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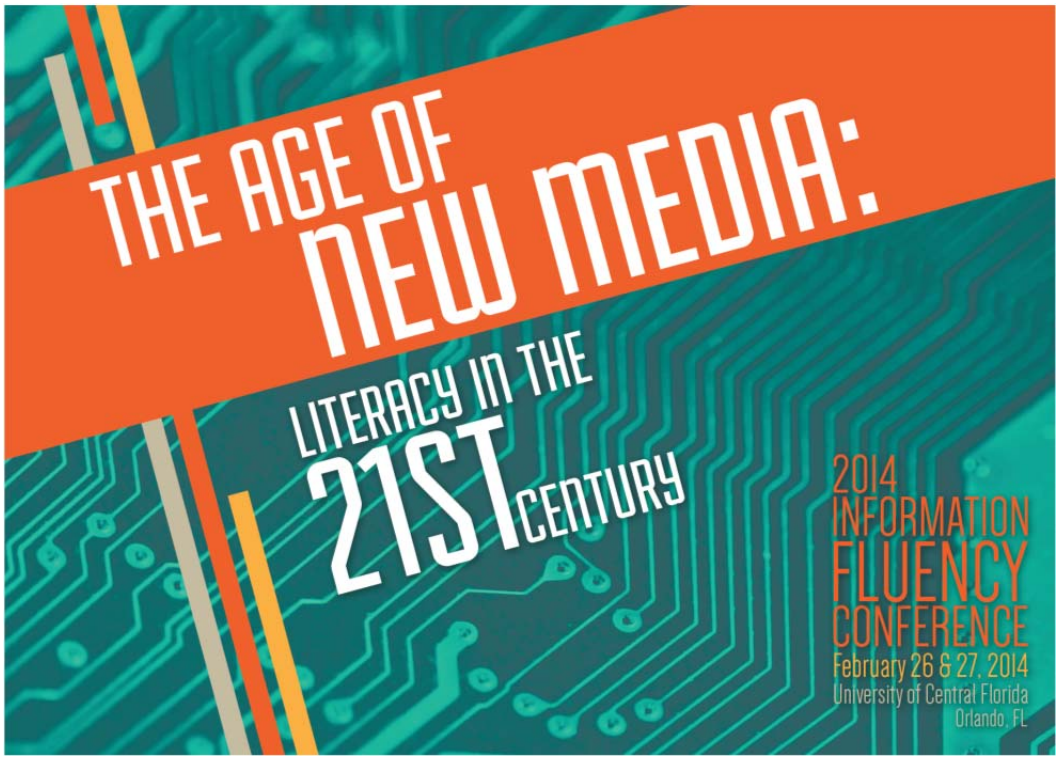

Table of Contents

From the Editor

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When we began the Information Fluency (IF) Initiative at the University of Central Florida, we learned quickly that each discipline defines IF differently and that to successfully work with each college, school, and department we had to utilize a very flexible definition for IF, one that would work for a variety of perspectives. Drs. Blummer's and Kenton's review of the literature on information fluency across disciplines examines and highlights best practices. In their summary, the authors state, "foremost, an examination of these initiatives underscores the importance of collaboration, goals, standards, course assignments, pedagogies, technologies, as well as assessments to facilitating the success of these endeavors" (18).

The second article, a position paper, assesses the "hybrid spaces" of human-machine interaction. Thomas Cavanaugh's examination of situated technological literacy and its applications within the hybrid space of Self-service Technologies (SST), reveals the line between expert and layperson as less noticeable. In the human machine interaction he explores, Cavanaugh explains how the technology compensates for the participant's lack of expertise; the technologies, in effect, shape the social situation of transactions.

Aimee deNoyelles and Baiyun Chen explore students' eTextbook practices and the increasing utilization of digital textbooks across academia. The study shows the need to better educate both students and faculty in the best practices of eTextbooks, while acknowledging that digital texts are not being adopted as rapidly as many had expected. As you read the survey results and the implications of this study, consider how eTextbooks can be integrated into your discipline and curriculum while ensuring the usage is assessed and evaluated to ensure the digital textbooks are truly assisting students in their learning process.

While Information fluency--defined, learned and applied--differently in each discipline, has many commonalities, and our institutions must strive to share our research and our best practices in order to benefit faculty, students and educational institutions. I hope you enjoy this third edition of the *Journal of Information Fluency*.

