in technical communication, supports the field’s unique focus on consequences as they are related to programmatic research on the communication construct. As shown in Figure 1, we propose a

framework of three overarching constants of consequence, research, and communication, as well as recursive components of localism, documentation, accountability, and sustainability.

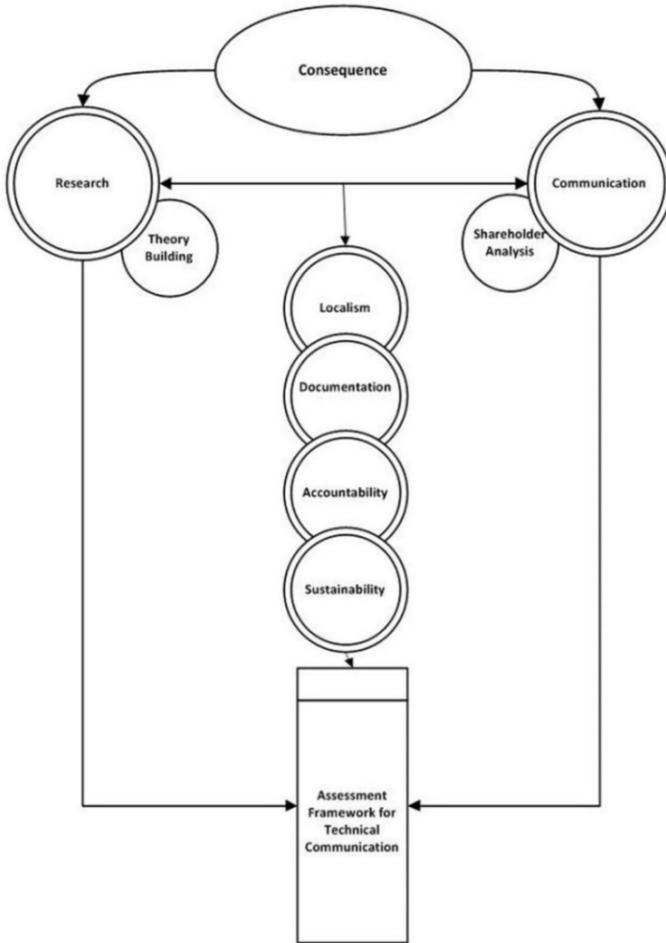


Figure 1: A Design for Assessment Framework

- *Consequence*: The first priority of program assessment is structuring opportunities for students. This priority creates an overarching mindset for all facets of the assessment. Under the foundational concept of fairness, our actions have moral as well as practical impact (Elliot, 2016).
- *Research*. Working within a designated program of research, reframing our task in assessment as research shifts our focus and our roles empowering instructors to design the assessment and to

build knowledge bases about their students and programs (Huot, 2002). Theory-building—based on knowledge of the literature on theories of technical communication, rhetoric, writing assessment, and program evaluation—is an essential part of the research component in designing program assessment; in turn, research continues to inform the process and product of self-study throughout the assessment process.

- *Communication*. The third constant in designing and implementing assessment is commitment to communication. At every point in the process, we communicate to networks of stakeholders, sharing our inferences and our intended information use (Gallagher, 2011).
- *Localism*. Following the claim of Brian Huot (2002) that assessment should be site-based, locally controlled, context sensitive, rhetorically-based, and accessible, acknowledgement of the deeply situated nature of communication allows detailed study of the construct through sociological and sociocultural perspectives.
- *Documentation*. Alice I. Philbin and Mark D. Hawthorne (2007) have described sources of evidence that document performance of the program through calendars, budget data, and other existing records. Their narrative demonstrates how a relatively new department used novel techniques in the service of program assessment.
- *Accountability*. Demands for accountability suggest that the public wants to know what the university is doing with their funds and whether their work is effective (Tebeaux, 2004). As a form of public responsibility, accountability uses contemporary project management systems to analyze resources allocated to the program, design instruments to measure programs success, and allocate resources under conditions of scarcity (Kaplan & Norton, 2007).
- *Sustainability*. Assessment allows for measured and strategic growth that is sustainable and purposeful, looking beyond the present to engage the future and public good (Johnson, et al., 2004).

This applied framework has two advantages. First, it advances considerations of consequence prior to the assessment itself. Such foregrounding allows discrimination of that which will structure opportunity for students to learn and that which will not. Consideration of the anticipated and unanticipated negative and positive impacts of an assessment strategy before it has begun affords a unique advantage to pursue fairness. Second, the applied framework advances research (and

theory-building) as well as communication (and stakeholder analysis) as complementary forms of action and sources of evidence. Attention to research serves as a guard against bureaucratization; attention to networks of stakeholder information guards against solipsism.

While the DFA model is deliberately broad in conceptualization, this application allows advancement of programmatic research and stakeholders as especially significant to the field of technical communication. Additionally, the framework advances principled investigation and sources of information in the service of inference. In the field of educational measurement, Michael Kane (2013) has provided an important contribution to validity in his use of interpretation/use arguments (or IUA)—a rubber-meets-the-road view of assessment. Emphasizing “claims based on the test scores (i.e., the network of inferences and assumptions inherent in the proposed interpretation and use),” he has led a refreshed emphasis on the contingent, language-based, temporally-situated nature of information (p. 2).

The applied DFA operationalizes what Kane (2016) has termed “the network of inferences and assumptions leading from test performances to conclusions and decisions based on the test scores” (p. 201). For example, under the model shown in Figure 1, information derived from the survey discussed in the case study would be evaluated in a broad *as if* context:

- *Consequence*: How would new variables lead to new opportunity structures that would, in turn, be used to advance opportunity for all students in the program?
- *Research*: What empirical methods of qualitative and quantitative analysis, along with emerging theories of communicating in digital environments, would provide additional information to that obtained by surveying the graduates?
- *Communication*: What other kinds of information, derived from other stakeholders, would be necessary to justify a seismic shift in the graduate program curriculum?
- *Localism*: What are the institutional circumstances that would allow dramatic changes to be made to the program, and how are those changes related to those made at other similar STEM research universities?
- *Documentation*: What kinds of performance-based information will be needed from students in order to rigorously study the transformed curriculum to ensure its ability to structure student opportunity?

- *Accountability*: In what ways will the new curriculum render instructors and administrators accountable to students and workplace leaders?
- *Sustainability*: How will the new curriculum impact hiring, staffing, tenure, promotion, professional development practices?

Under DFA, the inferences made from the case study are understood in a framework in which validation is subsumed under a larger consideration of fairness (Elliot, 2016). Ultimately, it is the interpretive emphasis of DFA—advancing nuance and explanation over proof and argumentation—that sets the stage for inquiry.

Case Study: Changing Program Outcomes through Relational Modeling

The following case study is an instance of that which occurs when those involved in programs of research attend to program assessment. A single-case design, defined as an adaptation of a time-series design intended to provide information on intervention impact (Kratochwill, et al., 2010, 2012), the present study examines the variables of our MS-PTC at a public research university. Using survey data, the study attends to curricular changes that have the potential to substantially shift the orientation and direction of the program.

