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Humanistic Communication in Information Centric Workplaces

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ABSTRACT
Professional writers adapt their skills to suit expanded professional roles that involve production and management of information, but preparation through mere skill-based training is problematic because that communication work is messy in ways that are not addressable through simple skills training. We must understand how skills "influence and shape the discursive activities surrounding their use" (Selber, 1994). This paper reports the results of a study of people trained in humanities disciplines like communication, English, writing studies, technical communication, etc., on how they have found means to employ their training in their workplace and keep what is humanistic about writing and communicating at the foreground of their interactions with information technologies. Instead of focusing on technology alone, this research encourages a unified approach to preparing students for the workplace.

CCS Concepts
Social and professional topics → Professional topics → Computing education → Computing literacy

Keywords
Technology literacy, skills, information processing

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INTRODUCTION
The practice of designing communication and the associated professional and academic training in technical and professional communication are frequently connected with discussions of technologies and technological proficiencies (e.g., recently see Brumberger and Lauer, 2015; Carnegie and Crane, 2018; Hovde and Renguette, 2017; Shalamova, Rice-Bailey, and Wikoff, 2018). Although professional communicators and people in the fields who are training them (e.g., English, Writing, and Communication programs) refuse to be thought of simply as skilled users of communication technologies, the development of new tools, such as those in componentized content management (CCM) (Andersen and Batova, 2015; Batova, Andersen, Evia, Sharp, and Stewart, 2016) and structured authoring (e.g., Evia, 2019) continue to prompt, anew, discussions of the place of tools instruction.

The argument over whether learning to design communication requires dedicated instruction about the tools of communication design has often turned on the issue of whether teaching the technology is a turn away from the "humanistic" dimensions of communication, from the concerns of rhetoric (e.g., see Selting, 2002; Selber, 1994) while also acknowledging that movements in industry are requiring writers of all kinds to understand technological trends and their associated practices and epistemologies and to adapt to their use (e.g., Andersen, 2013; Clark and Andersen, 2005). One way to understand this tension takes us back to a question that Carolyn Miller posed about the field of technical writing in late 1970's. She asked: what is the humanistic rationale for technical writing (1979). In answering this (still relevant) question today we must take issue with how professional communicators more broadly see through their tools to the humanistic work that they are doing with them.

In 1979, the focus of Miller's argument was that technical discourse, a kind of lexical and grammatical technology in its own right, was mistakenly understood to be aimed at enabling detachment of the world of technology and science (or other technical realms) from the situations and communities that provided the occasion and motivation for writing. Mastery of those technologies or discourses

effectively separated the technician or writer from the world in which their communications would do some work. Technical discourse was a kind of abstraction from or a tool for stepping away from the messiness of human motivations and situations for writing (1979, p. 613).

What ultimately makes technical writing humanistic, however, is the recognition that all communication is situated in communities (1979, p. 617) and in this case technical discourse is more like a "register" than a technology (see Biber, Conrad, and Reppen 1998, p.135). The same argument can be made of other technological developments in communication design, developments that flatten the world of experience (e.g., see Johnson-Eilola, 2005, p.51) and distance writers from those experiences. For example, technologies like CCM, methodologies like topic-based authoring using XML, and other database-supported authoring, decenters the writer as a communicator and "places the act of writing in a subordinate role to what one might call the act of *directing*" (Dubinsky, 2015, p.127 - italic in original). The trend is one that Albers commented on in 2003, noting that just as "industrialization and mass production methods replaced craftsman production in manufacturing; now single sourcing may be poised to do the same thing for writing" (Albers, 2003, p. 335). And research on emerging (and now commonplace) technologies of communication design frequently ponders where the space for rhetorical judgement and consideration of what makes communication humanistic goes when communicators are working with isolated pieces of content (e.g., Clark, 2008; Sapienza, 2004) that disconnect writers from their own experiential and embodied sense of writing and meaning (e.g., Whittemore, 2007). The matter may remain pertinent the more that communicators develop technical proficiencies (e.g., coding) that do not resemble communication and threaten to distance them or remove them from the realm of human uses of communication.

The most satisfying answers to these debates have focused on the different critical and rhetorical ways that communicators should be thinking about their technologies (e.g., Cargile Cook, 2002; Selber, 2004). These perspectives allow us to look at the ways that people who are trained to see the human elements of communication can adapt those technologies to their workplaces in order to facilitate just those community-based communication practices. Our study arises from a similar motivation. We aim to look at technologies and technological practices that have found their way into the communication design workplace, technologies like programming languages, markup, project management tools, content management systems, data analytics, and more familiar technologies like web applications that have become incorporated into the workplace and how the people who are making use of those tools are connecting with what it is that makes technologically-mediated communication a humanistic practice.

To answer this question, we have used a data analysis approach. A survey was designed to discover the range of complex communication tasks that participants perform in their workplaces. The following discussion begins by setting up an important distinction for thinking about the relationship that communicators have with their technology when designing communication at work. Following this review, we present the methods and results of the survey, which show participants' job positions, their responsibilities at the job, ways in which they use the skills developed through their educational training and the current training gaps in developing workplace writing skills. Next, we analyze interview data which illuminate how patterns in the survey data reflect different humanistic ways of developing communication and being embodied in the situations that call for that communication. Finally, we suggest directions for bridging the gap between training provided and training needs in workplaces.

THE CONTEXT OF WORK

Among others, Rebekka Andersen and Tatiana Batova have argued that one of the most important projects facing educators and scholars in technical communication today is to address the schism between the academy and industry. Together (Andersen and Batova, 2015) and separately (Andersen, 2013; Batova, 2018) the authors argue that the academy and industry have much to learn from each other by sharing methods and problems. But another point of connection concerns the students whom we are preparing to work in industry.

We can look at job descriptions to find out exactly what is relevant in the current industry, but the general skill set has not changed much for 8–10 years. Consistently, studies point to both people skills and technological proficiencies (for example, see Brumberger and Lauer, 2015; Lanier, 2009; Whiteside, 2003) as the abilities that people need to cultivate to adapt to their professions. In particular, we see a similar focus in the growth of the user experience profession (see Brumberger and Lauer, 2015) which broadly addresses how people participate in civic, professional, and social life, as it is mediated by information and communication technologies. To the extent that people must rely on technologies to participate effectively in their communities, we must take into consideration how those technologies or the data they produce represents and engages with human experiences rather than separates the communicator from those experiences. Collectively, these studies hint at the importance of having an adaptive knowledge of information technologies rather than a generic set of tool proficiencies or skills that are transferable across work contexts. The skills people are required to possess should be developed in service of skills with communication, social intelligence and critical thinking (Hibbs, 2017).