Information Fluency Initiatives in Academic Institutions: A Literature Review

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Abstract

An online search on the terms "information fluency" returned many descriptions of similar instructional efforts at other higher education institutions. A review of these results revealed information fluency initiatives that encompassed a wide range of disciplines such as education, business, political science, computer science, biology, economics, as well as first year experience programs and library training classes. This paper compares and contrasts the common components among these programs including: collaborative efforts, guiding standards, pedagogies employed, course assignments, technology use, assessment measures, as well as lessons learned and future plans.

Keywords: *information fluency; academic institutions; higher education; computer literacy; critical thinking; information literacy*

An online search on the terms "information fluency" returned many higher education initiatives that encompassed a wide range of disciplines such as education, economics, business, computer science, nursing, political science, chemistry, biology, as well as first year experience programs and library training classes. An analysis of these efforts reveals common components among these programs including: collaborative efforts, guiding standards, pedagogies employed, course assignments, technology use, assessment measures, as well as lessons learned and future plans. This paper compares and contrasts these elements highlighting the best practices in promoting students' information fluency skills in academic institutions.

Introduction

Methodology. The authors searched Google, Academic Search Premier, ScienceDirect, Emerald, ProQuest, Education Research Complete, Eric, PsychInfo, and Library and Information Technology Abstracts using the phrase "information fluency" OR "information technology fluency." Articles and manuscripts that focused on promoting students' information and technology literacies as well as their analytical, critical thinking or problem solving skills were included in the review.

NRC report. Much of the impetus for the promotion of information fluency in higher education evolved from the National Research Council's (NRC) Committee on Information Technology Literacy report. This report, published in 1999, promoted student's fluency with information technology (FITness) in three areas including: contemporary skills, foundational concepts, and intellectual capabilities. The Committee sought to develop a framework to support discipline or grade appropriate FITness initiatives.

That same year the Associated Colleges of the South (ACS), a consortium of liberal arts institutions, received funding from the Andrew W. Mellon Foundation to support information fluency initiatives at member institutions and host symposiums and workshops on the topic. One outcome of the ACS Information Fluency Effort was the continued refinement of an information fluency definition that initially included the intersection of information literacy, critical thinking, and computer literacy.

The NRC report also prompted undergraduate computer science departments to assess their programs based on the FIT guidelines. Dougherty et al. (2002) attributed the NRC report to the ACM-IEEE Joint Task Force interest in addressing information technology literacy campus wide. The Task Force recommended three academic models including: a general course for nontechnical students, an interdisciplinary effort among various academic departments including computing, and a computing course for specific student majors.

Authors also pointed to the role of the Southern Association for Colleges and Schools (SACS) in stimulating institutional attention to students' information fluency. Beile (2007) traced the University of Central Florida's decision to integrate information fluency across the curriculum to the SACS Commission on College's request for a Quality Enhancement Plan (QEP). This initiative highlighted an institution's commitment to enhancing quality in higher education through efforts that altered students "knowledge, skills, behaviors, and/or values" (para. 3).

Evans (2007), vice chancellor for academic affairs at Southern University, noted the SACS recent focus on student learning outcomes in her plea for enhancing students' critical thinking, information literacy and technology literacy. She advised chief academic officers to articulate to faculty the importance of information fluency, offer them training opportunities to support the integration of technology into instruction, and encourage them to involve students in the learning process.

Varied Approaches

The initiatives described in the present study were varied. Some approaches integrated information fluency integration across an institution or a program. There were also workshops offered to faculty teaching first year courses. However, the majority of initiatives referred to single class or pilot program that incorporated information fluency concepts. Overwhelming all of these initiatives relied on support from various individuals and departments in the institution.

Across the curriculum. Beile (2007) outlined the University of Central Florida's effort to integrate information fluency across the curriculum. Their information fluency integration model included the selection of four academic programs in the first year of the initiative. According to the author, participating faculty assumed "responsibility for implementing and assessing information fluency" in their areas with "institutional support" (p. 16).

Program wide. Dougherty et al. (2002) documented Auckland University of Technology's Business degree program that promoted information technology fluency. The authors listed the courses, assignments, and technology resources that prepared graduates for a variety of information technology business professional careers. DePauw University's Information Technology Associates Program (ITAP) provided students internships and events aimed at enhancing their information, computer, and critical thinking skills. These programs supported Lin's (2000) recommendations for a "project-based approach" for enhancing individual's FITness. He believed the "multiple iterations" provided opportunities for an "instructional checkpoint or intervention" (p. 74).