Program Core Competencies

In spring 2001, the researchers responded to the demands of a program review audit for our MS-PTC at NJIT, a science, technology, engineering, and mathematics (STEM) public research university in Newark, New Jersey. As a result of the internal review process, four elements of program review were identified: commitment of institutional resources as measured by the allocated faculty lines; curricular and instructional design as evidenced in syllabi; student satisfaction and support as interpreted from course evaluations and student surveys; and faculty support as obtained from records of released time and professional activity. As easily imagined, the bureaucratized auditing process was oppositional to the spirit of our own programs of research during that time in environmental discourse (Coppola & Karis, 2000) and health communication (Elliot, Quinless, & Parietti, 2001). Notably, the numbing exercise did not include measurement of student learning outcomes through performance assessment (Lane & Stone, 2006).

In fall 2003, we applied our sense of practitioner knowledge as field researchers to literature review, survey, and bibliographic data in order to develop the most important skills for our students' success as technical

communicators. Our research orientation led us to design the program and its assessment according to a set of eight core competencies: collaboration and teamwork; document design; interpersonal and oral communication; problem solving, personal traits, and work skills; specialized expertise; technology; writing and editing; and rhetoric (Coppola & Elliot, 2010, Table 1, pp. 134-135). For our purposes as researchers, these competencies were envisioned as a relational model in which the competencies were predictors (X , or independent variables) that were related to the outcome (Y , or dependent variable) of graduate education in professional and technical communication (Coppola & Elliot, 2010, Figure 2, p. 131). As shown below in Tables 1 and 3, a version of these traditional variables is present in the program at the present writing and remains part of our research program.

Relational Modeling

To validate the relational model within our specific NJIT context, MS-PTC faculty collaborated in spring 2004 to particularize how these core competencies might be addressed in their courses. We posted these to a core matrix, returned it to instructors for practitioner validation, and sought review by advisory board members. At mid-semester in spring 2004, with the assessment model operationalized into core competencies and enumerated as descriptors, we were ready to evaluate the ways those competencies were taught within the NJIT curriculum. Beginning in spring 2004, faculty met to review students' EPortfolios, which were organized to demonstrate the core competencies. For the fall semester formative review, instructors used a form, derived from the descriptors list, which served as a qualitative report of progress with accompanying confirmation of ability and advice for improvement. At the close of the spring 2004 semester, faculty met again to conduct a summative review designed to yield quantitative performance information; that is, faculty used a Likert-scale scoring rubric to provide information for further improvement of both student ability and the program itself. By 2013, we completed 13 instances of highly quantitative EPortfolio assessment over nine years, confirming the significance of the traditional variable model and its longitudinal force of advancing student learning (Coppola & Elliot, 2007; Coppola & Elliot, 2013). Thomas Barker (2012) has classified our method under an analytic tradition that "inserts the element of performance assessment into the descriptive picture" (p. 191). While that is certainly true, we also believe our method allows research designs using the survey methodology and Massive Open Online Course (MOOC) experimentation described below. Each of these designs incorporates variable modeling at the research core.

Competency Mapping

By the spring of 2012, we began to have doubts about the decade-old variables that had served us so well in our performance assessments. Were we hitting the target but missing the point? We can best explain our reorganization impulse in terms of the deep changes in the worldwide economy and society during that period. According to the Organisation for Economic Co-operation and Development (OECD), the number of Internet users in 34 OECD countries increased from fewer than 60 percent of adults in 2005 to about 80 percent in 2013, reaching 95 percent among young people. More than 75 percent of all enterprises in the OECD area had a website and 21 percent sold their products electronically. Higher speed internet, lower unit prices, and smart devices not only changed the skills our students needed but also the way we could deliver educational preparation for those skills. As Andrew Klobucar points out in his postscript to the present study, these market changes signaled a hallmark event in which digital environments were re-envisioned on both technical and conceptual levels.

Topics of our program faculty meetings trended toward discussions of how social media, a globalized economy, and networked technologies were changing the technical communication profession and education. How, we asked, are we adapting to media changes today to help develop the communication workforce of tomorrow? Is it enough that our graduates are proficient in tweeting, blogging, tagging, podcasting, and wiki writing? We began to problematize the skill sets identified with social media and possible learning outcomes for program leaders (Coppola & Klobucar, 2010). Faculty also considered major research questions facing our field and posited adaptive learning, an orientation toward pedagogy in which technology and instruction meet at a nexus of behavioral psychology, cognitive semantics, design, automated assessment, and big data analysis. How could adaptive learning, we wondered, become part of our research program so that we might more ably study how emerging communication techniques and just-in-time learning strategies used in the workplace could be translated into digital educational environments for our students (Longo, et al., 2013)?

Because our involvement in research turned increasingly to program assessment since 2001, we were attuned to the 2011 Society of Technical Communication (STC) initiatives regarding the TCBOK and the then newly formed STC Certification Commission (STCCC) (Coppola, 2011; see also Society for Technical Communication, 2016). As a member of the CPTSC Assessment and Program Review Committee, Coppola participated in the CPTSC Outcomes Survey pilot (Barker, 2012) that sought program

outcomes in an effort to align educational efforts with professional impetus. Academic and professional leaders of TCBOK had identified core knowledge areas for technical communication using a multi-method approach: mapping, card sorting, affinity diagramming, and shareholder analysis (Coppola, 2010). The original STCCC identified broad areas of practice that represent the major activities performed by technical communicators in which the certified technical communicator would demonstrate proficiencies (Coppola, 2011). Together, Coppola and Elliot (2013) identified strategies to advance the TCBOK through its integration with national efforts to develop knowledge taxonomies, its conceptualization through metaphor, and its application through the use of personas and genres relevant to its stakeholders. With the growing role of a digital economy, rapid evolution of knowledge in the field, and new faculty joining the program, it was time to re-examine the relevance of our established core competencies, which we refer to as “traditional variables” in our paper.

New variable identification. In the fall of 2013 we began creating a new variable model for our program. With graduate student Faye Newsham (2014), instructors used mapping techniques to arrange the competencies from three sources—the present core competencies from our graduate program (MS-PTC), the TCBOK (2016), and STC Certification—in a hierarchical grouping. Shown in Figure 2, the key variables are written communication, visual communication, and content development; these were also the must-pass areas of the STC certification assessment. Each of these variables was then defined in terms of STCCC primary core competencies, STCCC secondary competencies, TCBOK areas of core knowledge, and our own traditional MS-PTC core competencies. The figure highlights the mapped commonalities among the three sources of integrated skill sets.