By looking at technology skills in the context of communication and critical thinking, it becomes difficult to separate the base technological proficiency from the humanistic activity that they support. This entanglement of motive and means suggests that skills-based learning, which commonly pertains to knowledge that is practical and transferable, is problematic because the world of work is messy in a way that is not addressable through simple skills training (e.g., see Dias, Freedman, Medway, and Pare, 1999). Instead, we must really understand how technologies are used and how those uses "influence and shape the discursive activities surrounding their use" (Selber 1994, p. 366). To continue this conversation about the use of technologies used in designing communication, it would be beneficial to recast such work as technological competency, which extends the idea of technological literacy to include not just the means of participating in a discourse but also a sense of the underlying motivation and aims of that participation, something closer to embodiment in the situations addressed. To understand communication design broadly as a humanistic activity, we need a way to talk about how technological practices are shaped by the anticipation of participation in some social activity. A competency implies a goal or an aim that is shaped by one's motives for acting. We use technologies to accomplish ends, and the degree to which we are successful is a measure of our competency.

In the next section we overview key literature relating to pedagogical

research on technological and information literacy. These areas represent important points on ways in which competencies are being developed in light of the aims of training in communication to address human needs strategically (see Kimball, 2015). To do so, we need to understand the difference between skills and competencies. While examining these topics, we also discuss the difference between technological and information literacy before considering the contribution of our research results to this conversation. We believe that this information is not only helpful for teachers learning pedagogical strategies, but also helpful in understanding how the workplaces have evolved over the last decade, as they become more information centric (see Spinuzzi, 2007; 2008).

SKILLS, LITERACIES, AND COMPETENCIES

Due to rapid changes caused by technological advancements, competency-based training approaches are being discussed in both organizational and educational environments, but until there is a consensus on the meaning of "competence," efforts to identify "key competencies" will invariably lead to confusion (Hunt & Wallace, 1997). Beckett explains that skills and competencies both identify an ability that an individual has acquired through training and experience (Beckett, 2015) but "competency" is a broader concept that encompasses skills. Competencies are made up of three facets: skills, knowledge and abilities (Beckett, 2015). It is through the utilization of skills, ability, and knowledge that one engages in competent action.

Hunt and Wallace pull in research by various scholars, showing that competencies are identifiable and measurable across situations (Hunt & Wallace, 1997). Competency-based education measures how much was actually learned, instead of how much time was spent in a classroom (Gerstein & Friedman, 2016). Students' progress in schools is determined by demonstrating their competence, that is their ability to use the knowledge and skills that they have gained. "Skills" are incorporated into on-the-job behaviors which demonstrate the ability to perform the job requirements competently. Competencies further lead to problem solving abilities, transferable skills, adaptive learning and so on, which results in not just a career, but an overall development of students.

Some literature also points to the "context" which plays a key role in determining competence (Barrow, 1991; Bowden & Masters, 1993). These studies suggest that a key difference between skills, literacies, and competencies is that competencies are both ways of seeing and ways of acting. They incorporate a knowledge of how to act through technology (skill) with an understanding of what is contextually appropriate and with an understanding of what one aims to accomplish. A technological competency is heuristic knowledge, a way of seeing and acting that is shaped by technological knowledge. In information-centric workplaces the humanistic impulse to reflect on, cultivate, and record experience would, expectedly, fuse with technological knowledge to become a way of acting in a technological environment rather than an explicit base of technological skill. Skills and competencies are the prime focus of research in the field of literacy.

With the Internet, technological literacy has become an inseparable part of information literacy. Information literacy, at an early stage of development of the concept, was based on the ability to use information. In 1989, the American Library Association (2000) proposed a six-stage model for information literacy that was comprised of five aspects of a linear process of information handling: recognizing a need for information, identifying what information is needed, finding the information, evaluating the information, organizing the information, and using the information. Because of the Internet, information went online and terms like "network literacy" (McClure, 1994), "informacy" (Neelameghan, 1991), and "mediacy" (Inoue, Naito & Koshizuka, 1997) came into use. This context found its way into Geisler's definition of information literacy that comprises critical thinking, ways of functioning within complex communicative situations, and competence with knowledge assembly (Geisler et al., 2001). In their book, Lankshear & Knobel (2008) describe Gilster's work that sets the challenge of effective use of the internet into the long sequence of adaptation to new information technologies, beginning with the clay tablets of the Sumerian period: "technology demands of us, as it did of them, a sense of possibilities, and a willingness to adapt our skills to an evocative new medium. And that is the heart of information literacy. Our experience of the Internet will be determined by how we master its core competencies." (Lankshear & Knobel, 2008, p. 19). Therefore, although the six-stage model is still effective, due to the digital nature of information, digital literacy is a major influence on information-seeking behavior and the effective satisfaction of information needs. (Fieldhouse & Nicholas, 2008). So, we not only need to develop new technological skills to work with information, but also to associate them with the core competencies of knowledge management and situated, humanistic communication. Gilster termed this ability to understand and use information from a variety of digital sources as "literacy in the digital age." (1997, p. 9).

The question that remains is how communicators develop these literacies in the classroom and how they then develop associated competencies as they move out into different professions. How do communicators who are trained to understand the humanistic qualities of communication apply that training to their acquisition of tool-based knowledge and the application of that knowledge in developing communication at work? Assuming that communicators do retain this humanistic outlook on their technologically-mediated tasks, what can we learn about skills or frameworks that these people are still missing? How are they attempting to address those gaps?

In other words, how are people supported in developing proficiency with technology for humanistic applications? Through this continuation of studies looking at how to reconnect writers with the humanistic work their writing does, we hope to contribute to a discussion of how technologies as diverse as structured authoring, database management, and scripting can be contextualized as part of the humanistic work of communication, even if that work is aimed at directing content and structuring or facilitating human experiences in lieu of commenting on them directly.

METHODS

To explore the humanistic uses of communication technologies at work, we conducted an exploratory study based on observations from an online survey and follow-up interviews with survey participants. During the Spring semester of 2018, a survey was conducted for people who identified themselves as having received training in the humanities. The intent was to recruit participants who were likely to have received instruction that would focus on

social, humanistic dimensions of communication. The survey was circulated through multiple channels; however, most participants belonged to the Society for Technical Communication (STC) and the Association of Teachers of Technical Writing (ATTW), making the majority professional background to be technical communication. Data were collected from 109 survey participants and 20 interviews. Our strategy for participant recruitment did not discriminate between participants from industry or the academy. Both contexts require people to adapt uses of information and communication technologies to design effective, situated communication solutions.