Faculty workshop. Two of the articles traced the development of workshops for faculty teaching first year experience courses that incorporated information fluency components. Fishel, Hillemann, and Beccone (2006) described the creation of Macalester College's information fluency workshop to increase faculty awareness on information fluency, identify writing standards, design assignments that supported these standards, and discuss the needs of first year students. Likewise, Hendrix College librarians sponsored a workshop for faculty teaching "Journeys," a new course designed for freshmen that centered on information fluency skills.

Single class. The use of a course or class to promote students' information fluency skills was especially popular among the initiatives. Calvin College's "Fluency with Information Technology" course proposal aimed to address the inconsistent exposure students experienced with information technology across different majors and programs. To this end, the proposal centered on an information technology foundational course taken early in students' college career. The proposal's authors likened the course to a "hub" with "spokes" that included other course courses that addressed technology.

Collaborative Efforts

All of the initiatives described in this review centered on collaborative efforts involving faculty members and diverse academic departments. Authors highlighted the importance of support from outside their institutions as well. Starkey, Kissick, Collins, and Oh (2006) suggested their application for a regional fellowship stemmed from an effort "to support collaboration on research or teaching projects and expand networks of professional colleagues at other regional institutions" (p. 8).

Administrative support. Some of these efforts remained top down initiatives that evolved from the university's administrative level, but included support from librarians. Beile (2007) linked the University of Central Florida's institution-wide information fluency program to the library committee's pre-proposal that centered on the topic. She noted the University's Quality Enhancement Plan team "comprised of high level administrators" supported the concept (para. 4). Rollins College's information fluency initiative, a joint effort between the library and the department of information technology, had "strong support" from the College's associate vice president for information technology as well as the director of library services (Zhang 2002, p. 4).

Librarian led initiatives. Librarians remained especially supportive of efforts to promote students' information fluency skills. Moore (2002), Hendrix College's library director, obtained grant monies to sponsor a workshop aimed at educating faculty on teaching "Journeys," a new course designed to enhance freshmen student's information fluency. In addition, the workshop's developers hoped to forge relationships among faculty, librarians, and information technologist at the institution. Similarly, Macaleser College librarians utilized the College's writing center as well as the Center for Scholarship and Teaching to promote a three day workshop for first year course faculty.

Librarians were also instrumental in fostering partnerships with campus departments to create courses that centered on information fluency. Zhang (2001) described Rollins College's "Introduction to Information Fluency: Information Research, Evaluation, and Communication" as a joint effort between the Olin Library staff and the institution's information technology department. Likewise, Purdue University librarians partnered with the campus's Digital Learning Collaboratory to maximize students access to "high-end multimedia equipment and application" for an "Information Strategies" course that aimed to enhance students' information fluency (Sharkey 2006, p. 72).

Faculty-librarian partnerships. Faculty librarian ventures that aimed to incorporate information fluency components into an existing course remained especially popular in the literature. Many librarians shared Rader's (2004) beliefs on the importance of garnering faculty support for information fluency instruction. The author urged academic librarians to adopt a leadership role in promoting information fluency in their campus communities. At the University of Rhode Island, a librarian and an education faculty member revamped an educational course's research project in their attempt to improve honor's students' information fluency skills. A partnership between Birmingham-Southern College's librarians and a business faculty member aimed at enhancing the research and the writing skills for students enrolled in "Foundations of Business Thought." This partnership led to changes in the course design, the research assignment, the course delivery, as well as its assessment.

Various campus groups. The involvement of various campus groups remained critical for the success of academic institution's information fluency efforts. The University of Richmond pointed to a triangular partnership for faculty support and development in promoting information fluency in the institution. This partnership included the Faculty Program for Enhancing Teaching Effectiveness (PETE), Librarians: Outreach and Instruction Service, and Technology Professionals: Academic Technology Services. Joyce et al. (2000) observed each group provided a unique skill to promote faculty development in information fluency. The article chronicled the collaboration among these groups that sponsored workshops, events, and other support structures for promoting information fluency. Fishel, Hillemann, and Beccone (2007) believed support from the Macalester College's Center for Scholarship and Teaching remained crucial for the success of their information fluency workshop due to the stature of the Center on campus.

Goals, Objectives and Standards as a Guiding Force for IF Initiatives

Goals. The goals for information fluency projects highlighted the importance of students' computer, search, and analytical skills and these were promoted by the ACS initiative on information fluency. Grossman (2011) stated "students should know how to find information, process it, and effectively communicate whatever it is they learned" (p. 7).