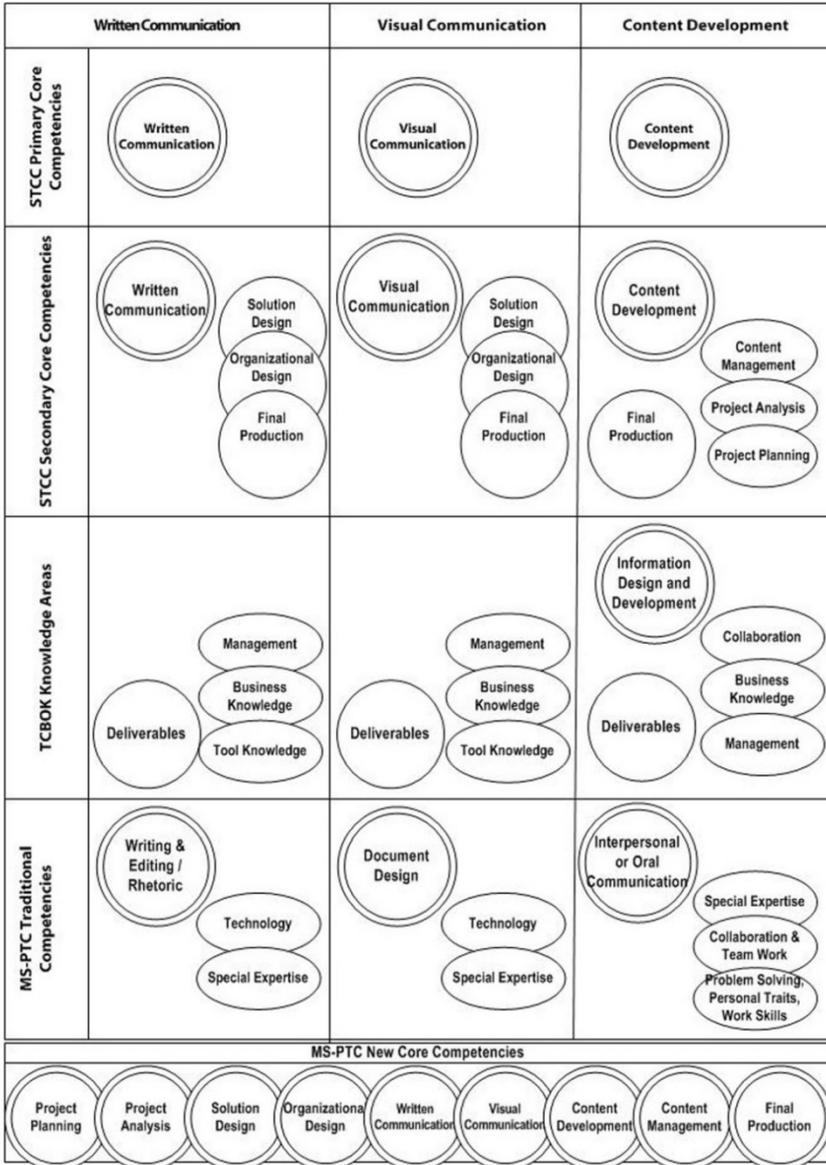


Figure 2: Technical Communication Variable Map

From the interaction between columns (the broad variables) and rows (the facets of these variables as informed by STCCC, TCBOK, and MS-PTC), we identified nine new variables: 1) project planning, 2) project analysis, 3) solution design, 4) organizational design, 5) written communication, 6) visual communication, 7) content development, 8) content management, 9) final production.

and 9) final production. We noted the recurrence of variables across categories and understood this replication as evidence of intersectionality. To estimate exactly how relevant these new variables might be to students, we developed an online survey of program graduates with survey questions mapped to the new variable model shown in Figure 2. As Table 2 and Table 4 illustrate below, these new variables were amenable to empirical study (Johnson & Elliot, 2010). In addition, because we were interested in how the traditional variables were viewed, we also included questions on our MS-PTC core competencies: collaboration, teamwork, document design, interpersonal communication, oral communication, problem solving, personal traits, work skills, specialized expertise, technology, writing and editing, and rhetoric. These variables are identified in Table 1 and Table 3.

Design Justification

The survey design, sampling plan, IRB approval, response rate, descriptive, and correlation analyses are understood as a way to examine traditional and new variables in their ability to advance student learning. There was little benefit in continuing performance assessment of EPortfolios without exploring new program variables. Indeed, as Klobucar demonstrates in his postscript, the creation and examination of new variables can be undertaken in a variety of ways, both standard (surveys) and innovative (MOOCs).

Survey design. Screening questions on the survey included year of graduation, first job title upon graduation (using the Bureau of Labor Statistics Standard Occupational Classifications [SOCs]), years in the profession, and current job title (again using the SOC classifications). Questions also were included on job preparation and degree relevance.

To elicit responses from our respondents on the traditional and new variables, we used a Likert scale with a range of scores from most important to least important. Variables were framed according to four questions. For the traditional variables, two questions were asked: Question 1—Rate these topics according to their level of importance for your first post-graduate job; and Question 2—Rate these topics according to their level of importance to your job today. For the new variables, identical questions were asked in Question 3 and Question 4. Varying the time sequence would allow respondents to reflect on their past and present experiences, as well as allow identification with program graduates in the future.

Sampling plan design. Our respondents were exclusively program graduates identified through an email list provided by our university's

alumni association. Calls for participation were additionally issued on social media, including FaceBook, Twitter, and LinkedIn. Using the platform SurveyExpressions, we provided links to the survey in all participation requests. Design followed best practices as identified by Don Dillman et al. (2009).

IRB approval. NJIT Institutional Review Board (IRB) reviewed and approved the research according to standards set for research at the university.

Sampling plan response rate. While 43 respondents agreed to participate in the survey between October 14, 2013, and November 1, 2013, the response rates varied according to question. For example, the range of graduation dates on the survey extended from 1996 to 2014—the history of the program. On this question “What year did you graduate?” 40 students responded, with the majority ($n = 38$) reporting graduating from 2003 to 2014. Based on this response rate and the fact that the program graduated 132 students during this 11-year period, the total response rate was 30 percent of the total population ($n = 40$ responses).

Following data cleaning only 33 surveys were usable (25 percent) in order to analyze the four main variable questions regarding traditional and new curricular topics. For some questions relating to these variables, the response rate fell according to the question answered. For instance, in Table 1, 30 respondents answered questions on the importance of problem solving, personal traits, technology, and writing and editing to their first post-graduate job. In Table 2, 33 respondents replied to the importance of the new variables to students’ first post-graduate jobs while 32 respondents replied on these variables as they related to their importance to jobs today. These total numbers were then used to produce the traditional and new variable correlations in Table 3 and Table 4, respectively. While the rate of response was not reported by Barker (2012), our sample size is similar to that reported by him.

Descriptive analysis. While only two students reported that they graduated in 1999 and 2000, the other 38 reported graduating after 2003. While graduates were employed in a variety of first jobs after graduation, the largest ($n = 11$, or 28 percent) were employed as technical writers (BLS SOC 27-3042). The next largest two groups ($n = 3$, or 8 percent) were editors (SOC 27-3041) and those who held job titles in education, training, and library operations (SOC 25-0000). Other professions were spread among 49 SOC codes, with no other distinct group pattern. Similar patterns held in their present job titles. The largest ($n = 10$, or 25 percent) were employed as technical writers. The next largest two groups ($n = 3$, or

8 percent) were editors and computer and information system managers (SOC = 11-3021). Asked if they had ever worked in the technical communication profession, 85 percent (n = 34) answered yes; asked if they were employed in technical communication at the time of the survey, 68 percent (n = 27) reported that that they were. Graduates (n = 33 on this question) reported that they were very well prepared (n = 7, or 21 percent) or well prepared (n = 18, or 55 percent) for their first post-graduate job. They also reported that they very strongly agreed (n = 7, or 21 percent) or strongly agreed (n = 14, or 42 percent) that their degree remained important to their work today.

Responses to questions asking graduates to rate the traditional topics (or variables) according to their level of importance for their first post-graduate job (Question 1) and rate these topics according to their level of importance to their jobs today (Question 2) are provided in Table 1.