After obtaining IRB approval for this study we recruited participants through email invitations on social media sites, email lists, and Slack channels where we were likely to find people with humanities background. Our solicitation email asked for participants who were trained in the humanities and who used information technologies as part of their daily work.

The final data set consisted of participants that varied in experience, age, educational background, and professional affiliation (Table 1). However, since all participants have an educational background in the field of humanities, the data can still be used to gain useful insights.

Table 1: Demographic breakdown of survey participants

Category	Range
Age	18–24: 11
	25–34: 45
	35–44: 28
	45 and above: 25
Educational Background	High School: 1
	Bachelor's: 12
	Master's: 63
	Doctorate: 33
Professional Affiliation	Academic: 54
	Industry: 55

Analyzing Skills

The survey included questions about the types of technology-assisted tasks performed by participants and their level of comfort interacting with technology (see Appendix A). Questions were based on commonly performed tasks by communication professionals in a workplace. The tasks and their scope are explained below in terms of how that work appears across workplaces. Although the tasks referring to technology were not described in detail for the purpose of surveys, examples were provided which helped participants align their understandings to the fairly broad technology categories that were referred to in the survey.

Writing chunks of content

Often, writing in workplaces refers to working with chunks of multi-use content. Although the rhetorical education in communication studies prepares students for writing this kind of content, they may be engaged with creating content for audiences that they have never before written to (Dush, 2015). Along with that, they are also engaged in tasks like content strategy, content management, or content writing. The necessity of these tasks is to create and manage content by what Johnson-Eilola describes as "breakdown and incessant movement and recombination" of written content to produce what are now called "marketable chunks" (Johnson-Eilola, 2004) used in different industries and domains, including technical communication, marketing and even sales. For example, small chunks of content are used for creating social media posts, blogs and even topics to help customers solve problems that they encounter while using products and services, but they may create further distance between the communicator and the text as the goal of communication turns more toward "directing" content (Dubinsky, 2015). Such needs lead to commodification of content making it a useful skill for business communication students in workplaces.

Analyzing patterns of data

Content analysis is a frequently used skill in the communication workplace. Content analysis is conducted using a set of qualitative and quantitative methods for collecting and analyzing data from verbal, print, or electronic communication. Textual information from interviews, focus groups, and open-ended survey questions can also be analyzed using content analysis. Data analysis is not just about learning how to work with numbers and statistics, but more about "critical thinking." Albers explains that the "goal of data analysis is to critically think about how to reveal the underlying patterns and trends in the data and its connection to the research situation." (2017, p. 230) Although students use communication skills to ask informed questions and conduct thematic analysis, Albers argues that the pedagogical scope for graduate coursework lacks a focus on fundamental critical-thinking processes useful for analyzing quantitative data (Albers, 2017).

Using code for data files

Qualitative coding is a process of reflection and a way of interacting with and thinking about data (Nowell, Norris, White, Moules, 2017). During coding, communication researchers simplify the unstructured datasets and create themes by focusing on specific characteristics of the data. Metadata (information about data), includes characteristics like title, author, keywords and so on. To store metadata, technologies like XML, HTML and JSON are used. These markup languages provide simple ways to save data that do not require programming knowledge, but contextual analysis techniques.

Organizing content

Another skill used for content strategy includes the ability to obtain, organize, store, and deliver content whenever required. Duin and Tham have highlighted the need of code literacy to organize content . While curating content is a practical strategy, it might also be said to lack values that should be at the core of any communication initiative pedagogy (Duin & Tham, 2018).

Digitizing content

A lot of research spaces have taken a digital turn. Research tools and methodologies have evolved and communication workplaces are no exception. Work on digitization supports thorough research on expansive bodies of information or documentation. The outcome of effective digitization is information about the cost, purpose, longevity and use of information. In addition to the skills required for producing information about information are the attendant skills of information management, or coordinating access to and queries of those data sets.

Visualizing data sets

Related to the digitization of content is data visualization, or skill

that uses graphical display of abstract information used for sense-making (also called data analysis) and communication (Few, 2003). Visual representations of scientific data have been central to science communication. Communicators are tasked with establishing links between knowledge and evidence and communicating with audiences through engagement techniques like visualizations.

Developing websites

Online content publishing has become a primary requirement for all professions. Along with that, delivering content in more than one format, to allow single sourcing, is also becoming common. Communicators use technology literacy to create interactive digital experiences for users along with delivering information (Duin & Tham, 2018).

Designing user interactions

Although user interaction is a field closely associated with user experience, which classifies it as a technical communication or psychological field in the social sciences, its relevance in communication and writing studies is significant. Along with products, usability evaluations are also conducted by marketing and sales professionals to evaluate their users. Cross-cultural usability evaluations are on the rise. Conceptual clarity of users' views is generated through a combination of interdisciplinary strategies including personal interactions and participant collaborations.

Finally, to understand their source of discomfort, the survey included a question about the problems survey participants reported having with the technology they used. At the end of the survey, participants were invited to opt in to an interview about their answers. They survey was administered through Qualtrics. All participants were anonymous unless they volunteered to be contacted for a follow up interview. The data resulting from the survey responses were aggregated using the built in analytics provided on the backend of Qualtrics. These data are reported using simple descriptive statistical measures.

Interviews

Similar to the survey, the interview participants varied in experience, technology experiences and professional affiliation. In all, 20 participants were interviewed out of which 9 were from the academy and 11 from the industry. 88% of academic participants worked as faculty or administrative staff and 22% made up of graduate students. A majority (45%) of the interviewees were in the age range of 24–35 years, 35% were between 35–44 years and only 10% belonged to the 40+ and 10% for under 24 years age bracket. These distributions helped in achieving a proportionate representation of the survey data samples. Each interview lasted for 15–20 minutes.

During the interviews, participants elaborated on the ways in which they used technology and described the problems they faced. The interview questions were as follows:

1. You answered Yes/No/Not sure to Question 9 ("Have you encountered problems when using these technologies?). Can you elaborate? Have you/have you not face any issues at work?
2. You mentioned using technology in your workplace. Can you elaborate? When do you need to use it? What was your first encounter? What kind of training did you receive, if any?
3. What accounts for your level of comfort using the technologies that you do?
4. If you use programming languages, which ones and for what purposes?
5. How would you rate the adequacy of the training you receive or seek out for learning technologies you use at work? (1–10, with 10 being highest).

