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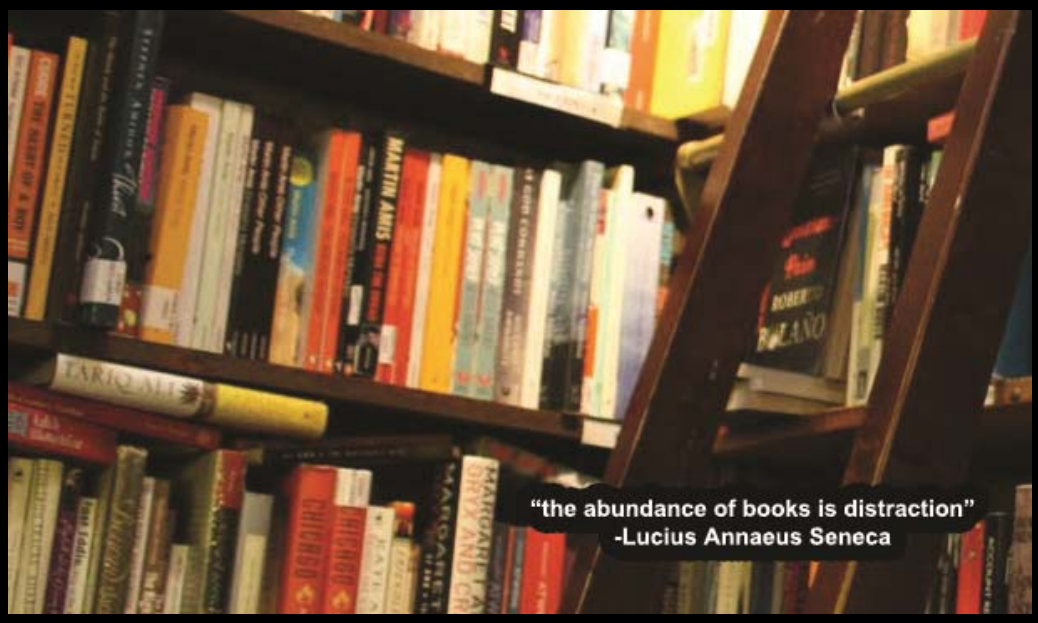

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Editor's Comments

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Welcome to this edition of the *Journal of Information Fluency* (JIF)!

This issue focuses on education, specifically the information literacy skills. Contemporary students have more access to information and technologies than ever before. However, are they interacting with digital resources in ways that are beneficial and efficient? Dr. Yuejiao Zhang discusses information fluency as a professional competency and an integral facet of technical communication education. She notes, "because the profession determines that we work in an environment of ever-growing information resources, we need to prepare our students for such conditions." Drs. Flammia, Musambria, Hastings, and Sadri explore teaching students about the complexity of the digital divide by teaching information fluency and intercultural communication as interdisciplinary skills. Flammia et al see their goal as teaching students to become engaged, global citizens. Drs. Dziuban, Morgan, Moskal, McMartin, Morrill, and Wolf present the results of a national study that aims to understand when and how students use digital resources, their preferences regarding digital resources, and how their information seeking behaviors change when they research a topic for class versus researching for their own interests. They conclude with the notion that studying students' less than strategic information seeking behaviors, will help educators develop models, instruction, and resources.

The journal is one facet of the information fluency initiative at the University of Central Florida. Facilitating several projects—along with a journal and a yearly conference, with an office staffed by 1 ¼ people (I'm the ¼ person!) hasn't been easy. I apologize to the authors in this edition as they were expecting this issue to be out in October 2012.

Defining Information Fluency Skills for the Technical Communication Curriculum

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Abstract

Technical communication professionals process and interpret information, and present it to a range of audiences, exhibiting abilities to gather, evaluate, and communicate information. However, the concept of information fluency is not normally considered in the field of technical communication. This article defines information fluency as both an overall professional competency and a collection of specific skills. As a professional competency, information fluency entails the ability to recognize information needs, to gather and evaluate information, and to transform information into usable communication products and best practices. A qualitative content analysis extracts 12 employer-valued information fluency skills embedded in 2,889 job requirements. The purpose of this study is to raise awareness of information fluency in the technical communication curriculum, and to suggest how information fluency benefits students graduating from technical communication programs.

In *Information Architecture for the World Wide Web*, Peter Morville and Louis Rosenfeld (2006) used the fishing metaphor to illustrate four ways a user finds information on the Web: “indiscriminate driftnetting,” when one casts the driftnets and drags up everything he can; “lobster trapping,” when the user is happy with a few good answers, and let go of the rest; “I’ve seen you before, Moby Dick,” when the information is tagged to be revisited; and finally, the “perfect catch,” when one comes in and finds the right answer. Technical communication professionals gather, evaluate, and communicate information to present the “perfect catch” in front of their users. The profession of technical communication entails all aspects of information fluency, including the less discussed communication aspect. More than a decade ago, Johndan Johnson-Eilola (1996) touched upon the idea of the information fluent technical communicator in his seminal article "Relocating the Value of work: Technical Communication in a Post-industrial Age." He challenged technical communicators to position their practice as “symbolic-analytic work” (p. 246). Described by the economist Robert Reich, symbolic-analytic work refers to the activities “to identify, rearrange, circulate, abstract, and broker information” (Johnson-Eilola, 1996, p. 255). Today’s technical communicators work with information and symbols, and produce reports, plans, and proposals. They are frequently involved in symbolic-analytic work and therefore should possess the “ability to manipulate, abstract, revise, and rearrange information” (p. 255), that is, to be information fluent.

However, information fluency as a pedagogical concept and practice is not normally

considered in the technical communication curriculum. For most instructors of technical communication, information fluency is a new terminology—something like a neologism. It is unlike the familiar concepts of document design, audience analysis, or usability that we can easily identify and share ideas about. Three-fourths (75%) of technical communication instructors who participated in a previous survey research (Zhang, 2009) indicated they are unaware of the concept of information fluency. Even though many instructors do incorporate information fluency activities and teach many of its relevant skills in their courses, they expressed unfamiliarity with the terminology.

Susan Leigh Star and James R. Griesemer (1989) first introduced the concept of "boundary objects" to refer to objects that are "both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" (p.393). According to Dziuben et al. (2010), our current generation of students—the net generation—is a boundary object: "The net generation is a notion in which many communities find themselves invested, but an idea that allows them to vector their own frames of reference" (p. 3). Growing with the net generation's learning style, information fluency is also a boundary object, as it is interpreted differently in different disciplines and is strong enough to have a common identity. This article positions information fluency in technical communication and proposes how it should be constructed within this discipline. It also attempts to find out the skills that entail information fluency for future technical communicators—the net generation students who study toward bachelor's degrees in technical communication and aspire to become professionals in the field. The empirical study analyzes online job advertisements to bring a focus on industry behavior.

In this article, I begin by reviewing some important remarks in technical communication history that had implied the desire for information fluency in our practitioners and to justify why the curriculum needs to include information fluency skills. This sets up a broader historical context within which we can begin to define and understand information fluency. Following the historical context, I describe my methodology in identifying the specific workplace information fluency skills valued by employers, and then present the results in more detail; finally, I discuss some implications of the data. By addressing these different aspects, I hope to provide my readers with a better understanding of information fluency within the context of technical communication and to suggest how these findings can inform curriculum design in the discipline.

INFORMATION FLUENCY IN TECHNICAL COMMUNICATION HISTORY

In the early 20th century when technical writing began to be recognized as an academic discipline, it was essentially concerned with good usage (Connors, 1982; Kynell, 2000). The key notion about good technical documentation in the 1950s was correctness, which meant the best and most accurate choice of words. Technical writing was also meant to be correct in the sense of

responsibility for correct, safe, and effective functioning or operation because "poor documentation could result in enormous losses, including loss of life" (Durack, 2003, p. 572). As a result of the emphasis on good usage and correctness, technical writing was impersonal and devoid of persuasion or advocacy. Also in the 1950s, technical writing was considered to be writing about technology. In other words, technology was the object rather than the means for technical communication, as is the case in our days (Durak, 2003, p. 572). Technical writers didn't need technology literacy to help them maneuver technology to communicate information. And because of this separation of creation and production, writing and editing were the only core competencies for technical communicators. In the 1970s, technical writing began to adapt a rhetorical approach that emphasized the writer-reader relationship (Connors, 1982). The curriculum started to teach skills in analyzing audience, purpose, and contexts.

In the last decade, the roles and competencies of technical communicators changed drastically to meet changes in the workplace. Today's technical communicators are no longer the documentation people waiting for their writing assignments at the end of the product development process; they are an integral part of the process. They need to intimately understand usability, information design, and at the same time to be skilled communicators (Giammona, 2004; Rockley, 2003). This change was predicted by Stephen A. Bernhardt in 1995, when he said that a new generation of technical communicators will be "comfortable in cyberspace, familiar with information protocols, conversant within the new media, and at home in virtual environments" (p. 601). The profession is no longer strictly attached to writing activities. Based on observations of employers' hiring patterns, Michael Albers (2005) suggested that technical communicators should be capable of expanding their skills into areas such as information architecture, information design, management, and human factors. These new roles and areas require them to able to effectively work with various information resources, symbols, and technologies.

Some scholars maintained that technical communicators are well suited to address the complex issues surrounding effective use and management of information (Haselkorn et al., 2003; Johnson-Eilola, 1996). And many recommended skill sets closely related to information fluency. For example, Geoff Hart (2000) suggested that technical communicators should emphasize the ability to understand products and communicate that knowledge to customers, and to empathize with the audience and understand their needs (p. 291). Similarly, Freya Winsberg (2000) recommended three skill sets for technical communicators: (1) analytical skills, the ability to gather information about new products, (2) organizational skills, the ability to impose order to large amounts of technical information and present it in a user-friendly form, and (3) writing skills, the ability to produce documents that meet company and industry requirements.

Today, technical communication includes any form of communication that exhibits one or more of the following characteristics:

- Communicating about technical or specialized topics, such as computer applications, medical procedures, or environmental regulations.
- Communicating by using technology, such as web pages, help files, or social media sites.
- Providing instructions about how to do something, regardless of how technical the task is or even if technology is used to create or distribute that communication. (STC, 2011)

Information fluency as a professional competency has the potential to empower technical communicators to master a series of different specialties, and consequently, support their transitions to influential positions in their organizations. As an academic discipline, technical communication cannot afford to neglect the development of such skills in our students, who hold the future of the field. For technical communicators who emerge from our programs, information fluency gives them the adaptability that is essential for success in the workplace.

INFORMATION FLUENCY AS AN OVERALL PROFESSIONAL COMPETENCY

As an overall professional competency, information fluency entails the ability to recognize information needs, to gather and evaluate information, and to transform information into usable communication products and best practices. In other words, technical communicators need to have five skill sets to claim information fluency:

- Recognize information needs
- Gather information
- Interpret, organize, and communicate information
- Synthesize information to form best practices
- Apply information technology

Because the concept of information fluency did not exist in technical communication when this study was conducted, I attempted to initiate a definition by situating several well-recognized definitions of information fluency within the context of this discipline. The Associated Colleges of the South (ACS), a consortium of 16 private colleges and universities in the South and Southeast United States, presents the most well-known definition. As an early proponent of information fluency, the ACS (2000) noted that information fluency "may be envisioned as the optimal outcome when critical thinking skills are combined with information literacy and relevant computing skills." In this definition, information fluency encompasses information literacy, computing, and critical thinking skills. Working under the same premises, Wenxian Zhang (2002) suggested that "the purpose of information fluency is to develop the critical thinking and information literacy skills of students through effective use of technologies" (p. 358).