Table 1: Descriptive Measures: Traditional Variables (n = 30-31)

	Most Important (1)	Important (2)	Σ 1+2	Somewhat Important (3)	Somewhat Unimportant (4)	Least Important (5)	M SD
VARIABLE (respondents)							
Importance to First Post-Graduate Job							
1. Collaboration (31)	29% (9)	29% (9)	58% (18)	23% (7)	13% (4)	6% (2)	2.38 (1.22)
2. Team Work (31)	32% (10)	32% (10)	64% (20)	16% (5)	13% (4)	7% (2)	2.29 (1.24)
3. Document Design (31)	48% (15)	19% (6)	67% (21)	10% (3)	10% (3)	13% (4)	2.19 (1.47)
4. Interpersonal Communication (31)	39% (12)	26% (8)	65% (20)	26% (8)	6% (2)	3% (1)	2.09 (1.11)
5. Oral Communication (31)	32% (10)	39% (12)	71% (22)	16% (5)	13% (4)	0% (0)	2.09 (1.01)
6. Problem Solving (30)	63% (19)	17% (5)	80% (24)	14% (4)	3% (1)	3% (1)	1.67 (1.06)
7. Personal Traits (30)	23% (7)	37% (11)	60% (18)	30% (9)	3% (1)	7% (2)	2.33 (1.09)
8. Work Skills (31)	48% (15)	23% (7)	71% (22)	23% (7)	3% (1)	3% (1)	1.9 (1.08)
9. Specialized Expertise (31)	48% (14)	21% (6)	69% (20)	21% (6)	3% (1)	7% (2)	2.0 (1.22)
10. Technology (30)	43% (13)	27% (8)	70% (21)	17% (5)	10% (3)	3% (1)	2.03 (1.16)
11. Writing and Editing (30)	60% (18)	30% (9)	90% (27)	0% (0)	3% (1)	7% (2)	1.67 (1.12)
12. Rhetoric (31)	16% (5)	23% (7)	39% (12)	35% (11)	16% (5)	10% (3)	2.81 (1.94)

Importance to Job Today							
1. Collaboration (31)	36% (11)	32% (10)	68% (21)	13% (4)	13% (4)	6% (2)	2.23 (1.26)
2. Team Work (31)	36% (11)	32% (10)	68% (21)	13% (4)	13% (4)	6% (2)	2.23 (1.26)
3. Document Design (30)	50% (15)	10% (3)	60% (18)	17% (5)	17% (5)	6% (2)	2.2 (1.39)
4. Interpersonal Communication (31)	48% (15)	26% (8)	74% (23)	13% (4)	10% (3)	3% (1)	1.94 (1.15)
5. Oral Communication (30)	37% (11)	33% (10)	70% (21)	13% (4)	17% (5)	0% (0)	2.1 (1.09)
6. Problem Solving (31)	55% (17)	25% (8)	80% (25)	10% (4)	10% (3)	0% (0)	1.74 (.99)
7. Personal Traits (30)	30% (9)	40% (12)	70% (21)	16% (5)	7% (2)	7% (2)	2.2 (1.57)
8. Work Skills (30)	53% (16)	20% (6)	73% (22)	17% (5)	3% (1)	7% (2)	1.9 (1.21)
9. Specialized Expertise (30)	53% (16)	23% (7)	76% (33)	10% (3)	7% (2)	7% (2)	1.9 (1.24)
10. Technology (31)	55% (17)	26% (8)	81% (25)	6% (2)	10% (3)	3% (1)	1.81 (1.38)
11. Writing and Editing (31)	61% (19)	29% (9)	90% (28)	0% (0)	3% (1)	7% (2)	1.65 (1.11)
12. Rhetoric (30)	33% (10)	17% (5)	50% (15)	30% (9)	7% (2)	13% (4)	2.5 (1.38)

Analysis is meaningful when attention is given to the first two responses in which Likert scale 1 and 2 categories are combined ($\Sigma 1+2$). In terms of their first post-graduate job, respondents reported that these 12 traditional variables were most important or important from a range of 39 percent for rhetoric (16 percent plus 23 percent) to 90 percent for writing and editing (60 percent plus 30 percent). The mean score of the 12 traditional variables reveals that the respondents believed that 67 percent of these topics ($SD = 12.32$) were above the level of somewhat important to their first jobs. Overall, the mean score of these variables when considered in terms of first post-graduate job ranged from a low of 2.81 percent for rhetoric to a high of 1.67 percent for writing and editing and problem solving. Notably, no variable received a mean score of 3 or above, a sign of declining importance.

In terms of the importance of their jobs today, respondents reported that these variables were most important or important from a range of 50 percent for rhetoric to 90 percent for writing and editing. The mean score of the traditional variables reveals that the respondents believed that 72 percent of these traditional topics ($SD = 10.3$) were above the level of

somewhat important to their first jobs. Overall, the mean score of these variables when considered in terms of their jobs today ranged from 2.5 percent for rhetoric to 1.65 percent for writing and editing. No variable received a mean score of 3 or above.

In a test of mean differences between the traditional variables in their importance to their first job ($M = 2.12, SD = .316$) and importance to their job today ($M = 2.03, SD = .249$), a statistically significant difference was observed (two sample t-test, $t(60) = 2.58, p < .01$). Thus, there is evidence that the variables lost value over time in terms of respondents' perception of importance.

Responses to questions asking graduates to rate the new topics (or variables) according to their level of importance to their first post-graduate job (Question 3) and to rate these topics according to their level of importance to their jobs today (Question 4) are provided in Table 2.

Table 2: Descriptive Measures: New Variables (n = 32-33)

	Most Important	Important	$\Sigma 1+2$	Somewhat Important	Somewhat Unimportant	Least Important	M
	(1)	(2)		(3)	(4)	(5)	SD
VARIABLE (respondents)							
	Importance to First Post-Graduate Job						
1. Project Planning (33)	36% (12)	36% (12)	72% (24)	25% (8)	3% (1)	0% (0)	1.94 (.86)
2. Project Analysis (33)	39% (13)	27% (9)	66% (22)	31% (10)	0% (0)	3% (1)	2.0 (1.0)
3. Solution Design (33)	36% (12)	46% (15)	82% (27)	15% (5)	0% (0)	3% (1)	1.87 (.89)
4. Organizational Design (33)	33% (11)	36% (12)	69% (23)	28% (9)	3% (1)	0% (0)	2.0 (.87)
5. Written Communication (33)	61% (20)	30% (10)	91% (30)	0% (0)	6% (2)	3% (1)	1.61 (.99)
6. Visual Communication (33)	61% (20)	30% (10)	91% (30)	0% (0)	3% (1)	6% (2)	1.64 (1.08)
7. Content Development (33)	64% (21)	21% (7)	85% (28)	3% (1)	6% (2)	6% (2)	1.69 (1.18)
8. Content Management (33)	49% (16)	27% (9)	76% (25)	15% (5)	6% (2)	3% (1)	1.87 (1.08)
9. Final Production (33)	36% (12)	36% (12)	72% (24)	22% (7)	3% (1)	3% (1)	2.0 (1.0)