All interviews were either submitted via email as written responses or were conducted on an audio-enabled communication platform like Google Hangouts, Skype or on phone. All interviews were recorded using QuickTime Player and subsequently transcribed for analysis. Analysis consisted of close reading of the responses for similarities of themes across the responses. After identifying themes through close reading, we returned to the literature reviewed above in order to identify any themes related to the humanistic applications of those technologies in communication design. These themes were then connected to details from the participant interviews (see Geisler and Swarts, 2019) that elaborated those humanistic activities and placed them in the context of situated technology use.

Finally, we extracted participant responses about the challenges of learning and maintaining competence with information technologies in order to see where learning gaps might still need to be addressed.

All interviews were transcribed for data analysis. Interview participants were classified into two categories, academia and industry and were assigned IDs to make it easier to trace responses to this potential analytic contrast. The number of interviewees almost equaled between academia and industry. The ratio of interviewees to survey participants suggests a fair representation of all participants. Transcriptions for each category of users were kept in one place, making it easier to compare and contrast the data for observations.

We prepared the transcribed interviews for analysis by following a process of constant comparison for the purpose of theory building by engagement with the source data (see Glaser and Strauss, 1967, pp. 101–115). Initial coding of the transcripts involved examining how the participants discussed their contexts of work. This focus was prompted by our engagement with Miller (1979) and the idea that technical communication in all of its forms would rely on an "understanding of how to belong to a community" (p. 617) and that this understanding would reveal something about how participants used and learned technologies in the context of joining a community.

From the first round of coding, we developed a comprehensive understanding of what the participants understood to be their motives and motivations for using technology as well as the workplace factors that influenced whether and how they were trained to use different technologies. From this comprehensive look at the data, we started to consolidate (or "reduce") the codes to arrive at themes of enculturation and deference to the needs of communities that appeared to be meaningful for how multiple participants thought about their technological experiences (see Glaser and Strauss, 1967, p.110). The themes that accounted for all coded references to communities and technology use/training then became the basis of our qualitative analysis reported below.

RESULTS

The survey data show that with few exceptions participants are utilizing all of the technological skills that we had asked about. The amounts varied a bit by professional affiliation and age categories. On question six, we asked about the frequency with which people access and process information in different ways (Figure 1).

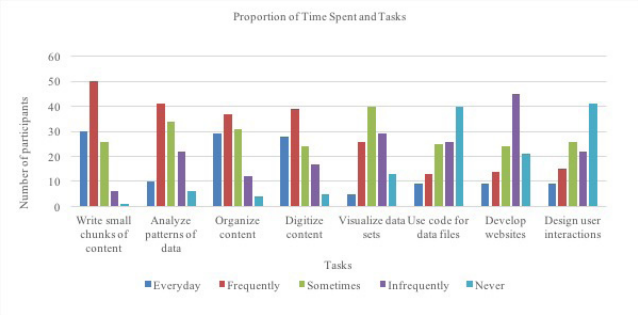

Figure 1: Proportion of time spent with different information processing tasks (all participants)

The most common technological skills practiced among all participants were writing small chunks of content for reuse or collaboration, analyzing patterns in qualitative or quantitative data, organizing content for retrieval by colleagues or users, and digitizing content.

When comparing the responses of participants who identified as academics (e.g., professors, graduate students) or industry professionals, we see some variations in the frequency ("everyday" and "frequently") of engaging in different information processing tasks (see Figure 2) but the data show that both groups engage to some extent with all of these technological skills.

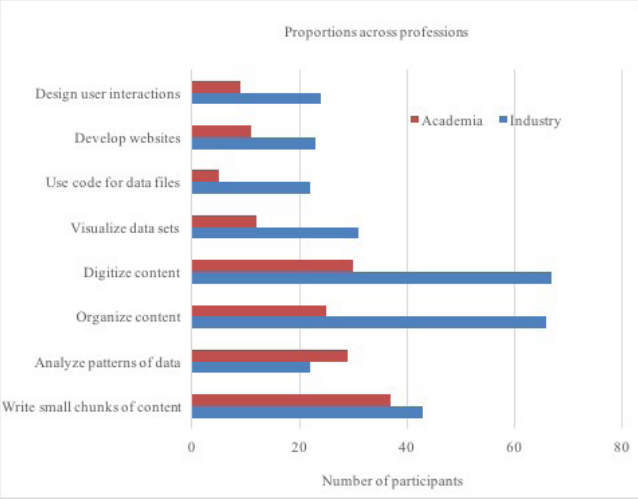

Figure 2: Comparison of academic and industry participants on information processing tasks

The breakdown by profession shows that in nearly all categories, those skills are more likely to be used by professional communicators working in industry. The most notable differences are:

- Analyzing patterns in qualitative or quantitative data: Academics were more likely to do this work "frequently or everyday" (39% compared to 22% of participants in industry).
- Organizing content for retrieval by colleagues or users: Industry participants were more likely to do this work "frequently" or "everyday" (65% compared to 25% for academics).
- Digitize content: Industry participants were more likely to do this work "frequently" or "every day" (66% compared to 30% for academics).
- Visualize data sets: Industry participants were more likely to say they did this work "frequently" or "every day" (31% compared to 12% for academics).

A few (n=24) of the survey respondents noted that they used code to make data files; although, academics reported doing this work sometimes (27%). Industry participants were most likely to either do the work infrequently (25%) or never (33%). Each group had a smaller number of people who did this work more frequently. Similarly, there was less focus on developing websites or designing user interactions with hardware and software.

Although the academic and industry participants practiced these technological skills in different amounts, it is notable that the participants from each group used all of them to some degree. The differences stem from two areas: audience and types of tasks. Both participants use technologies to solve problems. The range of technologies used by academicians have to be accessible to audiences inside and outside of the academy. For example, they learn to develop websites which are visible to researchers in their field as well as students seeking to learn to build websites from them. Further, audiences affect the nature of tasks performed by individuals in academia and industry. Participants from academia are expected to use these technologies and develop proficiencies not just to use them but also to offer instruction about them. They require humanistic skills to transform their knowledge into training.

The range of information technologies used across all participants showed that a majority of them extensively used web applications like Google docs and content management or version control systems like WordPress and GitHub. A number of them (68%) also conducted data analysis using tools and worked with markup languages (57%) for website building or to construct databases. (Figure 3).