From a bibliographic instruction point of view, Jeffrey Overholtzer and John Tombarge (2003) defined information fluency as "thinking critically about the information needed; understanding the structure and types of information in a discipline; finding information to meet specific needs using search engines, bibliographical databases, and other tools as needed" (p. 55). Hannelore B. Rader (2004), the University Library Director at Cleveland State University, provided a broader definition of information fluency and described it as "the ability to navigate information structures and to evaluate information retrieved through these information structures" (p. 76). According to Rader, information fluency included "library literacy, media literacy, computer literacy, Internet literacy, research literacy, and critical thinking skills" (p. 76).

Although these existing definitions vary depending on the kind of institutions or individuals who addressed it, they all carry a common theme; that is information fluency includes the ability to locate information, to critically analyze information, to effectively communicate information, and to use information technology with confidence. Based on this common theme, I suggested for the field of technical communication a definition of information fluency, which also appeared in the beginning of this section: The ability to recognize information needs, to gather and evaluate information, and to transform information into usable communication products and best practices.

INFORMATION FLUENCY AS A COLLECTION OF SKILLS

To explore the specific workplace information fluency skills valued by employers of technical communicators, I used a qualitative content analysis to extract the competencies embedded in 303 job postings (2,889 job skill requirements). Because technical communication programs emphasize practical experience, the ways in which information fluency is perceived and experienced in the workplace should to some extent influence how it is taught and experienced in academic and professional education programs. Online job recruitment advertisements provide a source of current and reliable data to explore the specific, tangible information fluency skills required in the workplace.

Data Collection

The data used for analysis are online job advertisements. Analyzing job advertisements allowed me to access a large sample of recruitment data without having to directly observe the hiring process. While collecting the job advertisement data, I used a typical qualitative sampling method—purposeful sampling. The objective of purposeful sampling is to yield insight and understanding of the phenomenon under investigation by selecting information-rich cases (Patton, 2002; Silverman, 2000). Following the purposeful sampling procedure, from April 1 to June 30, 2010, I collected technical writer/communicator job advertisements from the online employment Web site

Monster.com. To be included in the sample, the advertisement has to meet all three criteria as listed in the following:

- The job advertisement must have detailed statements on job responsibility and requirements or qualifications. These descriptions ensure that I collect information-rich cases and have ample content for the content analysis.
- The job advertisement must be suitable for newly graduated technical communication majors. I collected only job postings asking for 2-3 years of experience as a technical writer. Lanier (2009) estimated that many new graduates could claim 2-3 years of experience with part-time work, class work, internships, and/or co-ops. This criterion also means that the position do not require a degree in a technical or scientific discipline.
- The job advertisement must include information about the type of industry of the hiring organization. This information helps me understand the areas in which junior-level technical communicators take their career paths and suggest the type of challenges our graduates may face.

After 3 months of data collection, I counted the number of job requirements in each advertisement. The final sample included a total of 303 online job advertisements, which contained 2,889 individual skill requirements.

Data Analysis

A crucial step I took in the data analysis stage was counting the number of skill requirements list in all collected job advertisements. This step ensured that the results exhibit accurate total count of skill requirements in all advertisements. Most of the 303 advertisements contained more than 2 information fluency skill requirements. If I used each advertisement as the counting unit (instance), then I will inevitably count many of the postings more than once, each time under a different skill category. As a result, the percentage of all categories will add up to more than 100% because of the additional counting of advertisements. And this will undermine both presentation and analysis of the data. Therefore, the unit for analysis in this study is the individual job skill requirement, not the job advertisement.

After counting the requirements, I used the axial coding method first introduced by Strauss and Corbin (Lanier, 2009; Strauss & Corbin, 1990). First, I sorted them to one of the five skill categories mentioned earlier: 1) Recognize information needs, 2) Gather information, 3) Interpret, organize, and communicate information, 4) Synthesize information to form best practices, and 5) Apply information technology. The five categories are mutually exclusive, meaning they are classified uniquely and do not intersect with one another. Under each category, I read the requirements closely, moving back and forth and making connections. This step allowed me to discover more than one subcategories under each category. These subcategories are the skills I

intended to find in this study. Table 1 shows the categories, subcategories (skills), and descriptions of the skills. Meanwhile, because the content analysis only focused on discovering the requirements that reflect the ability in the five information fluency skill categories, the findings should be only considered as requirements of information fluency skills, and not as comprehensive skill requirements for a technical communicator position.

TABLE 1

Information Fluency Skills and Descriptions Identified in Online Job Advertisements for Junior-Level Technical Communicators

Category	*Skill (Subcategory)*	*Description*
Recognize information needs	Define project	Defining project needs, problems, scope, and objectives; analyzing requirements of a project to determine types of publications needed and understand issues and challenges
	Analyze audience	Identifying, assessing, and analyzing complex information needs of target audience
Gather information	Conduct interview	Conducting interviews with various users, technical staff, client, and/or managerial personnel to gather information
	Study existing material	Studying existing products and procedures, reading previous documentation, examining blueprint specifications, drawings, and mockups to extrapolate information
Interpret, organize, and communicate information	Interpret and communicate information	Interpreting technical concepts and communicating highly technical information to both technical and nontechnical audiences

	Adhere to standards	Creating documents according to corporate and industrial standards and compliances
	Visualize information	Creating and/or formatting visuals to illustrate key points in document
Synthesize information to form best practices	*Make information accessible*	Evaluating and testing documentation to ensure accuracy, accessibility, and ease of use
	Utilize best practices	Researching, evaluating, and developing documentation templates, guidelines, and standards
	Manage content	Creating and validating information in knowledge base repository; organizing and updating knowledge repository
Apply information technology	*Use technical communication software*	Desktop publishing, graphic, help authoring, content management
	Use general software	Microsoft Office Suite

Results

Among the 2,889 job requirements, 67% (1,936) asks for skills pertaining to information fluency. The five skill categories are evenly distributed in the 1, 936 skill requirements (See Figure 1).

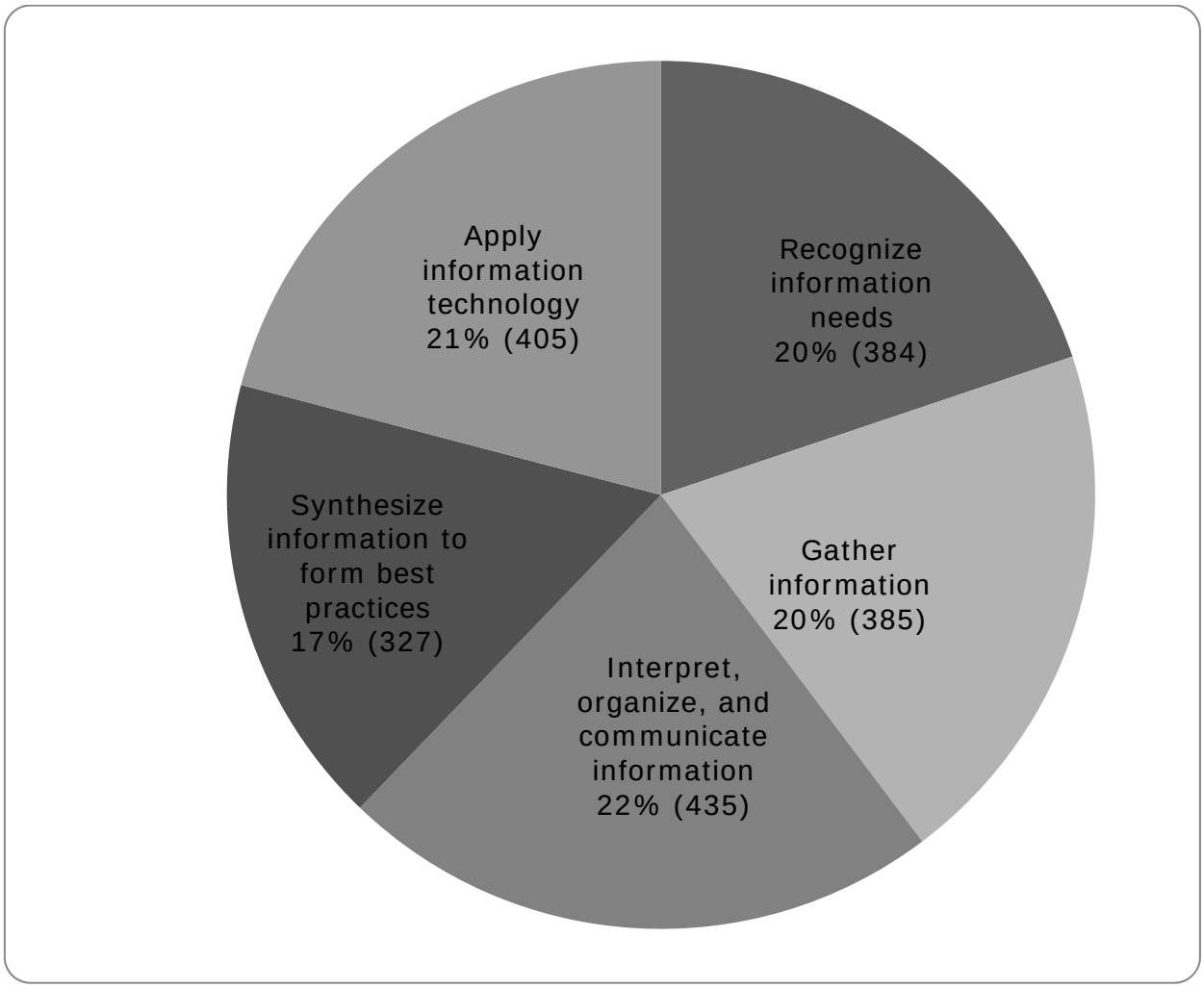

FIGURE 1 Five information fluency skill categories are evenly distributed in the 1, 936 job requirements pertaining to information fluency.

Many of the information fluency requirements (384 of 1,936; or 20%) look for skills in the first category—recognize when and what information is needed. This category consists of two skills: defining project with respect to needs, problems, scope, and objectives (158; or 8%), and assessing and analyzing the needs of target audience (226; or 12%).

An almost equal number of requirements (385 of 1,936; or 20%) ask for skills in the second category—gather information. Interviewing skill is required 212 times (11%), and the skill to extrapolate information through study existing documents and products, including reading blueprints and product samples, as well as observing production procedure, is asked 173 times (9%).