Importance to Job Today							
1. Project Planning (32)	44% (14)	34% (11)	78% (25)	16% (5)	6% (2)	0% (0)	1.84 (.92)
2. Project Analysis (32)	44% (14)	22% (7)	66% (21)	28% (9)	6% (2)	0% (0)	1.97 (.99)
3. Solution Design (32)	41% (13)	31% (10)	72% (23)	22% (7)	3% (1)	3% (1)	1.97 (1.03)
4. Organizational Design (32)	34% (11)	34% (11)	68% (22)	22% (7)	10% (3)	0% (0)	2.06 (.98)
5. Written Communication (32)	72% (23)	16% (5)	88% (28)	6% (2)	0% (0)	6% (2)	1.53 (1.07)
6. Visual Communication (32)	53% (17)	28% (9)	81% (26)	13% (4)	3% (1)	3% (1)	1.75 (1.01)
7. Content Development (32)	59% (19)	16% (5)	75% (24)	16% (5)	3% (1)	6% (2)	1.81 (1.20)
8. Content Management (32)	47% (15)	19% (6)	66% (21)	16% (5)	6% (2)	12% (4)	2.19 (1.42)
9. Final Production (32)	41% (13)	19% (6)	60% (19)	25% (8)	9% (3)	6% (2)	2.21 (1.26)

Again, attention is given to the first two responses in which Likert scale 1 and 2 categories are combined ($\Sigma 1+2$). In terms of their first post-graduate job, respondents reported that these nine new variables were most important or important ranged from 66 percent for project analysis to 91 percent for both written communication and visual communication. Respondents reported that 78 percent of these new variables ($SD = 9.38$) were above the level of somewhat important to their first jobs. Overall, the mean score of these new variables when considered in terms of first post-graduate job ranged from a low of 2.0 for project analysis, organizational design, and final production to a high of 1.61 for written communication. Notably, no variable received a mean score of 3 or above, a sign of declining importance.

In terms of their jobs today, respondents reported that these new traits were most important or important ranged from 60 percent for final production to 88 percent for written communication. The mean score of the traditional variables reveals that the respondents believed that 71 percent of these traditional topics ($SD = 9.17$) were above the level of somewhat important to their first jobs. Overall, the mean score of these variables when considered in terms of job today ranged from 2.21 percent for final production to 1.53 percent for written communication. No variable received a mean score of 3 or above.

In a test of mean differences between the new variables in their importance to first job ($M = 1.85, SD = .159$) and importance to job today ($M = 1.93, SD = .218$), no statistically significant difference was observed (two sample t-test, $t(60) = 1.65, p = .10$). Thus, there is no evidence that the variables gained or lost value over time in terms of respondents' perception of importance.

Inferences from descriptive findings. While graduates hold a variety of present jobs, the largest group is in the field of technical communication. Seventy six percent of graduates reported that they were prepared at a level above average for their first post-graduate jobs, and 63 percent reported their degree was relevant today.

The concept of relevance is further demonstrated by Questions 1 through 4. In terms of the importance of first post-graduate jobs (Question 1), the traditional variables are above the 50 percent level in terms of relevance as most important or important, with the single exception of rhetoric. Among the nine variables, writing and editing is clearly most important. In terms of the importance of these traditional variables to present jobs (Question 2), each of the variables is above the 50 percent level. The importance of writing and editing remains paramount. However, there is evidence that the variables, taken together, lost value over time.

Among the new variables, written communication and visual communication are clearly the most important (Question 3). In terms of their relevance for jobs today (Question 4), these two variables continued to hold the most important positions. All variables held value above the 60 percent level for both first post-graduate jobs and jobs today. In addition, the new variables remained stable over time.

In summary: In terms of first post-graduate job, our graduates reported that the traditional variables that drove their master's program were valuable, but they declined in importance over time at statistically significant levels. In terms of their first post-graduate job, our graduates reported that the new variables did not change over time in their level of importance. If a single word is used to capture the essence of the survey responses when descriptively analyzed, it would have to be fluidity. While some variables remain of consistent importance, others shift over time. A model that is fluid will allow students to envision a curriculum that is responsive to change.

Correlation analysis. For the purpose of the present analysis, these interpretive ranges were used for statistically significant correlations: high positive correlations = 1.0 to 0.70; medium positive correlations = 0.69 to 0.30; and low positive correlations = 0.29 to 0.00. A companion to Table 1,

Table 3 presents correlations of the traditional variables of Question 1 (shaded in top of table) and Question 2 (unshaded in bottom of table).

Table 3: Correlation of Traditional Variables: Importance in First Post-Graduate Job [FJ] (n = 30-31) and Importance to Job Today [JT] (n = 30-31)

VARIABLES	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Collaboration	FJ→ JT↓	.93**	.42*	.81**	.53**	.63**	.52**	.63**	.56**	.3	.41*	.21
2. Teamwork	.92**	FJ↑ JT↓	.26	.78**	.56**	.57**	.59**	.60**	.59**	.16	.21	.17
3. Document Design	.44**	.32	FJ↑ JT↓	.46**	.28	.41*	.19	.41*	.44*	.66**	.43**	.17
4. Interpersonal Communication	.68**	.63**	.41*	FJ↑ JT↓	.80**	.61**	.56**	.71**	.68**	.37*	.43*	.31
5. Oral Communication	.63**	.66**	.37*	.89**	FJ↑ JT↓	.31	.55**	.56**	.48**	.17	.13	.51**
6. Problem Solving	.74**	.66**	.45*	.65**	.62**	FJ↑ JT↓	.51**	.81**	.77**	.66**	.78**	.15
7. Personal Traits	.54**	.63**	.21	.62**	.69**	.58**	FJ↑ JT↓	.63**	.55**	.23	.16	.23
8. Work Skills	.74**	.67*	.51*	.82*	.79**	.83**	.73**	FJ↑ JT↓	.85**	.58**	.49**	.37*
9. Specialized Experience	.66**	.59*	.46*	.75**	.74**	.67**	.74**	.93**	FJ↑ JT↓	.59**	.45*	.14
10. Technology	.45*	.27	.62**	.49**	.45*	.66**	.31	.71**	.67**	FJ↑ JT↓	.74**	.23
11. Writing and Editing	.47**	.27	.46*	.53**	.45*	.76**	.24	.58**	.47**	.74**	FJ↑ JT↓	.01
12. Rhetoric	.26	.15	.19	.36*	.42*	.29	.28	.42**	.34	.4*	.17	FJ↑

* $p < .05$

** $p < .01$

In general, correlations are medium-to-high at statistically significant levels in terms of the value of the traditional variables in first post-graduate jobs. While there are cases where no statistical significance exists, there is a notable absence of low correlations. The variable of work skills demonstrated medium-to-high statistically significant correlations with all other variables, while rhetoric demonstrated the least number of statistically significant correlations. In terms of importance to job today,

the traditional variables retained medium-to-high statistically significant correlations. Again, there are few non-statistically significant relationships and no low statistically significant correlations. The variables of interpersonal communication, oral communication, and work skills demonstrated medium-to-high statistically significant correlations with all other variables, while rhetoric again demonstrated the least number of statistically significant correlations.

A companion to Table 2, Table 4 presents correlations of the new variables of Question 3 (shaded in top of table) and Question 4 (unshaded in bottom of table).