Objectives. Other information fluency initiatives referred to program objectives. Joyce et al. (2000) described the objective of the University of Richmond's information fluency initiative on ensuring students have "knowledge and critical thinking skills" to survive in the digital era (p. 139). Gehring and Eastman (2007) listed their biology course objectives as engaging students in experimental approaches, developing their experimental and analytical and writing as well as increasing individuals' awareness of social issues in developmental biology.

Although, the information fluency projects' goals and objectives varied in detail and scope, they shaped the development of the initiatives. Sharkey (2006) adopted the information fluency model promoted by ACS in devising "course objectives, homework assignments and [the] final project" for Purdue University's pilot "Information Strategies" course (p. 76). According to the author, the course components had to address information literacy, critical thinking and computer literacy. Lindquester, Burks, and Jaslow (2005) linked students' information fluency skills to training in the scientific method. In this instance, the project developers aimed to improve students' information fluency "in the context of laboratory research" (p. 59).

ALA standards. The use of standards also influenced the development of information fluency initiatives. Many of these standards were associated with the American Library Association (ALA) information literacy standards. Gehring and Eastman (2008) pointed to the ALA Information Literacy Standards for Science and Engineering Technology in the incorporation of an information fluency component for Connecticut College's upper level developmental biology course. The authors observed the course's revised design supported students' need for subject specific information fluency skills and remained especially important for those individuals with plans to attend graduate or medical school.

The ACRL Information Literacy Competency Standards for Higher Education remained very popular in guiding information fluency projects. The learning outcomes for Purdue University's "Information Strategies"

course were “grounded in the ACRL Information Literacy Standards” but also supported critical thinking and technology literacy (p. 77). Gibson (2007) suggested the University of Central Florida also utilized the ACRL information literacy standards for the “organizing framework” for the adoption of information fluency across the curriculum. In addition, the author noted the University incorporated “technology literacy and critical thinking in developing its information fluency plan” (para. 11).

Other standards. Authors often used the ACRL Information Literacy Standards for Higher Education in conjunction with standards promoted by department and professional organizations. Birmingham Southern College’s librarians pointed out the ACRL Information Literacy Standards overlapped with those established by the college’s business program that promoted communication skills, critical thinking, decision making, technology and independent learning or “skills needed for information fluency” (Bowers et al. 2009, p. 113). The authors also viewed the curricular standards for quality management education by the Association to Advance Collegiate Schools of Business (AACSB) International as supporting similar skills such as “communication abilities, ethical understanding and reasoning abilities, analytical skills, and use of information technology” (p. 113).

Promoters of information fluency at Kansas State University, Salina selected Technology Accreditation Commission’s (TAC) Accreditation Board of Engineering and Technology (ABET) criteria for incorporating information fluency into the engineering technology student program outcomes. Oh, Starkey, and Kissick (2007) utilized these criteria, in conjunction with the University’s student learning outcomes and the ACRL information literacy standards, in devising teaching objectives and student activities for a chemistry course in the engineering technology program.

Miller (2004) traced the inclusion of information fluency standards in a liberal arts college’s newly formed communications program to the ACRL information literacy standards. Still, she alluded to consulting faculty to determine “what the students would need to know to be successful as a student and a graduate in that major.” In addition, the author advised reviewing job advertisements to see “what students would need later” (p. 77).

Pedagogies Employed

The pedagogies employed in information fluency projects typically supported the project's goals as well as the standards utilized in development the initiatives

These pedagogies were varied and aimed to address students' various learning styles.

Learning goals. Zhang (2002) linked the type of instruction provided in these courses to the learning goals. The author maintained one strategy for enhancing students' information fluency in an electronic environment included active and problem based learning. She described the use of these processes in Rollins College's information fluency course that centered on students' abilities to research a problem and their efforts to find, evaluate and present relevant information. She noted the instructor provided "online and in-class discussions" to facilitate students' development of information fluency skills (p. 360).

Active learning. The incorporation of active learning was popular in other information fluency initiatives described in the literature. Sharkey (2006) emphasized the active learning component of Purdue University's "Information Strategies" course that adopted the information fluency model. According to the author, active learning remained especially important to today's students, typically Millennials. She pointed to the use of the Socratic method to foster discussion as well as the availability of an online tutorial to support lecture topics and course activities. Students also worked in groups to research and present on various digital tools. Similarly, Marshall (2008) observed St. Martin's College's magnetic resonance imaging program promoted independent learning through "enquiry focussed [*sic*] activity and active learning" (p. 242).