A number of postings (435 of 1,936; or 22%) require skills in the third category—interpreting and organizing, and then communicate appropriate information to different audiences. The calls for the ability to interpret technical concepts and communicating highly technical information to both technical and nontechnical audiences constitute 11% (206 of 1,936) of the requirements, and the ability to use visuals makes 5% (102 of 1,936) of the information fluency requirements. There are also times when a technical communicator needs to create documentation that must comply with organizational, industrial or governmental standards. For example, software and IT companies tend to require that the technical communicator be familiar with the Agile Standard—an industry standard of Software Development Life Cycle (SDLC). Creating documents to comply with organization and industry standards constitutes 6% (127 of 1,936) of all information fluency requirements.

Technical communicators have much room for creativity in their jobs. The creativity at work involves thinking and interacting with available information resources to solve on-the-job problems and to promote best practices, which makes 17% (327 of 1,936) of the information skill requirements. The specific job functions that entail this requirement are evaluating and testing documentation to ensure accuracy and ease of use (142; or 7%), developing and maintaining templates, documentation guidelines and standards (97; or 5%), and organizing and updating knowledge base or documentation repository (88; or 5%).

Some strongly recommend technical communicators to have up-to-date knowledge about advances in technology (405 of 1,936; or 21%). These requirements look for skills in using software tools specific to technical communication (152; or 8%) such as desktop publishing, graphics and illustration, help authoring, and content management. General office software, such as the Microsoft Office Suite, constitutes 13% (253 of 1,936) of the total requirements.

A visual comparison of each category with its corresponding skills is shown in Figure 2.

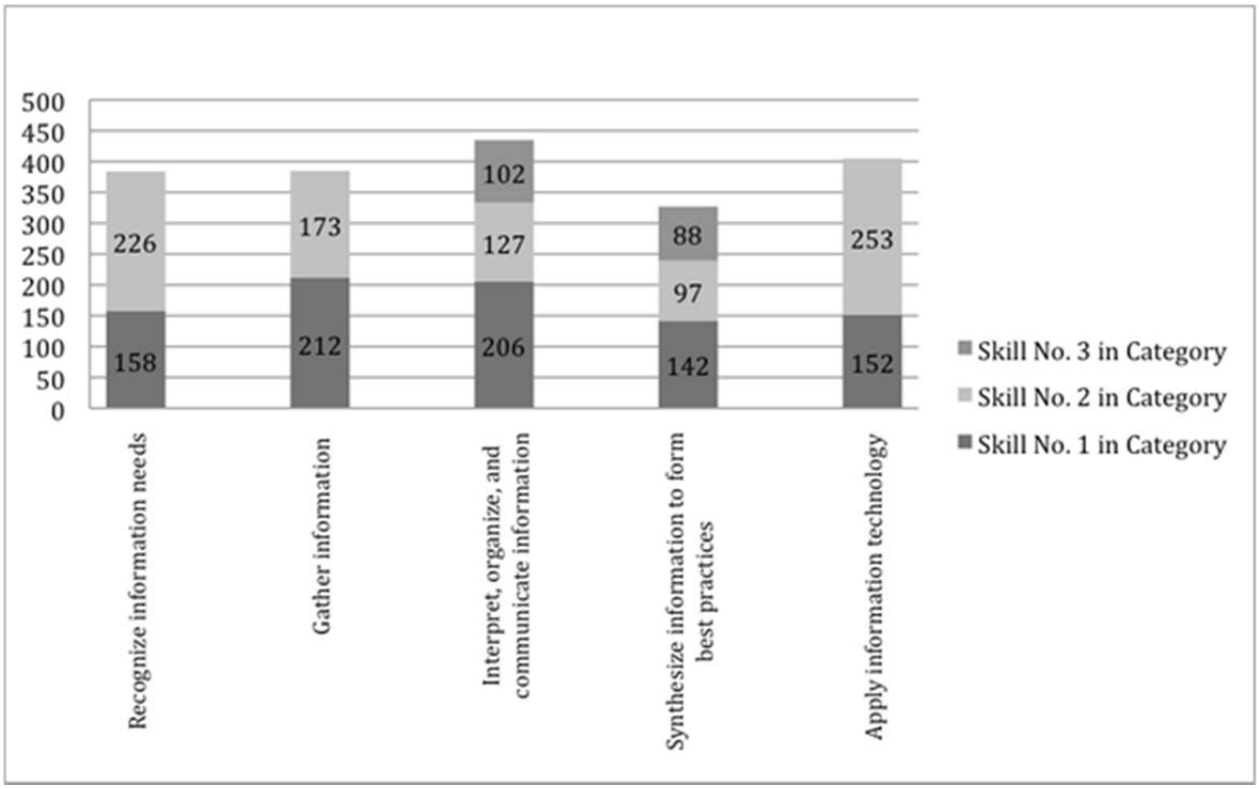

FIGURE 2 A comparison of the five skill categories with their corresponding skills.

Demographic data from the content analysis suggests a broad range of industries that seek technical communication specialties (See Table 2). Information technology industries, including computer/IT services and software development, are still the major areas (52%; or 159 of 303) that accept junior level technical communicators; whereas, industries such as aerospace, broadcasting, and publishing are less likely to hire newly-graduated technical communicators.

TABLE 2

Industries Represented by the Online Job Advertisements

Industry	*Number of Postings (out of 303)*
Computer/IT Services	96
Software development	63
Business and management consultation	25
Manufacturing	25
Financial services	15

Engineering	14
Telecommunications	13
Government and Military	11
Pharmaceutical and biotechnology	9
Education and training	5
Insurance and healthcare services	5
Energy and utility	4
Communication services	3
E-commerce and retail	3
Medical devices and supplies	3
Science and technology	3
Security and surveillance	2
Publishing	1
Environmental services	1
Broadcasting, music, and film	1
Aerospace and defense	1

DISCUSSIONS AND RECOMMENDATIONS

Information Fluency Helps Junior Technical Communicators Assume Information Responsibility in the Workplace

The political economist Peter F. Drucker (2002) defined information responsibility as the willingness and ability to ask "What information do I need to do my job? From whom? In what form? When?" (p. 46). The data suggests that today's technical communicators assume a great amount of information responsibility. More than half of the sample job requirements (67%) ask for information fluency skills from job candidates. Managers seek in their technical communicators an array of information skills, including audience analysis, visual design, content management, and usability. This is not surprising because a main task for technical communicators has always been to domesticate complex information spaces, to understand how information can be used in multiple ways, and to create organizational knowledge based on implicit and tacit information (Hughes, 2002; Rockley, 2001; Selber, 2010).

Many of these skills are associated with the tasks technical communicators currently perform. In order to bring sharp focus to a whole constellation of different but related skills, technical communication programs need to pay attention to develop information fluency with students. In addition, although the skills of information fluency vary, the use of this term allows us, as colleagues, practitioners, and professors in this field to speak about a whole collection of inter-related skills,

attitudes, and perspectives in a single term. However, this terminology is much more than just a convenient new notation system. It also helps faculty, students, and even employers to develop an awareness of the real intellectual and conceptual connection among these different factors and elements. The skills identified in this study are all interconnected because they are all aspects of information fluency, working toward making students information fluent. They are like pieces of a puzzle, all fitting together to develop the full picture of the information fluent practitioner who can claim a good amount of information responsibility.

The Curriculum Needs to Develop Skills in All Five Categories

The content analysis reveals that managerial expectations of information skills are distributed evenly among the five skill categories. The skills entailed in information fluency require a technical communicator to be strong in controlling information technologies as well as using information in smart ways. Because the five skill categories are shown to be almost equally important, as we prepare our students for the workplace, we should not neglect one and pay excessive attention to another.

In addition, this finding may serve to ease the tension between industry and academe as to what professional competencies graduates should possess (Dagget, 1994; Selfe & Hawisher, 2002; Spilka, 2000). The findings suggest that employers expect graduates to exhibit information expertise that involves critical thinking, research, organization, and communication, along with a reasonable amount of technology proficiency. These are obviously the competencies academic programs strive to educate their students. The same information fluency skills resulted from this study can also apply to more experienced practitioners at a different level. Employers usually recognize that new and experienced technical communicators can exhibit different degrees of mastery in the same kind of skill; and they do look for different levels of proficiency of the same skills when hiring technical communicators of different seniority. The major difference between the requirements of newly-graduated candidates and those have years of experience is a matter of degree but not a difference in kind.

CONCLUSION

Paul Anderson (1984) once remarked, “We must first understand the profession, then design our curricular accordingly. Only if we understand intimately the job we intend to prepare our students to perform can we create effective professional programs” (p. 161). Rainey, Turner, and Dayton (2005) also recommended managerial expectation as a dimension for academic program curriculum planning. Focusing on industry behavior, this study explored the professional context of technical communication and to learn about the kind of information fluency skills our graduates are expected

to possess. Because the profession determines that we work in environments of ever-growing information resources and technologies, we need to prepare our students for such conditions and enhances their abilities to learn new skills and knowledge that are vital to their success. The concept of information fluency, by touching upon and inter-relating these skills, provides an all-encompassing means of speaking of them all at once and in their interrelatedness. With information fluency, our future technical communicators will possess the "key adoptive ability" to confidently adapt "new behaviors within new technology environments" (Bernhardt, 1995, p. 601).

I hope the results from this study can raise awareness of information fluency in technical communication programs. To promote information fluency within the discipline, a lot more work needs to be done. We need to address important issues such implementation and assessment. This study is just a small step toward a big exploration.

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Preparing Students to Bridge Digital and the Disciplinary Divides

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Abstract

This article describes an interdisciplinary collaboration among faculty from Communication, English, and Political Science. The article explains how the faculty members help their students understand the complexity of digital divides in society from an interdisciplinary perspective. The faculty members describe how they use instruction in information fluency and intercultural communication to prepare their students to become engaged citizens who know how to take action to address the digital divides in society.

INTRODUCTION

Faculty members in all disciplines face the challenge of preparing their students to function as professionals and as engaged citizens in an increasingly complex global society. Today's students need instruction that will help them develop their information fluency, their intercultural communication skills, and their understanding of the digital divides that exist in our society. Both in the workplace and in their personal lives, our students are likely to encounter the need to communicate with diverse others and to use technology to gather and disseminate information effectively.

Interdisciplinary courses and collaborative projects that require students to work with diverse others are a valuable means to enhance students' understanding of the various divides that exist within and among nations, particularly divides related to technology access and use and to cultural issues. At the University of Central Florida (UCF), faculty have many opportunities to work collaboratively with colleagues across the disciplines. Such opportunities have led to the creation of an interdisciplinary team of faculty members from Communication, English, and Political Science. These faculty members shared interests in culture and power. Recognizing the benefits to be gained by giving student insights beyond the scope of one discipline, this team has worked together over the past three years to collaborate with and learn from one another, and then has taken this

learning to the classroom. The team members have also been guest lecturers in each other's classes to further enhance student insights. The collaboration led to two of the team members creating an interdisciplinary team-taught course. This article discusses the methods used by the team to work both within and across the disciplines to help students bridge the digital and disciplinary divides in our society and to prepare students to play a meaningful role in the democratization of information as concerned global citizens.