Table 4: Correlation of New Variables: Importance to Student First Post-Graduate Job [FJ] (n = 33) and Importance to Job Today [JT] (n = 32)

VARIABLES	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Project Planning	FJ→ JT↓	.76**	.64**	.54**	.44**	.41**	.5**	.53**	.43*
2. Project Analysis	.8**	FJ↑ JT↓	.7**	.51**	.28	.29	.29	.46*	.56**
3. Solution Design	.54**	.7**	FJ↑ JT↓	.56**	.61**	.7**	.64**	.66**	.74**
4. Organizational Design	.48**	.59**	.77**	FJ↑ JT↓	.58**	.57**	.64**	.63*	.58**
5. Written Communication	.48**	.47**	.65**	.55**	FJ↑ JT↓	.9**	.8**	.59**	.66**
6. Visual Communication	.58*	.5**	.7**	.53**	.8**	FJ↑ JT↓	.88**	.65**	.63**
7. Content Development	.56**	.48**	.65**	.58**	.75**	.83**	FJ↑ JT↓	.85**	.53**
8. Content Management	.57**	.57**	.53**	.41**	.5**	.7**	.81**	FJ↑ JT↓	.52**
9. Final Production	.39*	.62**	.7**	.61**	.57**	.67**	.47**	.51**	FJ↑

* $p < .05$

** $p < .01$

In terms of relevance of these new variables to first post-graduate jobs, the correlations are medium-to-high at statistically significant with

the exception of project analysis. All of the other variables are related at statistically significant levels. Regarding today's jobs, correlations are medium-to-high at statistically significant. Remarkably, all variables are correlated.

Inferences from correlational findings. The traditional variables are generally cohesive in terms of first post-graduate jobs and importance of jobs today. The new variables, however, are exceptionally inter-related. Indeed, when the descriptive statistics from Tables 1 and 2 are considered, it is apparent that the new variables are perceived as more relevant to, and more integrated with, first jobs and jobs today than are the traditional variables that our graduates experienced in their course work. While there differences between variable sets, the continued relevance of written communication remains evident.

This relevance is borne out through linear regression analysis that considers written communication as the dependent variable (Y) and each of the other eight variables in the new model as independent variables (X). In terms of first post-graduate job, analysis reveals that 86 percent of the variance is accounted for by the model ($R^2 = 0.86$, $F(8, 24) = 18.10$, $p < .001$). In terms of importance to job today, the model accounts for 75 percent of the variance ($R^2 = 0.75$, $F(8, 24) = 8.4$, $p < .001$).

In summary: In terms of first post-graduate jobs and importance of jobs today, our students reported that the traditional variables held together in a cohesive fashion. In terms of their first post-graduate job and their job today, our graduates reported that the new variables were more strongly related. Among the new variables, a regression model that takes written communication as the sole outcome proves to be an extraordinarily high predictor of skills needed for both first job and job today. If a single word is used to capture the essence of the correlations, it would have to be cohesion. A model that is interrelated at medium-to-high levels will allow students to envision a curriculum that is unified. The generalization inference of our traditional and new variable models suggests that the construct of technical communication shifts; as such, conclusions regarding construct coverage will change over time.

Heuristic for Interpretive Program Design: Stakeholder Networks

In the global environment described by OECD (2014), speed and flexibility are more in demand than ever before thanks to an accelerating knowledge economy and sophisticated communication networks (Spinuzzi, 2015). Moving away from document-based information development, our students will likely use digital collaboration platforms

and participate in online meetup groups to get work done (Johnson, 2015). Traditional technical writing skills as well as a disposition toward flexibility, independence, and strategic thinking are the order of the day, according to the managers who hire our graduates (Kimball, 2015). Technical communication pedagogy is changing apace. Any framework for assessment must provide a process for nimble interpretation, one that can be adapted for contingency and local problem solving while providing inferences that facilitate fair action through valid practice. Further, these new frameworks must allow programmatic research to be presented in meaningful ways to members of the field, university administrators, and individuals and institutions outside of academia.

Heuristics are often a way to navigate complex and contingent situations such as the one described in the case study. In recursive fashion, heuristic thought connects abstract theories to concrete practices; that is, this kind of thinking allows problem solvers to shift their thinking from broad, intuitive concepts to strategic, practical applications (Johnson-Eilola & Selber, 2004; Kahneman, 2011). In this case, we have used the DFA framework to generate heuristics as a series of broad foundational and practical questions that, in turn, are made specific by focusing on unique programmatic aims, outcomes, and mission. An extension of Figure 1, Table 5 provides a starting point for considerations by major networks of stakeholders in assessment: students, program instructors, program administrators, and workforce leaders. As Chris Gallagher (2011) has emphasized, attention to these networks “allows us to confront the dangers, limitations, and affordances” of the social and logical structures that constitute our society (p. 465). Answers to the questions facilitate agentic roles for each stakeholder network that, in turn, enrich the DFA interpretive framework through diverse perspectives.

Table 5: Heuristic Questions: An Interpretive Assessment Framework for Technical Communication

	Considerations for Students	Considerations for Program Instructors	Considerations for Program Administrators	Considerations for Workforce Leaders
Consequence	How will the assessment results be used to draw inferences about the individual student's ability as well as success of specific student groups?	How can various sources of evidence be used to provide information for instruction across the entire curriculum?	How can administrators use constructive alignment to map the institutional mission statement to program outcomes as they are instantiated in performance assessment?	How are professional viewpoints from workforce leaders and program alumni used in curricular transformation and program assessment?
Research	How are the answers to what we value, gained from theory and research, brought into the cycle of assessment and learning at the level of the individual student?	Have instructors been encouraged to think of themselves as researchers, collecting evidence for best practices and advancing the body of knowledge for the field?	How can administrators facilitate programs of research focused on the scholarship of teaching and learning?	How can workforce leaders who hire program graduates contribute to program design and assessment innovation?
Communication	How are program objectives clearly communicated to students so they understand what they are to achieve and the relevance of that achievement?	Have barriers to defining criteria and key terms of assessment been identified and negotiated to achieve the aim of transparency?	How can tensions between administrative demands and programmatic research become open dialogue?	If internships or service learning are program goals, how could reports from these experiences help provide evidence of professional pathways?

<p>Localism</p>	<p>How is the curricular design made relevant to individual student majors?</p>	<p>How are program development initiatives planned to advance the professional development of instructors so they may keep up to date in the latest technological innovations and market demands?</p>	<p>How can resources be shared across academic and geographic boundaries so that opportunities are increased for instructors and students?</p>	<p>How can workforce leaders leverage local and regional needs to create unique programs that will, in turn, yield national and international attention?</p>
<p>Documentation</p>	<p>How may an EPortfolio demonstrate meaningful engagement of program objectives and document the student's preparation for graduation and career success?</p>	<p>Will instructors share syllabi, tasks, and grading criteria to ensure that proven practices for achieving programmatic goals are transferred within and across the curriculum?</p>	<p>How will inter-institutional collaboration be encouraged through legacy documents such as assessment reports from benchmark institutions to foster growth of programmatic research?</p>	<p>What role might be served by external review of student EPortfolios by workforce leaders and program alumni?</p>
<p>Accountability</p>	<p>How might students demonstrate a professional identity that is contemporary and unique in ever changing global markets?</p>	<p>How is accountability understood by instructors in terms of teaching, research, service, and economic development as part of the institutional mission?</p>	<p>How will administrators ensure that hiring, staffing, tenure, promotion, and professional development practices are sufficient to ensure student success?</p>	<p>How have reporting processes been designed so that outcomes are used to address workplace as well as academic needs?</p>