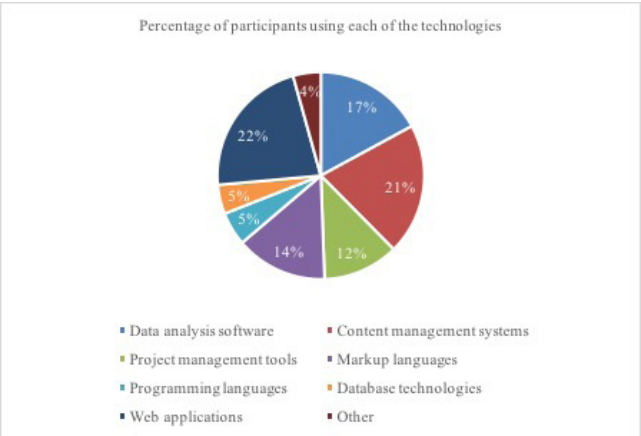

Figure 3: Proportion of information technologies used (all participants

Proportionally, academic and industry participants used the same technologies at similar rates (Figure 4). The only notable difference is that industry participants are observed to be using more project

management tools (~37%) than the ones in academia (~16%).

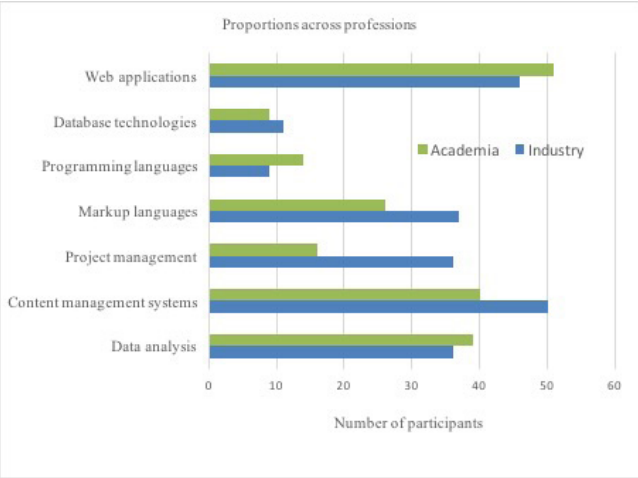

Figure 4: Proportion of information technologies used purposes (across professions)

Looking at the data for Question 8, regarding the participants' level of comfort using different information technologies, we see what might be expected: those technologies that are used more frequently are the same as those that the participants feel most comfortable using (Figure 5). As seen in Figure 4, web applications and content management systems are the most used technologies. More than 75% of the participants are at least comfortable using these technologies. On the other hand, programming languages and database technologies are the least used and least comfortable to use. However, participants use data analysis and project management tools sometimes or more frequently but they are less comfortable doing so.

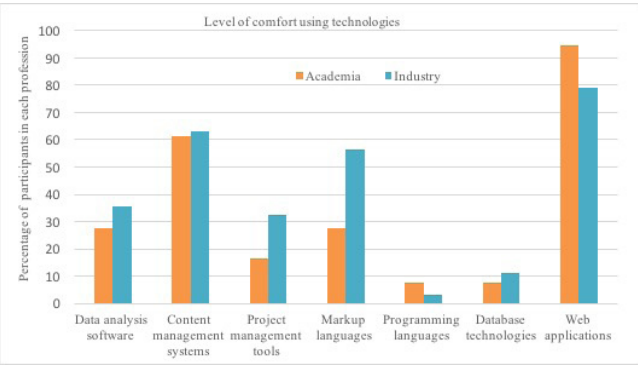

Figure 5: Levels of comfort for using various technologies based on profession

Question 8 throws light on another issue regarding the use of technologies in the workplace: flexibility of technology selection based on professions. The percentages of populations comfortable using technologies does not differ a lot for most technologies. However, a significant difference can be observed in the use of markup languages (28% in Academia, 56% in Industry) and project management tools (17% in Academia, 32% in Industry). While academics have flexibility to choose these technologies for their own use, industry practitioners depend on the tools assigned to them in the organizations that they are a part of. Using these tools for extended periods of time makes them proficient at them.

Questions 9 through 11 sought to reveal if there were technologies that the participants had problems using. Unsurprisingly, people experienced problems all of the time when using a variety of technologies. 60% of all participants said that they had experienced problems compared to 11% who said they had not experienced problems. Sometimes those problems are technical failures, but more often the source was a lack of knowledge or training (56%).

Our last question then asked participants to describe the sources that they rely upon for learning or refining their understanding of the technologies that they use. Overall, the most common forms of instruction are "self-instruction" (29%) and peer based training, learning from friends and co-workers (23%). This is consistent irrespective of the field. We found that learning technologies in most cases is informal, primarily through self-instruction (52 in Academia, 56 in Industry) and peer based (39 in Academia, 44 in Industry). This emphasizes the need for training in both environments. While some of the participants noted that they do receive expert training in the workplace (14%) not everyone who received such training thought it was the most helpful form of support received.

ANALYSIS

Based on a close reading of the data, using techniques of constant comparison outlined in the methods section, we focused our analysis on themes of community and "enculturation" that are at the heart of Miller's argument about what is humanistic in technical communication (1979, p.617). Overall, this thematic analysis led us to focus on what people trained in the humanities are bringing into the workplace and whether they adapt that training as competencies that allow them to maintain a focus on what makes communication humanistic. Taken at this level of analytic abstraction, we found similar patterns of enculturation and community acknowledgement of both the academic and industry partners. While those groups might have differed some in the rates at which they use different technologies they share many of the same motivations for using those technologies and for understanding the humanistic work that these technologies support and the competencies that one develops around them.

The issue of concern that we used to lead into this argument is that as communication work has become more technologically-supported and as more instruction on communication has incorporated technology instruction, developing expertise in technologies may have become a wedge that drives communicators further away from the humanistic situations for which they are developing communication.

This argument about writing technologies separating communicators from their audiences and producing different states of mind and engagement is as old as ancient Greece (e.g., see Havelock, 1988, p. 24). The gist is that as people become more trained in and proficient with communication technologies (starting with written language) they take steps further away from the immediacy of the communicative situation. This argument has persisted over time even though we have grown to understand that some technologies (e.g., written language) do not impede humanistic application. Carolyn Miller joined the same argument in 1979 to show that technical and scientific discourse also does not sever this connection to the humanistic; although, it is easy to overlook it. The argument persists to this day in the way that skeptics talk about new communication technologies and adjunct technological

proficiencies (i.e., like XML markup and coding) that seem further away from what one might consider humanistic communication. For example, see a discussion of this concern throughout debates over whether the use of structured authoring is rhetorical work (Evia and Priestley, 2016).