The article begins with a description of an interdisciplinary course taught by two members of the faculty team. Then, the article describes individual teaching units used to promote student understanding of the digital divide by focusing on how culture and technology shape human consciousness. Finally, the article concludes by explaining how a major meta-theoretical framework can be used within the Communication discipline to help students conceptualize the digital divide. Throughout the article we emphasize how our various pedagogical approaches benefit students.

THE DIGITAL DIVIDES

The term "digital divide" was originally coined to describe the gap between those individuals and groups with access to digital and information technology and those with no access to it (National Telecommunications and Information Administration, 2000). Such a gap can exist within a nation between the rich and the poor, and it can also exist between developed nations and developing nations. When the term was first used, it typically referred to a disparity in the United States between rural and urban areas and focused primarily on the disenfranchisement of minorities, the elderly, and persons with disabilities. Even more affluent people can suffer from the digital divide. Senior citizens do not have or know how to use technologies that could benefit them. McMurtrey, McGaughey and Downey (2008) explore how the "gray divide" keeps seniors from accessing technologies that could help improve their quality of life, such as by providing timed reminders to take medicine. In 2004 Sciadas argued that "The digital divide represents the area of overlap between the economic and social issues of the Information Society… [and] it is surrounded by normative overtures regarding the perils of marginalization and social exclusion" (p. 4).

However, a great deal has changed since the term was originally coined, and today we speak of digital divides *plural*. Many developed countries are now experiencing a decreased digital divide in terms of access to the Internet, and those developing countries who are "relatively similar" to the developed world from a socioeconomic perspective are also seeing a decreased digital divide (James, 2011, p. 127). However, merely having access to digital and information technology is not enough to create digital inclusivity.

Beyond having access to technology, individuals must be digitally literate in order to benefit from the use of the technology. While our students have access to various information technologies, they typically use them in an uncritical fashion. Faculty members must develop students' digital

literacy and their ability to use technology in meaningful ways (Vie, 2008). Modarres (2011) speaks of replacing the term "digital divide" with "digital differentiation." He uses this term to refer to the "type, speed, and nature of access to information" that users have. He goes on to discuss a 2010 Pew Research Center study by Aaron Smith that found differential usage patterns divided along the lines of race, class, and ethnicity. Therefore, a gap still exists, but now it is a usage gap rather than an access gap. In both cases, it is typically the same groups who are on the "wrong" side of the divide. Clearly, the changing nature of the digital divide makes it increasingly important for faculty members to prepare students for the challenges of global citizenship. The next section describes a team-taught interdisciplinary seminar in global citizenship.

AN HONORS SEMINAR IN GLOBAL CITIZENSHIP

The two members of the faculty team from Political Science/International Relations and English/Technical Communication have developed an interdisciplinary Honors seminar on global citizenship, Global Citizenship: Theory and Practice. The course examines issues of international relations and intercultural communication as they relate to the challenges faced by citizens in the 21st century.

Course Objectives

The course has several interrelated objectives:

1. Students will develop their information fluency skills.
2. Students will develop their knowledge of intercultural communication and international relations.
3. Students will develop an understanding of the complexity of the digital divides within society.
4. Students will produce a real-world project that addresses a global issue.
5. Students will realize the power implications of the digital divides and information fluency.
6. Students will become inspired to continue their global civic engagement beyond the completion of the course.

The course objectives are interrelated because in order to prepare students for global civic engagement, the instructors must first develop their understanding of the many challenges facing our global society including, world hunger, the environment, poverty, inequality, and world health. Students will develop their information fluency skills when they are required to research a global

issue and to produce a service-learning project to address that issue. Moreover, students will learn about the power implications of the digital divides and information fluency.

The students' understanding of the complexity of the digital divides in society may come about in one of two ways: 1) students may choose the digital divides as the global issue they wish to research; or 2) students may encounter the challenges created by the digital divides when researching other global issues. For example, when researching world health students may discover how individuals on the wrong side of the digital divide in developing countries are unable to access important health care information that is readily available to people in developed countries. Even within the United States, with an increasing reliance on websites to disseminate health care information to the public, there are several disenfranchised groups who are unable to access vital information regarding health care and benefits and other important social services. Typically, these disenfranchised users are older adults, disabled persons, and non-native speakers. Therefore, the role of the digital divides in addressing global issues becomes a central part of the students' research and of the development of their projects later in the semester.

Introduction of Basic Theories of International Relations and Intercultural Communication

At the beginning of the semester, students are introduced to basic theories of international relations and intercultural communication. Beyond giving students a solid grounding in both fields, the main focus of the course is to have students develop an informed understanding of global challenges and their power implications.

It is essential that students realize the very nature of international relations (which involves dealing with people from other cultures) has changed. As the classical work of Keohane and Nye (1977) illustrated, international relations is not just an area for the activities of states and government officials anymore. The 21st century has witnessed a surge in relations among ordinary people across international borders as well as a significant increase in non-governmental organizations and activities. The technological revolutions in transportation, computers, and telecommunication have empowered ordinary people to make connections independent from their own government with their counterparts beyond their national borders. Thus, there are more channels of communication with more players at the international level. Consequently, this involves more communication between people from diverse cultural backgrounds. Intercultural communication encounters are increasing especially as the international digital divide among various groups of people are decreasing.

Mindful Intercultural Communication

The instructors strive to help students understand the complexity of intercultural communication and introduce them to the key issues in the field. They avoid focusing on differences

among cultural and co-cultural groups and instead use the concept of mindfulness as a starting point for communication across cultures. Intercultural communication scholar Stella Ting-Toomey (1999) describes a mindful intercultural communicator as someone who avoids stereotypical thinking about other cultures and who respects the viewpoints of diverse others. The concept of mindfulness is valuable for students because it can be applied in all situations and does not require an individual to have extensive knowledge of other cultures or of cultural differences in order to be an effective intercultural communicator.

Student should also realize that mindfulness in international relations may occur at three different, but interrelated, levels-of-analysis: the individual level, the state or national level, and the international system level. From a level-of-analysis perspective, students will become aware that mindfulness may involve conducting activities at a personal level, representing one's ethnic or national background, or focusing on a humanitarian cause beyond one's own borders.

Research Assignment

Early in the semester, guest speakers from various non-profit organizations (Amnesty International, the United Nations Association, the Information and Policy Analysis Center) address the class. These presentations stimulate the students' awareness of various global challenges. At the same time, the class is given a research assignment; this assignment requires each student to conduct in-depth research on one global issue. The students are free to choose the issue they wish to research, but they must get the instructors' approval of their choice. While working on this assignment, students will not only develop their knowledge of global issues, they will also develop their information fluency. The students are required to use both US and non-US sources for their research papers. Further, as part of their research, they must conduct a technology-supported interview with at least one subject matter expert in another culture. Students may use e-mail, Skype, online chat, a videoconference or another computer-mediated technology to conduct their interviews.

Service-Learning Project

Before the guest speakers come to the class, the students are told that they will have the opportunity to volunteer to do a service-learning project for one of the non-profit organizations represented by the speakers. Students are much more likely to be engaged in service-learning projects when they have the opportunity to choose the organization they will serve (Stevens & Campbell, 2006). During the question and answer session after each speaker's presentation, the instructors make a point of asking the speaker what types of projects the students might volunteer to work on for the organization. The students are also given the option of finding an agency of their own choosing in need of a service-learning project.

The students choose their own client and form their own teams for the service-learning project. Each student team works on a semester-long documentation project (website, manual, newsletter, brochure, handbook, or white paper) that supports the mission of a non-profit agency. The project may be used internally within the agency, for example, a handbook for volunteers, or may be used externally, for example, a website to publicize the activities of the organization.

Each team is required to write a proposal for their documentation project. The proposal is submitted to the client for approval before the students begin working on the project. In order to complete the proposal, the students must do research on the non-profit organization and the global issue the organization addresses. This research will help to develop students' information fluency. Additionally, since the students will be developing their documentation in an interdisciplinary context, the project will also serve to enhance their understanding of the complexity of global issues, since they will be challenged to view them from more than one perspective.

Successful Students Projects

The nature and focus of student projects varies widely depending upon the interests of the students in the class and the needs of local non-profit agencies. For example, in Fall 2011, one student team worked on a project for the United Nations Association (UNA). The team developed curricular materials to be used at the fifth-grade level to introduce students to the United Nations. This project came about because the Orlando Chapter of UNA was concerned about the fact that typically students do not learn about the organization until they are in high school. Making students aware of the organization and its mission at an earlier age will make it much more likely that they will become active and involved citizens who understand the many global challenges facing society.

Another student team did a project for UCF's Office of Diversity Initiatives and Office of International Studies. The team's project was the development of a website, *UCF Celebrates Diversity*. The site presents information on the various holidays and traditions celebrated by members of the UCF community. The purpose of the site is to recognize the richness of the diverse UCF community and to enhance communication and understanding among its members. Although this project did not serve a non-profit agency, the students felt very strongly about the need to cultivate greater understanding among the diverse members of the UCF community. The website is designed to allow individuals to add their own traditions and experiences, and the site will be open to the general public.

The third student team developed a project for the International Visitors Center. Each year, the Central Florida area receives a large number of international visitors. Many of these visitors come to the UCF campus. This student team created a brochure to be used by volunteers giving tours of the UCF campus to international visitors. By sharing information about UCF and the Central

Florida area, the tour guides can increase international understanding and goodwill. In addition to creating the brochure, the students also volunteered as tour guides.

Public Presentation

The students were also required to give a public presentation of their work. The purpose of this presentation was for students to share their work with members of the campus community, a group in the larger community surrounding the university, or with the target audience for the documentation they created. The presentation could be given to another class at the university, to a class at a local elementary or secondary school, or could be given as part of Diversity Week, International Education Week, or another relevant campus or community event. By sharing their work publically, the students help to raise awareness of global issues on campus and in the community.

Benefits to Students

Students derive many benefits from participation in these service-learning projects for non-profit organizations. These benefits are related to the development of their skills and their understanding of complex global issues. The benefits include:

- Understanding of cultural differences
- Understanding of the digital divides in society
- Development of information fluency
- The ability to think critically about global issues
- Knowledge of world events and the ability to view them from an interdisciplinary perspective
- Knowledge of how to take action locally to address a global issue
- A framework for future civic engagement

Of course, the students' projects also benefit the non-profit organizations they serve. Ideally, the work the students do will also raise the awareness of the campus community, and perhaps the larger community, regarding global challenges. The greatest benefit for students is their development of a framework for civic engagement that they can apply throughout their lives. When students have the opportunity to develop a sense of themselves as global citizens, they will see the connections among lifelong learning, information fluency, and global civic engagement (Stevens & Campbell, 2006).

CONSCIOUSNESS AND THE DIGITAL DIVIDE FROM A COMMUNICATION PERSPECTIVE

In addition to creating an interdisciplinary course germane to promoting information fluency in the digital divides, members of the team also devised individual teaching units that further address

these issues. Thus, issues of information fluency and the digital divide from an interdisciplinary perspective become more fully integrated into the curriculum of each department represented on the team.