Sustainability	Will the framework of the program stand the test of time, yielding immediate and future career success of it students?	How are instructors encouraged to view their teaching as research-based and longitudinally-centered?	Has sufficient investment been made in the program to ensure its success within shifting economic conditions?	How can annual review by external advisory boards provide enduring connections to non-academic settings for students, instructors and administrators?
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While the questions stress agentic roles for each stakeholder network, they also distribute the responsibility for programmatic research applied to program assessment. For example, in terms of consequence, program administrators are charged with implementing constructive alignment (Biggs & Tang, 2011). As an integrated instructional and assessment framework used to map learning activities to outcomes, administrators can use constructive alignment to link learning activities at the level of institutional mission to the syllabus at the level of the course. Such mapping allows those involved in assessment to document the ways that the program uses available resources to advance student learning so that, in turn, the range of inferences is enriched regarding student performance. Once administrators take on this active role, coursework for students become defined, instructors began to see their work as research providing evidential information, and workforce leaders begin to see their roles as more consequential than cosmetic. In terms of each center of evidence, heuristics allow meaningful distribution of responsibility and precise, actionable direction. The extrapolation inference of our heuristic questions suggests that the shifting construct of technical communication is best understood by involving a wide variety of stakeholders. By providing historical, theoretical, and contextual evidence, we have attempted to demonstrate that program assessment is an ideal vehicle for programmatic research. The evidence-centered DFA framework we have featured provides opportunities for future program researchers.

To close our proposal for an interpretive framework for program assessment in technical communication, we have asked the current program director, Andrew Klobucar, to provide a reflective statement on efforts thus far and to identify new directions for the future of graduate study in our field. Sustainability in program assessment is important as one generation of researchers departs the assessment scene and others

take their place at center stage. Following is the postscript of our new program director.

PostScript: New Director, New Directions

To complement the analysis of program assessment and its impact on online learning in technical communication offered by my colleagues, I would like to discuss the recent emergence and nature of new socially constructed learning environments, noting specifically how they helped me test the fit of the variable model shown in Figure 2 in relation to a massive open online course (MOOC). I then want to conclude the paper with a focus on alignment and comment briefly on that which lies ahead for graduate instruction in technical communication.

Responsiveness

The early 21st century saw dramatic improvements in content delivery in online education through the transition to broadband and fiber-optic networks along with important usability enhancements in web interfaces and page design formats. Faster and more reliable distribution technologies helped refine course delivery on many levels, while paving the way for the more essential, paradigm-shifting developments in professional communication we attribute to social networking software like Twitter, YouTube and Facebook, released between 2005 and 2006. With the media enhancements brought on by these later tools, however, the web moves from a means for networked communication to what contemporary cultural theorists call “platformed sociality” (van Dijck, 2013).

These same developments sponsor many of the profound transformations we continue to witness in education-related digital network technologies today. In general, we can see that the social media enhanced web has done much in just a single decade to refine online networks into serious tools of academic instruction; the very first peer-reviewed publications on digital modes of curriculum design, course delivery and general pedagogy have appeared only recently in 2008 (Liyaganawardena, Adams, & Williams, 2013). Assessment research is obviously crucial to these developments, as many of the same tools and learning management system enhancements that helped to improve the web’s capacity to nurture connections and build communities also provide the means to collect and process in real-time a uniquely rich array of data regarding online course-related student behavior, interpersonal conduct, and human performance.

MOOC Field Test

By 2015, MS·PTC courses in social media were supported with supplementary modules in instructional design, user experience (UX) and universal design learning (UDL). Many of the core tasks could be delivered through a MOOC run in tangent to the program's central learning management system (LMS). In line with several of the program's new core competencies, these modules could showcase collaborative, peer-driven activity around larger project-based ventures, and in doing so, required the ongoing refinement of the variable model shown in Figure 2 and its assessment framework shown in Figure 1.

The MS·PTC MOOC "The Strategic Communicator's Toolkit," developed and hosted on the Canvas LMS (registered as CN-1875-TOOLKIT), was open to enrollment from September through October 2015 with initial course assignments made available the first week of October.

Enrollment

Enrollment had reached just over 400 students by the course's opening date of October 5, 2015, with approximately 150 additional students joining the projects by the end of the first month for a total peak enrollment of 589 students. Of these participants, one of several exit surveys showed that 55 percent were women, with almost 60 percent of all learners currently living in either North America or Western Europe, half of whom spoke English as their primary language. The solid majorities in these categories give us a fairly consistent portrait of the contemporary MOOC learner.

She is a native English speaker living in a developed western country with an interest in professionalization and current information and communication technologies. Additional survey results provide an even more interesting portrait regarding this learner's highest level of education achieved. Although the MOOC course was offered in conjunction with our MS·PTC program, 39 percent of respondents indicated that they already held master's degrees, while 8 percent had completed doctoral programs, including medical or law degrees. Factoring in those learners who were either currently enrolled in a graduate program at a degree granting institution or at minimum held a four-year college degree, our survey shows us that a full 79 percent of all participants were college educated. This high level of education coincided well with the average age of our respondents, showing, as it did, that 74 percent of these learners were over the age of 35, with just over 30 percent between 45 and 54, and 18 percent between 55 and 64.

The older age of the MOOC’s participants, combined with their relatively high levels of education, guaranteed advanced levels of discussion and task management within all the modules.

Alignment

The MS-PTC MOOC “The Strategic Communicator’s Toolkit” consisted of four major modules, each one organized around a single theme and a set of related topics currently considered critical to the field of professional communication in both high technology and digital media firms. The modules were designed to be completed in one week and, although offered consecutively, were left fully accessible for the duration of the course in support of a heutagogical approach to learning. These assignments—and their alignment to the new variable model shown in Figure 2, Table 2, and Table 4—are shown in Table 6.

Table 6: MOOC Field Test of New Variables

New Variable Model	Aligned MOOC Course Module	MOOC Course Content	Future MS-PTC Considerations
1. Project Planning	Module 1: Communication Module 2: Simplicity	General history and principles of communication theory Concept mapping leading to improved collaborative communication Organizational methods in collaborative project organization	➤ Continue to develop and feature project oriented tasks.
2. Project Analysis	Module 3: Feedback	Value of revision, interaction, and dialogue Techniques to solicit strong feedback, open up negotiations, and build communal interaction	➤ Develop new project planning based competencies, along with enhanced opportunities for project analysis emphasizing design and implementation.
3. Solution Design	Module 2: Simplicity Module 3: Feedback	Methods and tools designed to facilitate near instantaneous peer-review and critical commentary on group assignments and tasks	➤ Develop new opportunities for engagement in collaborative solution design, as well as assignments intended to develop techniques in feedback and forum discussions.