The data collected in this study show that participants are deeply invested in technological ways of communicating but that they are doing so, explicitly and consciously, toward humanistic ends. To summarize, industry participants use humanistic skills to collaborate, articulate problems and solve problems. Participants in academia use their humanistic skills to analyze problems critically, break down problems and articulate them, develop curiosity and facilitate training. Both develop solutions by using data and information situationally. It is in examining these activities and the ways that participants have adapted their understanding and uses of technology that we can see the outlines of technological competencies that ought to be the focus of both workplace and classroom technology instruction.

Is technologically-mediated communication today still humanistic? Yes. All participants show concern with humanistic qualities of communication that are supported through these technologies. Overall, we find that these domains of humanistic practice still apply to the way that our participants are adapting the information technologies that they use to their workplaces.

HUMANISTIC MEDIATION OF TECHNOLOGY

As the interview data showed us, many of the participants saw their work through a humanistic lens that shaped both how they use technology and what they understood to be their ongoing learning needs. For example, a faculty member said that they "adopt Google Docs platform for teaching (technical writing) because it is a live document and helps meet user need for up-to-date information". Another participant from the industry commented, "we also use product APIs (like Slack APIs) to set up integrations for something like posting in a channel whenever a user gives us feedback on a doc page". In both these instances, participants are articulating various activities not as being connected to the feature provided by the tool, but rather as a task achieved to solve problems in the communities where they work. Using similar examples, this section discusses two overarching themes which showed how a concern with the humanistic dimensions of communication shaped the way people thought about their acquired technological skills.

Accounting for and accommodating human experience

One activity that is central to the humanistic work of any kind of communication is using language to document and reflect upon human experience. Such work entails being immersed in and working in social environments in a number of ways. Professional communicators of all types can empathize with others' viewpoints; they can generate insights about others' viewpoints; they can recognize how viewpoints are influenced by cultural and historical context, and they can recognize human experiences and values in cultural artifacts. These perspectives are essential for communicators to advocate for users and to facilitate communication between people within an organization (e.g., see Hart-Davidson, 2013). Of course, technologies are themselves socio-cultural artifacts and they are central players in supporting the small-scale and large-scale interrelations that collectively make up different social networks (see Latour, 2005). One might expect that people trained in the humanities would bring such a social awareness to their technologies, both those that they use and those that they might document.

The study findings supported this view of how people are using and interacting with their technologies. The interviews pointed to the different ways in which communicators used their technology skills to enhance their professional environments as well as end user experiences. Selection of technologies generally depends on the proficiency of end users using the tools. For example, one participant chose Google docs and Blackboard to interact with the students as they were aware of the students' ability to use these tools. In workplace settings where people work collaboratively, human characteristics influence the outcome of projects. By understanding factors such as motivation, emotions, rational thought, habits, politics and culture, communicators organize people and tasks to build better and successful project workflows. One of the participants mentioned the need to appreciate the value that human experience imparts to information that one might be considering for use at work. One participant recalled an anecdote that influenced their use of project management support technologies: "When I wanted to pull a list of GitHub issues and post them in Slack, I found example code snippets in Stack Overflow for different pieces of the script and put them all together to form my script. I just figured it out as I went along by looking at what other people have done."

These comments from participants show us that the consideration of what is humanistic about technology use starts with the selection of technologies based on an understanding of others who would be engaging with it or through it. Each participant stressed that the selecting technologies required an understanding of users, their needs, what they value, their abilities, and also their limitations to create effective user experiences. For example, is GitHub or a Slack channel the most effective setting for a supporting users or supporting engagement between people?

Communicators also need to develop technological skills in order to address the requirements of creative effective human experiences. For example, one participant discussed the need to modify training quizzes for learners, and this person needed to use JavaScript to do so. However, the skills described was not just writing the script but also facilitating a user experience with a training module through the choices made in scripting. Like others facing similar demands for shaping user experiences, however, they learn the skills with programming or scripting through peer interaction and/or other training available online, rather than in an academic setting where the context of communication might be foregrounded.

Similarly, API documentation has become crucial for the software industry needs. Technical communicators need to understand programming languages like C, C++, etc. in order to document APIs. By placing themselves into users' shoes, technical communicators try to understand how APIs work, where and how they can be used, and then document all the information that will be required by users to use APIs. Technical communicators mentioned the use of JavaScript, CSS, Python for data manipulation and an understanding of collaborative frameworks like Git. In each of these cases, the kind of programming knowledge these participants required revolved around understanding how to create effective user experiences.

For project management, the primary technologies mentioned by participants served the purpose of organizational communication, collaboration and project delegation and tracking. Some of the popular ones that were discussed are: Slack, Github, SharePoint (Share Calendar and Share Templates). One of the participants clearly mentions, "I use technology on a daily basis as part of my job. We use it for communications (Google Apps, Outlook, etc.), customer/client relationship management (CRM) such as ServiceNow—a ticketing / incident management system." Here as well, the core knowledge that the participants needed to apply (whether in academic or industry settings) relied on understanding how people experience their work and work through those experiences in order to interact with a technology or with other people. Humanistic training provides this lens, which can be developed further for using those technologies.

The common point in these experience recounted so far is that the humanistic concern that mediates use of these technologies is with the experiences that one can create for users and an understanding of what experiences are valued and useful based on who is involved. It is not communication with the aim of imparting information to recipients, always, but sometimes ways of using information technologies to shape the environment in which information is encountered. Understanding the influence of environment on reception and on delivery of the content is clearly a humanistic concern, and the competency that participants are developing for using those technologies takes into account that application.

Understanding and designing the uptake of content

Solving problems requires a variety of ''skills,'' including both pragmatic and vocational ones (Katopes, 2011). Katopes suggests that devising solutions to currently unimagined problems requires "an entrepreneurship of the imagination, encouraged by a rigorous immersion in the liberal arts – especially the humanities" (p. 145). Humanities professionals are natural problem solvers. Along with that, they can engage with, explain, and work to break down complexity and complex systems. Katopes has defined two facets of complexity – the inability to take action and the power of dominance, both resulting in chaos. In the first one, there is no core unifying body. Therefore, unless stated in job descriptions, professionals do not think of utilizing their skills for different positions. In the second, if the unifying power is like the Internet, which provides an ability to search for synonymous job descriptions, it still results in complex connections between information and interpretation. Communicators can make connections between data, people, texts, or other artifacts as part of a broad, complex system. This helps them to critically trace the connections that will lead to solutions to complex problems in workplace ecologies. One example of such a problem is automation. For automation, technologies are used to develop systems that can perform tasks without human intervention. The role of humans in performing these tasks needs to be understood and mapped to the processes that a machine can perform instead of humans.