An approach used by one of the Communication faculty members to promote student understanding of the digital divide is to explore the coalescing roles of culture and technology on shaping human consciousness. Students today are often asked to "think outside the box." This instruction presumes that students (and their instructors) are even aware of "the box." The box that students are asked to explore is treated metaphorically, simplifying the essence of the task requested.

Geertz (1983) urges scholars of culture to analyze common sense rather than merely use it. Geertz posits that common sense is a cultural system to which we are enculturated. It is not an inherent rationality, but a culturally generated rationality. That which seems obvious in one place is alien in another. Yet, the common sense that emerges is so powerful that it becomes naturalized and unquestioned. When common sense controls the consciousness,, mindfulness is absent. The task for talking with students about common sense is to make students realize that which has become commonplace to them is not shared by the rest of the world.

A Cultural Case Study

One strategy used to help students recognize the digital divide involves sharing an old news article. In 1996, *Newsweek* published an article about two Iraqi men in Nebraska who married two Iraqi girls aged 13 and 14. They were, at that time, being prosecuted. The article provides a great basis for discussion because it triggers many ethnocentric reactions – against arranged marriage, immigrants, sexual abuse, and against those who do not adapt fluidly to the local rules and customs observed in the United States. The instructor invites the students to discuss what they think should happen to these men and asks them to identify what further information they would require were they to serve as jurors in the case.

The discussion of the article always includes at least one student stating that anyone who comes to our country should know our laws. Such a statement provides an opening for the instructor to draw students' attention to the digital divide. The instructor asks if the student if he or she were traveling overseas, what would he or she do to prepare. The student usually responds with an answer of doing some sort of research. The instructor then probes further, asking about how the research would be conducted. The student responds that a computer or the Internet is used. At this time the instructor asks, "And where do you find a computer?" Most students are puzzled at the question. All of the students have a personal computer and many carry a smart phone. The students are then asked if (a) they assume everyone in other countries owns a personal computer or (b) has easy access to a computer. (Students are also asked how many of them have left the

United States as a refugee.) The objective in the discussion is not to promote a "right" answer about the situation, but to make students increasingly aware of the impact of a digital divide on other cultures. The students recognize that their reasoning is grounded in widespread accessibility of technology and that this reality can shape their expectations and judgment of others.

Exploring the Complexity of the Digital Divide

In addition to examining one case study, the instructor also guides the students through some challenging topics. Two explored herein involve using the discussion topics of Affirmative Action and research on how media shapes consciousness. The objective of using these two different topics to exploring the digital divide is to see the phenomenon from a critical perspective. Rather than simply identify that there are differences, students are encouraged to explore the far-reaching effects of those differences. These discussions also guide students to recognizing that the people on the other side of the divide are worthy of consideration.

When students are presented with topics such as Affirmative Action, many will reject the need and appropriateness of such policies. Students feel passionately about promoting a system that evaluates "merit" rather than one that responds to issues of "historical injustice." It is common for students to decry the need to acknowledge "historical injustice" when slavery occurred so long ago. For students to begin to comprehend why there are two sides to issues such as Affirmative Action, it is again necessary to help them to peel back the layers obscuring that which is "cultural" about our common sense.

Data from the National Telecommunications and Information Administration suggest that between the years 2000-2003, an urban household with a high income was more than twenty times more likely than an urban low income household to have Internet access. They also note that "a low-income Caucasian family is *three times* as likely to have Internet access as a child in comparable African American family and *four times* as likely to have access as children in a comparable Hispanic household" (Whaley, 2004, p. 184). Providing students with such information helps them to recognize that economic and racial differences are still influential today, and that one does not have to look only to a distant past to notice inequities. Likewise, students are informed about how the problems are further exacerbated in school systems struggling with the digital divide. Some scholars have suggested that impoverished school systems tend to use technology in a more additive way thus decreasing the level of information fluency promoted as opposed to the schools who take a more integrative approach to the use of technology (Morse, 2004). Given the global economy in which the United States so actively participates, such a disparity can suggest profound implications for children growing up in homes and schools impacted by a digital divide.

Another way that students are urged to recognize "the box" (or the impact of cultural common sense) is through examining media influences that define "the box." Media shape consciousness. As the media differ across national and even generational boundaries, the cultural differences are broadened. Geertz's notion of common sense also holds important implications for teaching students about the "impoverished" people who do not have the same access to technology. While, as noted above, the digital divides can have significant implications in a global economy, it is an important part of undergraduate students' education to combat ethnocentrism by reinforcing the notion that "different" does not equate with "less than."

Scholars such as Ong (1982) and Havelock (1986) have explored how the shift from orality to literacy has shaped human consciousness. Having been raised in literate cultures, today's students have been shaped by discourses promoting literacy and concerns over illiteracy and functional illiteracy. It is useful, however, to recognize that oral cultures should not be judged by a standard of literacy. Ong points out that "You cannot without serious and disabling distortion describe a primary phenomenon by starting with a subsequent secondary phenomenon" (p. 13). Instead, students are invited to speculate and reflect upon that which is admirable in an oral culture; for example the recognition of shared knowledge rather than "private ownership of words" (Ong, 1982, p. 131), the participatory or social aesthetic nature of orality, and the potent abilities of memorization for those living within an oral culture. By viewing those with different knowledge bases as fully human and vitally intelligent, students develop a respect for the cultural other enriches the complex understanding of the digital divide.

In order to help students to more actively engage in a process of questioning, it is helpful to use that which McLuhan and McLuhan (1988) called their "tetrad." The tetrad is comprised of a series of four questions to use in interrogating medium of communication or a cultural artifact. These questions are:

- What does it enhance or intensify?
- What does it render obsolete or displace?
- What does it retrieve that was previously obsolesced?
- What does it produce or become when pressed to an extreme? (p. 7)

By inviting students to ask these questions of the social media in their lives, for example, they begin to take a more critical stance of their own social world. This questioning can be seen as a step toward de-naturalizing their world and as moving students toward de-centering their own lived experiences. Pavlovich and Krahnke (2012) review scientific evidence to advance the argument that empathy "causes people to act in ways that benefit and enhance outcomes for others" (p. 133). Through such pedagogical techniques, students are encouraged to recognize a digital divide while doing so in a way that is humanizing and respectful to those on the "other side" of the divide. It is also the hope of most educators that

students will internalize some values that seek compassionate bridges to cross the divides that separate people.

Benefits to Students

Students who participate in the discussion about them begin to realize that there are both global digital divides that make intercultural comparisons and applications of a single standard for evaluation untenable. It is important to note that the recognition of a digital divide is fostered through a discussion process rather than a lecture. The quizzical look on student faces when asked where they go to find a computer enhances an awareness of their own cultural common sense. By the same token, exploring how digital divides are evident among cultures within the United States borders fosters an awareness of how a different understanding of the world can stem from economic histories and differing abilities to access technologies. Pairing the concepts of common sense and digital divides provides a conceptual foundation for further inquiry and improved global citizenship.

THE COMMUNICATION DISCIPLINE AND THE DIGITAL DIVIDE

Besides the interdisciplinary course and the individual teaching unit in communication already described another individual teaching module was developed to help students understand how the digital divide can be conceptualized within the communication discipline and the implications this has for addressing it. In order to engage students both intellectually and practically, the module emphasizes use of a major meta-theoretical framework in the communication discipline to enable students to explore a multi-theoretical way of conceptualizing the digital divide. A meta-theoretical framework is a conceptual category system that organizes the theories which account for a given phenomenon.

Essay Assignment

The essay assignment involves requiring students to identify a major meta-theoretical framework as presented in a scholarly or pedagogical source (e.g., a journal article or a textbook) and to use it to write an essay showing how the digital divide can be conceptualized in different ways and the implications this has for strategies to address it. In the same essay, students are also expected to compare the experiences of two countries which show can show how the digital divide exists not only between countries but also within them. Students are then required to apply some of the theoretical insights gained in the meta-theoretical analysis to the experiences of the digital divide between and within the countries examined.

An Exemplar of a Meta-Theoretical Analysis of the Digital Divide

In order to facilitate students' understanding of how a meta-theoretical analysis might be used to conceptualize the digital divide and how to address it, Craig's (1999) Constitutive Meta-Model of Communication is used as an exemplar. This meta-theoretical framework has been widely examined in both the scholarly (Myers, 2001; Craig, 2001; Craig, 2007; Donsbach, 2006) and pedagogical literature (e.g., Miller, 2012; Littlejohn & Foss, 2011; Griffin, 2012) in the communication discipline. Students are required to engage the original article but also any of the multiple secondary sources that analyze or describe the meta-theoretical framework. Because it mostly paraphrases the framework, the secondary source can help to ease students' anxiety of engaging the complex article. A brief rendition of how each of Craig's seven traditions of communication theory might conceptualize the digital divide follows.

Rhetorical Tradition

The digital divide would be viewed as a social exigency which Loyd Bitzer (1968, p. 7) defined as "an imperfection marked by urgency" but which can be changed partially or wholly with the use of persuasive rhetorical appeals. Because this outlook on communication believes that persuasive speaking is teachable and that some people are more proficient at it than others, students can be taught to speak persuasively against the digital divide. For example, students can learn how to craft and deliver effective logical, emotional, and ethical appeals drawing on Aristotle's classical rhetorical theory utilizing the subject of the digital divide. Outside of academia, decision makers such as representatives in congress can be lobbied concerning policies that address the digital divide within and between nations.

Semiotic Tradition

Because this tradition conceptualizes communication in terms of how verbal or nonverbal signs or symbols either facilitate or obstruct shared understandings between or among people, the digital divide would be understood in terms of the codes that bind the digital haves but also alienates the digital have-nots. Specifically, the jargon or specialized language employed by the digital haves which is alien to the digital have-nots (e.g., USB flash drive, thumb drive, flash disk, flash drive) becomes an interesting topic of discussion from this perspective. Cultivating digital or computer literacy as a way to promote inter-subjectivity on matters digital divide then becomes a logical extension of this discussion.

Phenomenological Tradition

With the emphasis on communication problems as "absence of authentic human relationships" the digital divide becomes another manifestation of this social malady. One major

reason for the existence of inauthentic dialogue is failure to suspend judgment of others which undermines the ability to gain insight into the "other's" experience. For example, Dervin (1989, 2003) and Savolainen (1993) argue that service providers tend to ignore the perspective of the poor by categorizing them (and pejoratively so) from service providers' point of view rather than trying to understand the poor people's subjective perspectives of how they make sense of the world. According to Dervin (1989, p. 217), predictions by service providers who use such categorizations result in "the advantaged users [becoming] better served and the disadvantaged [becoming] worse off. Therefore, the phonological tradition aspires to cultivate ways of fore-grounding the subjective meanings of both the so-called digital haves and digital have-nots.

Cybernetic Tradition

Viewing communication in terms of information processing within a social network, the cybernetic tradition recognizes flaws or "malfunctions" in the system that prevent individuals, groups, and countries from accessing information resources. A digital divide, then, would be viewed as a function of such a "bug" in the information processing within the social network. Addressing this "bug" might involve linking those who are excluded from the network to resources that connect them to the information processing in the network.