<p>4. Organizational Design</p>	<p>Module 2: Simplicity</p> <p>Module 4: Leadership</p>	<p>Social media and augmented reality technologies to organize and manage group situations</p> <p>Leadership skills through established communication and collaboration techniques, with particular emphasis on agile project management methods</p>	<p>➤ Develop new social media and augmented reality assignments intended to establish collaborative and leadership techniques.</p>
<p>5. Written Communication</p>	<p>Module 1: Communication</p> <p>Module 2: Simplicity</p>	<p>Familiarity and fluency in using screen-based, digital communication technologies/media</p> <p>Techniques and tasks in peer-review assessment and commentary</p>	<p>➤ Continue opportunities for formal writing as well as development of stronger, more persuasive rhetorical voices in written communication.</p>
<p>6. Visual Communication</p>	<p>Module 1: Communication</p> <p>Module 2: Simplicity</p>	<p>Survey of the development of screen-based, digital visual communication technologies</p> <p>Visual presentation skills and technologies</p> <p>Use of software to record and edit a video for online distribution</p>	<p>➤ Develop new opportunities for video-based production, as well as advanced graphic design skills.</p>
<p>7. Content Development</p>	<p>Module 2: Simplicity</p> <p>Module 3: Feedback</p>	<p>Instruction and management techniques in the context of adapting personal expertise to direct a new project</p> <p>Methods to condense and share information within a group with multiple skills and backgrounds</p>	<p>➤ Develop new opportunities for content produced off-line to be incorporated into the LMS.</p>

<p>8. Content Management</p>	<p>Module 2: Simplicity</p> <p>Module 3: Feedback</p> <p>Module 4: Leadership</p>	<p>Methods and tools to help professional communication managers organize and distribute content through sharable archives and catalogues</p> <p>Techniques to design and promote related project campaigns</p> <p>Methods and tools to help professional communication managers build augmented reality archives for projects managed in multiple locations</p>	<p>➤ Develop new opportunities for management executed off-line to be incorporated into the LMS.</p>
<p>9. Final Production</p>	<p>Module 4: Leadership</p>	<p>Emphasis on the collective nature of each assignment and strategies of professional media producers adept at working in collaborative settings</p> <p>Focus on strong leadership needs in communication projects, with particular emphasis on augmenting existing strengths and inspiring others in shared enterprises</p> <p>Methods to help project managers define boundaries and provide direction when needed</p>	<p>➤ Develop new opportunities for increased integration of learner-based activities with instructor led assignments leading to a final product.</p>

Looking at Table 6 in some detail, we can see specifically how individual learning outcomes as well as task and topic-based directives are able to address the nine competencies outlined in the new variable

model. The first four competencies—project planning, project analysis, solution design and organizational design—together accurately frame the primary learner project around which the MOOC is actually constructed. As learners work through each of the modules of communication, simplicity, feedback and leadership, they will simultaneously be in the process of organizing, designing, and implementing a team-based social media campaign, either promotional or educational in its aims, based on a corporate or community-based assignment of their own imagining. Central to the success of MOOCs as learning environments is their distinctive capacity to align contemporary professional, expertise-driven situations and issues with practical tasks and activities. “The Strategic Communicator’s Toolkit” required learners to build and then actively incorporate that exact instrument into their major project: a communicator’s toolkit. The course content was accordingly built around this primary objective. Learners were encouraged to use and gain experience with an array of different contemporary online media tools by adapting them to a strategic communication project that they individually devised and then constructed. Thus, the next five competencies—written communication, visual communication, content development, content management, and final production—were brought into play as the MOOC progressed.

Future Considerations

As illustrated in Table 6, the course content developed for the MOOC generally supported the new variable model, while referencing key learner outcomes associated with the model’s nine competencies. Just as significantly, multiple learner surveys conducted during and immediately following the course’s initial run indicate several areas of alignment between learner attitudes of MOOC participants regarding these outcomes and those of MS-PTC survey respondents.

To be specific, variables in Table 2 rated by enrolled students as most important to their current jobs and job-related experiences tended to be ranked equally highly by most learners in the MOOC, as may be interpreted through particular questions posed to them regarding their personal and professional motivations for participating in online education programs. (This last qualification should be considered when comparing responses between MOOC and traditional MS-PTC participants because the original survey taken by the program graduates was not taken by MOOC learners.) Nevertheless responses submitted through the MOOC regarding primary learning motivations—along with overall attitudes towards the professional value of the material, tasks, and learning outcomes offered within the program—can be rudimentarily

compared to the earlier MS-PTC survey. Where 56 percent of MOOC participants claimed that their primary motivation for enrolling in such programs was due to their personal enjoyment in learning about the featured topics compared to only 5 percent who participated to learn specific skills, we can conclude through participant work that more comprehensive competencies such as project planning, project analysis, and solution design were appealing. The competency of organizational design, however, suggested less alignment: While MOOC learners expressed a consistently strong regard for all project-based assignments, MS-PTC participants did not rank that variable as most important or important in terms of their jobs today, as demonstrated in Table 2.

In general, MOOC participants were drawn to a coherent, well-integrated set of tasks designed to develop a single, more unitary project. The MOOC surveys also demonstrated an overall high appreciation among participants for each of the module's writing as well as multimedia assignments. This ranking seems to complement the general significance MS-PTC participants attribute to the competencies of written communication and visual communication. When MOOC learners chose to enroll in "The Strategic Communicator's Toolkit," they were clearly looking for distinct opportunities to develop both written and visual communication skills by working with current online communication tools. As Table 6 suggests, written communication should remain central to MS-PTC, with new opportunities identified for students to develop voice and persuasion strategies. Similarly, while visual communication remains important, new opportunities should be developed for video production and advanced graphic design skills. While each of the new variables should be maintained in MS-PTC, particular directions for advancing student learning should be newly considered.

In sum, program directors in the process of guiding graduate program curriculum design in technical communication will no doubt find it beneficial to consider the introduction of the variables, modules, and content identified in Table 6. It is important to recognize that these are manifestations of a particular evidence-based attitude toward programmatic research that lends itself to innovation and change.

Commencement

Use of the DFA interpretative framework—the design, codification, implementation, and revision, and assessment methods—has proven essential to the growth of NJIT's MS-PTC. Use of evidence-centered assessment design has further made it possible to gauge more rigorously what issues matter most to instructors in the design and implementation of their courses.

Granted the last word in my role as the new program director, it seems only fitting to re-emphasize how any sense of an ending in the program's DFA model of assessment signifies first and foremost a new beginning. In documenting their ongoing efforts to maintain a high level of quality assurance in the MS-PTC, one might do well here to recall the critical savvy of my colleagues Nancy W. Coppola and Norbert Elliot in their reference to exigence. While exigence respectfully expresses the often urgent nature of the types of changes and adaptations the field of technical communications routinely undergoes as media technologies continue to advance, one must be careful not to let it obscure the important learning opportunities program assessment can provide as a consistent tool of analysis and evaluation. It will no doubt be perpetually tempting to reduce many of these more recent changes to curricula and administrative practices to an "urgent" need to correct newly perceived imperfections in program identity. At the same time, assessment has provided an unparalleled structured opportunity for research and discovery through careful consideration of the learner's own role in his or her instruction. Exigency itself, as my colleagues demonstrate, must be mitigated by principled action informed by evidence. Their observation of the need for both fluidity and cohesion is especially relevant.

As it is now being re-designed and re-constructed, MS-PTC stands at a particularly important crossroads in its long history of development. The post-print world, suggested as a mere possibility in 1994, has fully arrived. What is especially important to recognize is the centrality of what has been documented in this paper: The challenges the program now faces in its effort to adapt to these new education technologies will soon likely be general to all academic disciplines. Both the professional and social relationship between learners and instructors are in the process of being transformed at a number of levels; while such changes represent significant trials and even difficulties, they also offer important opportunities for student learning within the platformed sociality of our increasingly networked world. To this end, the interpretive framework described in this paper provides a proven and sound way to leverage success, both for ourselves and our students.

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