Silvia, Beaty and Nusbaum discuss the need for real-world creativity to solve such insightful problems (2013). Training in the humanities (and of course in other disciplines as well) focuses student attention on how to critically analyze various discourses. This training provides them the ability to not only analyze a problem, but to test its possible solutions before implementation. Communicators assist in resolving such problems in workplaces by appreciating a problem's complexity and then working through that complexity to make the problem and the solution accessible to those who need it. After working through the complexity of a problem, one can rely on automation to reduce the cognitive or social burden of engaging with that complexity (e.g., a cognitive problem like pattern analysis in a data set, or a social problem like version control). For example, some participants described applying programming in order to relieve the burden of some common tasks: "our team uses python to automate tasks like checking for broken links. go: Our development team uses go, so I've had exposure to it and had to use it for a few commands. Curl:" and another who said that they use "Python to automate tasks, specifically automatically updated files for a variety of reasons." Doing this kind of work effectively relies on understanding either what kinds of tasks users are skilled or less skilled at doing (e.g., checking broken links) or it relies on people being able to understand complex patterns of work to see which of those could be delegated to technological agents.

The same sensibility and appreciation of complex, situated uses of information is on display in how communicators talk about their uses of markup languages for producing documents. For example, one participant described the use of XML to carry out conversion processes, "We use XML for digitizing content. We use Oxygen for editing content and then we have a content management system to publish those documents. The process is called transform. If there is a problem in the chain, the entire process collapses. Transforming content from one form to another is always a complex process. Somethings work sometimes and do not work at other times. Troubleshooting those problems is a major issue." Another participant uses XML markup to understand a methodology "I was given a foundation in XML, thank heavens. I don't think I would get a job if I hadn't known DITA even though my team mostly uses markdown now. Also, I'm perpetually in a state of converting materials from other disciplines to apply to my job role." Such interactions with code last much longer than the time required to perform the task or solve a problem. These competencies create a bridge between understanding processes and implementing solutions which communicators extend to other operations in the workplace.

Among all participants, more than 73% wrote content for reuse or collaboration purposes. A majority of the participants mentioned using skills for writing small chunks of content, organizing content for retrieval by colleagues, digitizing content, and visualizing data frequently. These communicators are well trained to create visual and verbal content to communicate both visually and verbally to carry out those tasks. They generally have good presentation and writing skills. Areas of communication, collaboration and social responsibility have their roots in the humanities (Jablokow, 2007). They employ these skills for various day-to-day tasks in their workplace. For example, solo or collaborative authoring, styling information and publishing content. All these tasks involve use of technology.

Although these communicators are exercising a skill with coding and markup that creates helpful automations and allows content to be automatically shuffled and recombined into different outputs, the competency required to build these automations, to develop the markup, and to apply the markup require an understanding of the problems those automations address. Which people and which resources need to interact at what time and when? The work is humanistic in that communicators are creating the environments in which communication is happening and in that sense they are

controlling not only the content of that communication but the arrangement and delivery as well. It is an embodiment of what Slack, Miller, and Doak had called an "articulation" function of communication (1993).

Returning to an earlier finding from the survey about how the participants are learning about the technologies they are using, it is noteworthy how often they are relying on their own resources or peers to learn the technologies. If the humanistic adaptations of technology that we have discussed in this section are enough inspiration to see a wider range of technology competencies as influenced by humanistic training, this might be evidence in support of a broader effort to introduce these technologies in the classroom so that their mediating properties can be contextualized against a background of humanistic concerns.

Limitations and Implications

Developing a technological competency, without focusing on mere technical skills, while also embodying the humanistic qualities and aims of communication, is the primary challenge faced by communicators who are inundated with technologies the workplace. Data for both industry and academic participants is similar when it comes to training. Most participants develop technological skills on the job through self-training or from peer collaboration. However, this also helped us identify the limitation of this study.

Our survey design attracted a significant number of respondents with graduate degrees and who are working in fields that are primarily thought of as technical communication of some type. It may be the case that people who have graduate training are more likely to see what is humanistic about technologically-mediated communication work. It may also be the case that people who work in technical communication are more likely to see the same. If we narrow down the survey responses for training issues, the data present a complex pedagogical issue. There exists a significant gap between tasks supported by current pedagogical frameworks for communication and those required to participate in workplace practices. For example, Batova and Andersen discuss this issue by focusing on the technical communication field. They argue that although elements of content management may be integrated into other existing courses, this is not adequate to represent "a seismic shift in the practice of TC" (Batova and Andersen, 2017) brought about by technology. Nevertheless, how these people see what is humanistic is still a valuable outcome that can drive pedagogical decisions. It would take a broader survey population to see if this awareness of what is humanistic pervades other communication-centric fields.

Miller urges that the teachers of writing should teach technical or scientific writing, not as a set of techniques (or technological skills) for accommodating workplace tasks, "but as an understanding of how to belong to a community"..." to engage in any communication, to understand the conditions of one's own participation-the concepts, values, traditions, and style which permit identification with that community and determine the success or failure of communication" (Miller, 1979, p. 617). The lack of programs that teach students to fulfill such technology-oriented roles is an opportunity for academia–industry collaboration in curriculum design. At the very least this reminder of what remains humanistic about technologically-mediated communication can point to the kinds of humanistic competencies that ought to be cultivated in the workplace and that should be the critical frameworks through which academics are teaching the technologies through which those competencies are practiced.

More than 90% of participants relied on self-training for learning the technologies that they use and the competencies that they practice. Educators in the humanities have to include these technological skills in the curriculum by demonstrating their application to help communicators practice what remains humanistic about their communication practices. As the participants in this study have shown us, accounting for and accommodating human experience and understanding and designing the uptake of information is what connects communicators to their audiences even through the lenses of technologies that would appear to separate them from communicative engagement with real readers.