Socio-psychological Tradition

Seeking to explain communication in terms as a function of "personality, emotion, perception, cognition, [and] attitude," this tradition would conceptualize the digital divide in terms how these constructs account for it as a dichotomy or spectrum. A number of studies that represent this tradition include Crump and McIlroy (2003) who accounted for digital divide regarding a New Zealand ICT project in terms of degree of interest in the Internet; Katz and Aspen (1997) who focused on how motives explain being "on and off" the Internet; Kang, Bagchi-sen, and Rao (2005) who examined how the "intermittent user" and the "drop out" types account for the degree of Internet use; Ishii (2005) who examined how the degree of experience with e-mail was related to satisfaction with it; and Kalmus, Realo, and Siibak (2011) who analyzed the role of motives and personalities in predicting Internet use.

Socio-cultural Tradition

Emphasizing how communication reflects social order, this tradition suggests that the digital divide is reproduced by pre-existent social structures which are then perpetuated and exacerbated. Yu (2006) categorizes these social structures in terms of factors that are associated with the digital divide between countries and those linked to the digital divide within a country. International digital divide factors include economic development, public policy, cost of access, market structure, level of

urbanization, official language, and information infrastructure. Intranational digital divide factors are family structure, age, race, socioeconomic status, and geographical location. Factors that apply to both international and intranational digital divides involve educational level and culture.

Critical Tradition

With its focus being on how communication can be distorted in terms of oppressive and hegemonic relations between historically dominant and less dominant groups, this tradition conceptualizes the digital divide as manifestation of these social dysfunctions. Examples of this type of research includes social exclusion theory which posits that the social exclusion suffered by the digital have-nots "is a state and process of deprivation imposed on its victims by those who have power to exclude" and that therefore "critiques the oppression of the powerful over the powerless of society" (Yu, 2006, p. 667). From this perspective, social structures that reflect the digital divide as described under the socio-cultural tradition are not neutral but sites of oppression which need to be critiqued and resisted for emancipation to occur. A specific study conducted along these lines is Mossberger, Kaplan, and Gilbert (2006) which concluded that for African Americans as a group, racial discrimination rather than their ethnicity accounts for their exclusion from the digital revolution.

Benefits to Students

As a result of this assignment, students' critical thinking abilities are enhanced as they realize the different ways in which communication phenomena can be conceptualized and the practical implications involved. Also, by explaining the similarities and differences between the digital divide experiences of the countries examined students are able to expand their international and intercultural awareness.

CONCLUSION

The course and course modules described in this article are just examples of interdisciplinary approaches to fostering students' understanding of the digital divides that exist within our society today. Although the primary focus of these pedagogies is to develop students' ability to comprehend the complex issues related to digital technologies, power, and communication, such instruction also fosters the development of their intercultural communication skills and their information fluency. The work done by the faculty team described in this article provides many benefits for students and gives them skills, abilities, and competencies that will serve them well both in their personal and professional lives.

However, one additional benefit of interdisciplinary collaboration that should not be overlooked is the way such teamwork enriches the teaching and scholarship of faculty members.

We learn a great deal from one another and by our own collaboration can serve as role models for our students. Although interdisciplinary work often requires extra effort and time on the part of faculty members, it is our experience that the benefits for both students and faculty far outweigh the challenges inherent in such work.

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Cover Art

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In choosing the original logo design for the *Journal of Information Fluency,* we carefully selected the jigsaw puzzle pieces for the background. As we navigate the digital world and attempt to find relevant and useful information, evaluate the information, and then decide how we can ethically use the information in our research and course development, it sometimes feels as though we are putting together a puzzle. Over the past five years I have noticed that students, faculty, and professional staff struggle with deciding what information is most appropriate in a given situation and how it "fits together" with other information. The abundance of information may become overwhelming and look very similar to a 5,000 piece jigsaw puzzle when you first empty the contents of the box and pour the pieces onto your table.

When I saw the quote from Lucius Annaeus Seneca (bottom cover image) in a recent article, I laughed. I remember studying Seneca in a philosophy course and learning even more when I was researching to teach history during a summer semester at a military college in Georgia (very early in my academic career). Seneca (4 BC- AD 65) was a Roman Stoic philosopher, statesman, dramatist, rhetorician, and advisor to Emperor Nero. He spent much of his life in exile and is credited with writing 12 essays, numerous letters, nine tragedies, a satire, and even a meteorological essay. I found the volume of his publications interesting when compared with his often repeated quote, "the abundance of books is distraction." Perhaps he meant the abundance from other writers was a distraction. Or he may have meant those whose opinions differed from his were publishing too many essays. Perhaps, he even meant that there were so many good works being published he did not know which to require his students to study.

As I consider his quote, I wonder how he would feel today about the quantity of information that is freely and easily available. He may consider the abundance of information to be a lot like the pieces of that large, 5,000 piece jigsaw puzzle, waiting to be gathered, evaluated, and correctly used to form the perfect picture.

Examining Student Information Seeking Behaviors in Higher Education

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Abstract

With the growth of online and blended courses and the abundance of information now available online, students have more access to digital resources than ever before. Yet, little is known about how they find, evaluate and use these resources. This paper presents the results of a national study of higher education students aimed at understanding when and how students use digital resources, why students prefer some more than others, and also how their information seeking behaviors change when they research a topic for class or work versus their own interest. Findings illustrate that students create priorities for how they view the usefulness and quality of information, depending on their circumstance and need.

INTRODUCTION

With the plethora of information sources available, today's college and university students have access to more learning resources than ever before. How they find, evaluate, and use this information is still under investigation, however, and determining how students interact with and use digital resources has implications regarding the costs and opportunities for higher education (Bates, 1989; Morville, 2005; Taleb, 2010). Higher education is experiencing exponential growth of online courses (Allen & Seaman, 2011), including the new movement toward massively open, online courses (MOOCs) (*What campus leaders need to know*, 2012). In addition, the open educational resources movement continues to grow (Wiley & Green, 2012). Public and private foundations, including the National Science Foundation, have devoted significant funds to the creation of digital resources and to digital libraries to organize and disseminate them. Many students find themselves physically remote from a traditional college library, yet conducting research is still a necessity for

higher education coursework. Libraries have been forced to adapt to the electronic world by providing online search capabilities as well as access to electronic books, journals, and other resources known only in "print" form by past generations. Many libraries have adapted their services to this online environment by providing students with remote access to resources as well as reference librarians in an effort to keep pace with the growing digital demand.

Even as these services grow, we need more knowledge about how students engage with and learn from online resources. We know students have increasing access to online environments, technologies, and the ability to collaborate (Allen & Seaman, 2012; Anderson, Boyles, & Rainie, 2012; Johnson, Adams, & Cummins, 2012). Thus, we tend to presume that current generation of students are adept users of the Internet for learning purposes--using multiple strategies to find, evaluate, and interact with these resources in a manner that stretches the boundary of what has been students' "traditional" interaction with college and university libraries. We know even less about how they use the growing educational content available through open access content (journals and eTextbooks), open educational resources (OER) or digital libraries such as National Science Distributed Learning (NSDL).

Trips to a university library or a visit to an instructor's office are diminishing in frequency because the majority of students can conduct significant amounts of research online –searching their own campus's library collections, as well as collections well beyond the confines of their campus boundaries such as the freely downloadable material from OER sites, or search engines (e.g., Directory of Open Access Journals or Google Scholar).

PRIOR WORK

Existing research about students' use of digital resources varies widely in approach and focus. Many studies have been completed in a K-12 setting and are thus of limited utility for understanding the use and benefits we might see in higher education (Crawford & Brown 2003; Nokelainen 2006).

Most recently, the Pew Internet & American Life Project examined how teens in middle and high school conduct digital research by surveying advanced placement and national writing project teachers (Lenhart, Arafeh, Smith, & Macgill, 2008). They found that the best students excel at finding detailed information on topics that interest them, that students have access to varied multimedia formats, and that many become self-reliant researchers. However, teachers expressed concern over students' dependence on search engines rather than utilizing online databases, respected news sources, or even librarians. Students also have difficulty assessing the quality of online information, and lack information literacy and time management skills (Purcell et. al, 2012). This research examined the highest performing K-12 students, and by the authors' own admission,

has limited generalizability to other populations, or how these students will perform in higher education research settings.

Where undergraduate studies of student use of digital content have been done they tend to be small in scale, often focused on a single course or at a single institution (Hardy et al 2008; Khine 2006; Lau and Woods 2008; Koohang 2004; Apedoe 2007; and Borgman et al 2000). Furthermore, the small-scale, focused studies tend to be about materials that were developed specifically for a project, rather than being focused on generally available, shared and re-purposed digital learning materials, of the type commonly found in specialized NSDL collections (De Salas & Ellis 2006; Hsin-liang & Gilok 2005). Common practice has been for studies to focus on the combined impact of digital learning materials in the contexts of specific e-learning environments (Lam & McNaught 2006; Pavey & Garland 2004; Khine, 2006), specific technology environments (Grimes, Warschauer, & Hutchinson, 2006; MacFarlan, Bohling, Thompson & Townsend, 2006), and a particular type of pedagogy or teaching intervention (Genereux & Thompson, 2008; Manfra & Stoddard, 2008). Investigators have encountered difficulty disentangling the impact of the resources from the other elements of the intervention.

Clearly, students are seeking out online learning materials and finding them useful. This is supported by some suggestive findings from some of the smaller scale research that has been done on student use of digital learning materials. Although subject to the limitations listed above, the findings suggest some promising avenues of research. For example, Lau & Woods (2008) used a technology acceptance model to look at user beliefs and attitudes about learning objects to assess the likelihood of their use. They conducted a demonstration in a large freshman undergraduate IT class, followed by a survey to assess beliefs and attitudes. They found that beliefs and attitudes will have a substantial influence on whether or not users are likely to use learning objects in the future, though they found that user perceptions of usefulness had a stronger influence than ease of use. Specifically, they measured actual use, behavioral intention, attitude towards, perceived ease of use and perceived usefulness. Similarly, Hong et al (2001) found usage of an institutional digital library was less than they expected but they still found both ease of use and relevance important in determining potential student use with relevance being the most important factor.

Some broad-based studies of undergraduate student technology use have been conducted (Dahlstrom, 2012; Allen & Seaman, 2011; Lenhart et al, 2008; Jones 2002; Valentine & Bernhisel, 2008; Kennedy et al, 2008). However, these studies tend to focus on student ownership and use of specific technology tools and their general media habits and only peripherally consider student interaction with research content within a learning context, if they do so at all. Caruso and Salloway, (2008) reported that students perceive themselves as very skilled or experts (80%) at information literacy skills such as Internet searching, evaluating the reliability and credibility of online sources or understanding the ethical issues surrounding digital information.