However, some of the participants we interviewed are not skilled in using technologies (e.g., those supporting automation). Those participants often rely on engineers to solve such technological problems. A participant mentioned "there is always some sort of problem with technologies: compatibility, connectivity, the need to collaborate across platforms, versioning, and getting people to pay for license fees." This is an area that can be improved. Communicators rely on engineers, peers or online available instructions to troubleshoot technological problems, and a lack of familiarity with the vocabulary can increase the time required to look for the solution. Another participant states, "Usually when I run into problems it is when I overlook a programming error or get stuck at a part of a tutorial where I'm using a different software version or the author of the tutorial assumed background knowledge that I did not have." A knowledge of programming languages like Python that are widely used for the purpose of automation and acquisition of the skills to communicate technological issues can further develop communicators' ability to think about problems critically and solve them.

Due to the constant exposure to different technologies and lack of formal training, humanists find it hard to learn any one tool in detail. One of the participants explained that they have little knowledge of the technology that they use: "Can look at it but not proficient to work." Another participant states this difficulty as "It would take me a while to list all of the tools, and we're shifting and adding new ones all the time." In response, many participants learned the required technological skills on the job through self-training or peers. One participant explained, "I use HTML and CSS, sometimes to clean junk code. As a technical editor for a rhetoric journal, I have learned a little bit about JavaScript, PHP and other stuff." Humanities professionals are forced to learn new tools due to several reasons. A participant discussed one of them: "Tools are based on audience. They use collaborative tools for producing documentation." Therefore, these professionals learn to use different tools for achieving the same task.

While these sources of informal learning are certainly beneficial it is questionable whether the technological training one receives is sensitive to humanistic work that those technologies are supporting. To avoid these training problems, contextual and conceptual understanding must be inculcated in academia, among humanities students to make transitioning easier. For example, moving to new tools and technologies requires transferring skills. However, if the students were able to understand tools as frameworks to develop and publish information collaboratively, it would make it easier for them to shift among various collaborative platforms. This will also help them make informed decisions while choosing tools and technologies that suit their needs instead of merely

considering audience accessibility. So, while it is important for academic audiences to engage with the technology skills in light of the humanistic work that those technologies support, it is equally important for recognizing and incorporating awareness of that humanistic work in the workplace setting where this just-in-time learning is taking place.

The constant change makes technology training the biggest challenge in humanities classrooms. Training by creating a purpose, context and critical thinking about technological use is easier said than done. Some ways to accomplish this could be to provide students with a problem and asking them to identify the technology they would need to solve it by applying their humanistic understanding and communicative abilities for justifying their choice. Most participants relied on peers in their work environments to teach them how to navigate certain processes that demanded a deeper understanding of technology. Collaborative projects in interdisciplinary classes can boost the need to not only learn from one another in guided classroom spaces, but also increase their ability to consciously participate in problem solving through articulation and other communication practices.

Scholars in our field often stress the need for building technology skills when teaching students about communication design. However, this tendency to consider the technology as separable from the human concerns that it addresses and that situations in which those technologies are used, undercuts the idea of a unified approach in preparing students for the workplace. Through the findings of this research, we have tried to emphasize the relationship of humanistic perspectives on communication with technological skills used in the workplace. Our hope is that this humanistic framework for thinking about technology use will encourage instructors to include technology in their classes and to focus critically on the work that technologies do to advance humanistic ideals in information-centric workplaces.

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APPENDIX A: SURVEY QUESTIONS

This study is designed to gain an understanding of the technological needs of individuals with humanities backgrounds, particularly those that indicate the need for developing programming knowledge.

Personal Information

1. Age:

   a. 18–24

   b. 25–34

   c. 35–44

   d. 45 and above

2. Gender

   a. Male

   b. Female

   c. Do not wish to answer

3. What is the highest degree or level of school you have completed?

   a. High school graduate, diploma or the equivalent

   b. Bachelor's degree

   c. Master's degree

   d. Doctorate degree

4. Area of academic training for the highest degree earned _____

5. Profession/Title _____

Information Access

6. How frequently do you do each the following at work:

   a. Write small chunks of content for reuse or collaborative purposes

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   b. Analyze patterns in qualitative or quantitative data

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   c. Organize content for retrieval by colleagues or users

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   d. Digitize content

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   e. Visualize data sets

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   f. Use code to make data files

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   g. Develop websites

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   h. Designing user interactions with hardware and software

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

   i. Other _____

   Everyday -- Frequently -- Sometimes -- Infrequently -- Never

7. What information technologies do you use for academic or professional purposes? Check all that apply.

   j. Data analysis software (e.g. R, SAS, MS Excel analysis)

   k. Content management systems (e.g. WordPress, Git, Subversion, GitHub content repositories)

   l. Project management tools (e.g. GitHub Issues/ZenHub, Jira, ServiceNow)

   m. Markup languages (e.g. XML, XSL, HTML, Markdown)

n. Programming languages (e.g. Python, Javascript)

o. Database technologies (e.g. SQL, queries)

p. Web applications (e.g. Google docs,

q. Other _____

r. None of the above

8. For each technology that applies, how comfortable are you with using it?

s. Data analysis software

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

t. Content management systems

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

u. Project management tools (e.g., GitHub)

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

v. Programming languages (e.g., Markdown, Javascript, etc)

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

E. Database systems

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

w. Web applications

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

x. Other _____

- Extremely comfortable
- Very comfortable
- Slightly comfortable
- Not at all comfortable
- Not applicable

9. Have you encountered problems when using any of these technologies?

y. Yes

z. No

(link question 10 to question 9 … show only if 'yes' on question 9)

10. How would you characterize these problems?

a. Lack of knowledge/training

b. Technical failure

c. Other: _____

11. What sources do you rely on for learning or refining your knowledge of technologies that you use? (Check all that apply)

aa. Academic training

bb. Professional/Industry training, workshops, or certification

cc. Self instruction

dd. Expert/trainer at workplace

ee. Peers

ff. Not applicable

Miscellaneous

12. Are you willing to participate in an interview (about 20 minutes) in case you get selected for it based on the responses?

a. Yes

b. No

ABOUT THE AUTHORS

Nupoor Ranade is a PhD candidate with a research focus on audience analysis, digital literacy, digital rhetoric and user experience, primarily in the field of technical communication and artificial intelligence. Her research experience and partnerships with the industry help her bridge gaps of knowledge that she then brings to her pedagogical practices. She is interested in exploring interdisciplinary collaborative work which helps in redefining perceptions of audiences and identifying roles of marginalised populations.

Jason Swarts is a professor of technical communication in the Department of English at North Carolina State University. He teaches courses on structured authoring, community-based approaches to knowledge work, networks, and discourse analysis. His research focuses on interrelated areas of genre studies, computer-mediated communication, networks, knowledge work, and knowledge communities.