More recently, the Project Information Literacy Progress Report (Head & Eisenberg, 2010) surveyed students from 25 campuses regarding their information seeking strategies and research difficulties. With over 8,000 students responding, they focused on examining how students conceptualize and operationalize course-related and everyday life research. The majority of students reported frequently conducting "academic" research for writing papers, oral presentations and interpretation of texts required for course work; "everyday life" research for personal reasons and for personal use. Students reported having fewer problems finding information for personal use than for conducting course-related research. They reported (84%) that the most difficult step in the research process was getting started. Over 95% of the respondents reported that what mattered most to them for course related research was getting a passing grade, finishing an assignment or getting a good grade. At the same time, almost 80% reported that they thought it was important to conduct comprehensive research and learn something new. Evaluating the information was collaborative because these respondents often turned to friends and/or family for advice or help in sorting through and evaluating the information, particularly for personal use. Forty-nine percent reported asking instructors for assistance when seeking information for course purposes, with only 11% seeking advice from campus librarians. And despite students' reputation for being avid computer users who are fluent with new technologies, researchers noted that few of them used Web 2.0 application for collaborating on assignments or research.

This study expanded upon their prior study where Head and Eisenberg (2009) conducted student discussion groups across 7 U.S. college campuses and found that students had varied search philosophies for course-related versus everyday life research, finding that Google, blogs, and Wikipedia were sources to turn to for everyday life research. Often, this was conducted in open-ended format with students searching more out of curiosity and interest than with a clear direction, as they had with course-related research. Course-related research, however, proved to be more frustrating as students reported difficulty finding materials or locating resources.

THE STUDY

The present research began by examining how students at two- and four-year colleges and universities find and use information resources. The main focus was on learning associated with coursework, but also encompassed more informal or personal learning situations. We began the study by conducting focus groups to investigate the way students gather, evaluate and use information via digital resources. Focus group sessions were conducted at the University of Central Florida, University of Illinois, and the University of Wisconsin, Madison (4-year research universities) and also at one Illinois community college –Parkland College. Discussion centered around students' views of digital resources and their perceived value, motivation for students to utilize digital

resources, strategies and perceptions of students utilizing digital resources, and any barriers to their use.

Analysis of the focus group discussions culminated with a draft student survey which was then administered to students in two courses at the University of Central Florida. In addition to question responses, students were asked to provide feedback on the question format and wording, noting any questions that they perceived were particularly confusing. This allowed for more precise refinement of the final survey and this extensive input from students provided a survey that was valid and relevant.

The final survey consisted of demographics, academic and employment information, technology availability and use. In addition, a number of Likert-scale items were asked that focused on the comparison of how students utilized digital resources for gathering information for coursework versus gathering information for topics of interest, student motivation for studying and completing academic work, and general student preferences for the use of digital resources.

In this article, we report on the aggregate and summary results from this national survey of 18 to 31 year olds in the United States. While our target sample was currently enrolled higher education students, we also received a significant response from recent higher education students, and a smaller sample of individuals who had not pursued post-secondary education. The survey focused on their perceptions of digital resources and their utility in the service of learning. The research was aimed at understanding when and how students use digital resources, why some are preferred more than others, and what they perceive to be the benefits of their use. While funded by the National Science Foundation, the research spanned all disciplines, not just the sciences, mathematics or engineering. Digital resources was defined broadly and included social networking sites, sites deemed ‘general interest’ such as Wikipedia or iTunes University, disciplinary focused curated collections of materials such as BiosciEdNet (http://biosciednet.org) or digital library collections from their own or other campuses. Use of resources encompassed all aspects of learning within a college environment, including conducting research for writing assignments, completing homework assignments such as problem sets, clarifying concepts or questions raised in lectures or through readings, seeking supplementary information or pursuing answers to students’ own questions.

An online survey administration provider (Survey Monkey) was used allowing for a national sample. Because of the large database of participants maintained by the provider, the sample was narrowed to those within 18-31 years of age to increase the likelihood of student respondents. The anonymous nature of the participants streamlined the Institutional Review Board (IRB) process, while allowing for a large sample of students attending a wide variety of two- and four-year public and private colleges, as well as those formally or never attending college.

Responses were received from 1,740 participants. Fifty-nine percent were male, forty-one percent were female. Seventy-three percent were Caucasian/white, while 8% were Hispanic, 5% Asian, 5% African American/black, and 9% other or did not disclose their ethnicity. Table 1 illustrates the breakdown of students by status. Sixty-two percent of respondents were either full time or part time students.

Table 1. Student status (n=1740)

	%
A full-time college/university student	53
A part-time college/university student	9
A former college/university student	31
Never a college/university student, and not currently a student	8

Table 2 presents the most recently attended institution for those responding illustrating that the majority (62%) of current or past students attended a 4-year college or university.

Table 2. Most recently attended institution? (n=1555)

	%
2 year/community college	16
4 year college/university	62
Trade or tech school	2
Comprehensive or research university	17
I do not know	1
None of the above	2
An online institution	1

For those respondents who were current or former college students, the highest concentration of majors included Business (15%), the social science fields such as psychology (13%) and engineering and computer science (11%). Thirty-one percent of respondents were in STEM fields, with 69% indicating they were in non-STEM majors (Table 3).

Table 3. College major (n=1564)

	%
Biological/life sciences, including agriculture	8
Health sciences, including nursing	9
Vocational or technical programs, e.g. automotive, culinary arts	2

Business, management, marketing	15
Education, including physical education	6
Engineering, including computer science	11
Humanities, including history and liberal arts	7
Physical sciences, including math	3
Social sciences, including psychology	13
Fine arts	5
Undecided	5
Other	16

For participants who were currently students (Table 4), nearly half (48%) were lower division students, while approximately 37% were upper division undergraduates and 12% indicated they were graduate students. Thirty-seven percent of students indicated they lived in on-campus housing, while 38% lived off-campus, either with family or spouse/significant other/partner. Seventeen percent lived off-campus with friends and 8% were alone and living off-campus.

Table 4. Academic standing. (n=1041).

	%
Freshman	24
Sophomore	24
Junior	18
Senior	19
Graduate	12
Other	3

Forty-one percent of the respondents were not employed, while 32% worked less than 20 hours a week. Nineteen percent worked from 20-39 hours a week and 9% worked 40 hours or more (Table 5). Perhaps not surprisingly, 43% of full time students lived on-campus and were unemployed while 95% of part time students were living off campus, most often with family or spouse/significant other/partner (69%), and 74% of these students were also juggling a job, with over a third (34%) working a minimum of 40 hours per week.

Table 5. Hours employed per week.(n=1043)

	%
0, I'm not working	41
1-9 hours	14
10-19 hours	18
20-29 hours	12
30-39 hours	7
40+ hours	9

Anticipating that students' experience and exposure to technology use in education may influence their use of digital resources, a number of demographic questions were asked concerning what technologies had been used in their courses versus what they preferred faculty to use in instruction and also what modality their courses had been versus their preferred course modality. Those students with extensive experience in the online environment might respond differently to some information seeking behaviors and digital resource use. In addition, we examined differences by various demographics, including age, gender, STEM vs. non-STEM major, etc.

Nearly three-fourths of students had courses that utilized video or audio, while 69% used online library resources, and 62% utilized outside Websites for content (Table 6). Less than half of students (42%) reported that they had utilized e-books or e-textbooks in their courses. Technologies used far less prevalently included course wikis and blogs (24%), simulation, animations, or online games (24%) and social networking technologies (19%). Very few (5%) reported utilizing mobile applications in their courses. Examining these by STEM and non-STEM majors showed little difference, with the exception that STEM instruction included more simulations, animations or online games (35%) compared to non-STEM courses (19%). Non-STEM instruction also utilized more online library resources (74% vs. 66%) and course wikis and blogs (27% vs. 21%) than non-STEM courses.

Table 6. Technologies used in classes or class assignments last semester (n=1071)

	Total (%)
Video or audio related to course content	74
Online library resources	69
Content from websites outside of your campus	62
E-books or e-textbooks	41
Course wikis and blogs	24
Simulations, animations, or online games	24
Social networking technologies	19

Table 7 reports student respondents' *preferred* frequency of use of these various technologies in classes or in class assignments. Most preferred (sometimes or frequently) technologies for courses or assignments included video/audio (88%), external website content (80%), simulations/games (67%), and e-books or e-textbooks (63%). Most notable is that the majority of students do not have a preference for course wikis and blogs, mobile applications, and social networking technologies, with over half of students indicating they would like to see these technologies used seldom or never in their courses.

Table 7. Respondents' preferred use of technologies in classes or class assignments.

	n	$\bar{x}$	SD	Never (%)	Seldom (%)	Sometimes (%)	Frequently (%)
Video or audio related to course content	1000	3.19	0.74	3	10	52	36
Content from websites outside of your campus	1000	3.06	0.79	4	16	50	30
Simulations, animations, or online games	994	2.79	0.98	14	19	41	26
E-books or e-textbooks	998	2.73	0.97	13	24	39	24
Course wikis and blogs	994	2.35	0.92	21	35	34	11
Social networking technologies	995	2.20	1.03	33	28	27	13
Mobile apps related to course content	992	2.19	1.03	32	30	25	13

Table 8 compares students' experience with their current classes utilizing course Web modalities, compared with their preferred course modalities. The majority of students (81%) had minimal, if any Web use in their courses. Similarly, they liked it that way with 71% indicating they preferred minimal or no use of the Web in their courses. Twenty percent preferred an equal mix of Web vs. F2F and a very small percentage (8%) either had the majority or all of their coursework over the Web or indicated that mostly online instruction was their preferred method of learning.

Table 8. Modality of majority of course vs. preferred modality. (n=1002)

	Classes (%)	Preferred (%)
Entirely face-to-face	45	40
Minimal use of the Web, mostly held in face-to-face format	36	31
An equal mix of face-to-face and Web content	12	20
Extensive use of the Web, but still some face-to-face class time	3	4
Entirely online with no face-to-face time	5	4

Next, we asked students about their information seeking behaviors—when they need to find information, where do they go? And, specifically, what do they do if it is for class versus a topic merely of interest to them? Table 9 illustrates 13 common search behaviors that are used to locate information on a given topic, demonstrating the change students illustrate with the pressure of needing information for class. The rating scale for these questions was a 5-point Likert scale, ranging from Very unlikely (1) to Very likely (5). Mean responses indicate that when looking for information required for class, students first go to the class textbook, then turn to Google and their friends. Interestingly, they seek out faculty and teaching assistants (TAs) only after going to their friends.

When looking for information on a topic of interest that is not required for class, student behavior changes. Google and Wikipedia are the primary sources for information, followed by supplemental readings and textbooks. Although using Wikipedia might be considered inappropriate in some educational areas, 57% of respondents indicated they typically used it for class or work, with 49% indicating they used it to gather background information, 38% using it for explanation of complex topics, and 28% using Wikipedia to find citations for other sources. For those who didn't use Wikipedia, 28% distrusted the accuracy of information, 28% indicated there were more appropriate resources available, 18% were not allowed to use it as a source, and 10% felt it provided too little detail.

Interestingly, students indicated they preferred online library resources to asking a librarian for assistance, with the librarian being one of the most unlikely sources indicated and the online library sources being moderately used for either class or for topics of interest. Likewise, students tend not to use Internet message boards or talk to outside experts when seeking information.

Table 9. Students' Information Seeking Behaviors: Class

		n	$\bar{x}$	SD
1.	Consult textbooks	983	4.48	0.82
2.	Google search	979	4.32	0.92

3.	Seek out friends	983	4.19	1.01
4.	Seek out faculty and TAs	986	3.88	1.13
5.	Use online library resources	981	3.82	1.14
6.	Wikipedia	982	3.81	1.30
7.	Consult supplemental readings	985	3.72	1.17
8.	Text or IM friends	982	3.69	1.29
9.	View online lecture	982	3.45	1.28
10.	Tutor or learning center	981	3.17	1.28
11.	Post on Internet message board	984	2.78	1.39
12.	Ask a librarian	981	2.44	1.31
13.	Email outside experts	983	2.30	1.33

Students Information Seeking Behaviors: Interest

		Rank for class	n	$\bar{x}$	SD
1.	Google search	2	955	4.54	0.83
2.	Wikipedia	6	959	4.13	1.21
3.	Consult supplemental readings	7	957	3.87	1.22
4.	Consult textbooks	1	957	3.85	1.23
5.	Use online library resources	5	956	3.75	1.27
6.	View online lecture	9	958	3.51	1.34
7.	Seek out friends	3	960	3.50	1.33
8.	Seek out faculty and TAs	4	960	3.26	1.42
9.	Text or IM friends	8	959	3.14	1.41
10.	Post on Internet message board	11	956	2.69	1.42
11.	Email outside experts	13	956	2.63	1.40
12.	Ask a librarian	12	958	2.57	1.39
13.	Tutor or learning center	10	959	2.31	1.32

Similarly, we asked students about their information seeking behaviors when searching for information for work versus a topic that was of interest. Table 10 illustrates that Google is the search method of choice when school is not involved. If locating information is critical to work, students indicated they would consult books or experts after Google. However, Wikipedia was preferred to books when the topic was not required for work. Posting on an Internet message board or asking a librarian were the least preferred methods of gathering information in either case.

Table 10. Respondents Information Seeking Behaviors: Work

		n	$\bar{x}$	SD
1.	Google search	642	4.36	0.91
2.	Consult books/textbooks	643	4.21	1.01
3.	Seek out an expert	640	4.04	1.04
4.	Use online library resources	642	3.79	1.24
5.	Seek out friends	641	3.78	1.13
6.	Wikipedia	639	3.77	1.31
7.	Email experts	639	3.61	1.24
8.	View online lecture	637	3.38	1.28
9.	Text or IM friends	638	3.11	1.36
10.	Post on Internet message board	640	2.88	1.35
11.	Ask a librarian	639	2.38	1.31

Respondents Information Seeking Behaviors: Interest

		Rank for class	n	$\bar{x}$	SD
1.	Google search	1	638	4.52	0.87
2.	Wikipedia	6	635	4.10	1.18
3.	Consult books/textbooks	2	633	3.70	1.28
4.	Use online library resources	4	634	3.54	1.36
5.	Seek out friends	5	637	3.47	1.26
6.	View online lecture	8	635	3.24	1.37
7.	Text or IM friends	9	636	3.03	1.35
8.	Seek out an expert	3	633	3.01	1.35
9.	Email experts	7	635	2.81	1.36
10.	Post on Internet message board	10	635	2.74	1.38
11.	Ask a librarian	11	632	2.24	1.30

CONCLUSIONS

This study began with the objective of examining student attitudes and preferences regarding their use of digital resources in seeking information on a topic for class-related research or on a topic merely of interest. Our preliminary examination of the data, however, does bring to light some noteworthy observations and has given us a more nuanced view of how students interact with digital resources as well as their experience with various learning technologies and Web instructional resources.

Our findings do challenge the notion that students embrace online education. Over half (53%) of the respondents were enrolled in college full time, and an additional 9% were part time students. The majority (62%) were from 4-year colleges. By the nature of the survey being distributed through an online process, respondents were scattered in all 50 states, and there were multiple colleges represented. Yet, 81% of these students indicated that the majority of their courses had minimal or no use of the Web. Perhaps more surprising was that the students indicated an ambivalence with the use of the Web in their courses in that they preferred mostly face-to-face instruction, with 71% indicating they wanted no more than minimal, if any, Web use in their coursework.

Because 48% of the respondents were freshmen and sophomores, perhaps they do have limited experience with Web courses. Lack of experience or familiarity with Web instruction can contribute to ambivalence to this change. However, this was an unexpected finding given the research indicating the growth of online education and students' preference for it (Allen & Seaman, 2012; Anderson, Boyles, & Rainie, 2012; Johnson, Adams, & Cummins, 2012).

Certainly, the student preference for strong face-to-face course modalities should give colleges and universities cause to reflect on why students still might prefer face-to-face instruction. Higher education would be well advised to ensure that online and blended course modalities facilitate any disconnect students feel when courses are conducted via the Web. More research is required to determine whether this sample was representative, or why, in fact, these students show a definite indifference for the online modalities. Quality online instruction can facilitate access to students that might not otherwise be possible. This strategy has worked well at some locations where considerable resources are contributed to design, development, and support for online instruction, insuring that institution, faculty, and student goals are aligned (Moskal, Dziuban, & Hartman, 2013; Dziuban, Moskal, Cavanagh & Watts, 2012). But, clearly, students in this study were not convinced by the notion of online courses.

Students do appear to have experience with technology and online resources, however, with video/audio course content use being prolific in respondents' courses. In fact, this is also the most-preferred technology with 88% of students indicating they would like to see this used sometimes or frequently in their courses.

In addition, students indicated that they see the value in utilizing Web material, not related to the course, for their instruction. And, while fewer than half the students currently utilize e-texts, a larger percentage (63%) indicated they would prefer to have electronic texts used in their courses at least sometimes, showing a desire to have more electronic options available to them.

An interesting finding was some students' negative attitudes about using mobile technologies in the classroom. A third of students indicated they never wanted to use these in their classes. While there

is a large mobile learning initiative underway in higher education and many find that students are eager to utilize these resources (Dahlstrom, 2012), our research shows that there is at least a segment of the student population that is negative regarding its adoption in instruction. Students had a similar reaction to the use of social networking technologies' use in instruction. This could be attributed to students' familiarity with video, content websites, and simulations in their prior class experience and lack of familiarity with the use of social networking and mobile technologies in instruction, creating a dissonance. However it might be that students feel a personal connection to their social and mobile networks, and prefer that this boundary not bleed over into their educational lives. In any case, educators and those who are involved with content utilized in student research and instruction should be aware of a segment of this population that is at best, ambivalent, about its use. More research needs to be done on how to bridge this gap and how to identify those who are amiable to this technology being used. And finally, research needs to examine what the implications are for this finding in designing and utilizing instructional applications for these technologies. Perhaps if students identify with quality uses of these technologies, and have experiences they deem worthwhile and positive toward using them in instruction, then those who are negative might see a value in having these technologies as valuable instructional resources.

From this research, students associate different priorities to search strategies they use for seeking information they deem important for class research versus topics merely for interest. As others have found (Head & Eisenberg, 2009), Google wins out over any other Web search strategy. However, for class, students will consult textbooks prior to going online. This makes intuitive sense because class texts so often mirror instructional content covered by the instructor. While students seeking information from friends over a teacher may not be intuitive, if considering friends in the same class who may have understood a topic better, then a picture begins to develop. Students utilize the most *convenient* methods first that they perceive are class-related. Textbooks and a Google search can be done without interacting with others. Lacking success there, students turn to others, but gravitate toward friends first, saving the interaction with teachers for the last hope of those class resources that are most accessible. Only then do they migrate to less convenient methods of gathering information.

When a topic is being researched that is for students' own self-interest, however, their priorities change. Interaction with humans slips down the list of priorities, with folks choosing to "go it alone" first, through online strategies Google and Wikipedia, then researching texts—textbooks or supplemental—in an effort to find the information themselves, without contacting others.

Perhaps most interesting is how low on the list librarians and outside experts fall. These are truly the last places students look for help. That is not to say that students don't utilize libraries, as online library resources was in the top 5 most preferred methods for obtaining information, whether for class or interest. Again, this indicates that convenience plays a part in students' behavior as it is

easier for them to access online resources than make a trip to a physical library to speak to a live person. It is unclear why students have little interest in emailing outside experts. Is it lack of comfort, inability to identify experts related to their research, or timidity with asking for help? In either case, this does counter others' argument that point to the future of education as being a virtual smorgasbord where students can seek out, interact with, and learn from experts in the field (Kamenetz, 2010). Certainly, our respondents indicated ambivalence toward interacting with others who were not familiar to them.

Search strategies for work-related topics varied from class, however. Again, participants preferred to work alone, going with convenient methods prior to asking for help. However, when the research was required for work and information could not be found on their own, respondents then sought out experts to help. Again, this makes intuitive sense if we assume that once in the workforce, we have an easier time identifying and interacting with experts in our prospective fields. These respondents indicated that once the priority of work was removed from their research needs and their search was merely for a topic of interest, they again gravitated toward convenience, choosing online resources such as Google, Wikipedia, and even online library resources, as well as books or textbooks prior to seeking out help from others. And few choose posting on Internet message boards or going to a librarian in either case.

These findings do have implications for higher education. Discovering that there are students opposed to some of the newer technologies illustrates why educators should not assume students have a breadth and depth of technology and information literacy, or that they have a desire to use all technology in the classroom. In fact, these students showed a preference for face-to-face instruction, but obviously turned to the Internet when searching for research topics. When faculty utilize technologies unfamiliar to students, they should expect resistance from some and insure that there is an instructional advantage to incorporating or using these technologies – especially those which students see as being part of their personal, social network. It may be necessary to provide instruction on the use of the technology to bridge the gap students indicate exists. In addition, it is always important to conduct research to determine the impact of any new instructional resource on student satisfaction and performance. Impeding students' learning of course content is not the point of incorporating new technologies in instruction. However, it is a possibility and it would be wise for those designing curriculum and instruction to continually monitor their impact for unanticipated side effects.

Overwhelmingly, convenience appears to moderate our search strategies when looking for information, either for class, work, or interest alone. So, to engage students, these resources have to be readily available and easy to use. This is particularly true of library resources, which this study indicates seem to be accessed only when convenient–and in this case, virtual resources are more convenient than live. So, designing instruction to help students find and evaluate information

sources and content, as well as connecting them with collections that may help them narrow their search strategies may be extremely worthwhile. Providing students with virtual access to librarians—either through email or live text—may also be useful.

This research did not address the question of ethics and how students gauge the quality of sources they locate and use. These are also important issues that need to be addressed if students are using Google and Wikipedia are on the front line of information for their research. Instead of blacklisting these resources, we need to guide students on how they can be strategically used in research, as well as how to sift through sources to search for the best quality products, then how to ethically site those sources they use.

As newer online and technological resources become available to students, and the amount of virtually-accessible information continues to grow, more research needs to be conducted on how students sift through the overabundance of resources they have available to them. With this research, it is clear that students create priorities with how they view the usefulness and quality of information, depending on their circumstance and need. We need to identify models of this behavior and determine how best to provide students with the instruction and resources they need to succeed. Furthermore, identifying whether these models vary for different students (for example STEM vs. non-STEM) may shed further light on how best to structure our content and instruction to help our students become more information fluent.

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