Gehring and Eastman (2008) touted the benefits of inquiry based learning for the development of student's information fluency. They described it as paralleling the "scientific process" with the inclusion of problems, activities, and collaboration that can foster students' "understanding, performance, reflection, generativity and commitment" (p. 54). In this instance, inquiry learning focused on investigative lab projects that contained assignments aimed at building students' information fluency skills.

Several approaches. Likewise, the proposal for Calvin College's "Fluency with Information Technology" course listed several pedagogical approaches including: plenary sessions to introduce the topic, breakout sections to hone student's critical evaluation skills, and tutorials to enhance individuals' computer skills. The proposal pointed to students working in class and in computer laboratories with faculty from diverse

disciplines. Moreover, the proposal's authors envisioned online tutorials that were hyperlinked to a Web-based textbook to support regular updates.

Technology. Course developers also considered technologies in the selection of the pedagogy for information fluency initiatives. Joyce et al. (2000) emphasized the support provided by the University of Richmond's Program for Enhancing Teaching Effectiveness (PETE) for many "pedagogically related projects" involving technology at the institution (p. 138). Niedbala and Fogleman (2010) noted their course sought to devise the most effective pedagogical constructs for using Web 2.0 tools. They detailed the course's backward instructional design model that incorporated Vygotsky's zone of proximal development in its provision of scaffolds to guide and support learners during the learning process.

Course Assignments

Information fluency project developers underscored the importance of course assignments and especially their ability to support the course's pedagogies, goals, and standards. A science course instructor, a librarian and a writing center staff member at Kansas State University, Salina created chemistry assignments that supported the university's student learning outcomes, the TAC of the ABET program outcomes criteria, as well as the ACRL information literacy standards (Starkey et al. 2006, para. 11). Likewise, Macalester College's "Entering the Community of Inquiry" faculty workshop included small and large groups to facilitate discussion and to provide support for designing course assignments to enhance students' information fluency.

Promotion of information fluency skills. The majority of information fluency initiatives contained course assignments that challenged students' search skills, critical thinking, and especially technology literacy. Grossman (2011) argued students needed to learn how to sift through information, not find it. He urged readers, especially in the historical discipline, to harness students' multimedia skills to make "historical work more exciting" as well as to prepare students for "substantive and critical use of these skills" (p. 8).

Sharkey (2006) seemingly shared this sentiment. Her information fluency course at Purdue University included a multimedia project that contained active learning components that challenged students' information literacy skills, critical thinking, and use of technology. According to the author, students worked in groups to create a presentation on a topic of their choice. In this capacity, students utilized a variety of skills and technologies such as Microsoft PowerPoint, digital camcorders, Movie Maker, or iMovie. Students in Sadri's

(2007) Middle East Politics course at the University of Central Florida's were required to upload their reports to the course website, participate in online class discussions, complete online quizzes and exams as well as utilize various software programs.

Sadri (2007) noted the University of Central Florida's Middle East Politics course also enhanced students' technology skills. For instance, students were required to upload their reports to the course website, participate in online class discussions, complete online quizzes and exams as well as utilize various software programs.

Other authors devised assignments that enhanced students' information literacy, critical thinking skills, and writing skills. Bowers et al. (2009) described the redesign of the research assignment for Birmingham Southern College's "Foundations of Business Thought" to enhance student's critical thinking as well as their research and communication skills. The new design focused on an individual, rather than group, project as well as a workbook that required students consult various business sources. The assignment also required students write a reflective paper on the experience.

Initiatives that promoted students' information technology fluency also underscored their critical thinking and writing skills. Golub (2007) believed information fluency courses should consider the impact of technology on society. He advocated "paired discussion" that supported course readings on the topic to enhance students' understanding of technologies' impact on society. The promotion of information technology fluency in Auckland University of Technology's Integrated Business Studies programs centered on four research papers as well as students' use of various software applications.

Presentation skills. Faculty also promoted students' presentation skills in information fluency course assignments. Lindquester, Burks, and Jaslow (2005**)** maintained Rhodes College's introductory biology laboratory course also aimed to train students in presenting results and conclusions orally. Students reported their research utilizing Microsoft PowerPoint. One of the goals of Overholtzer and Tombarge's (2003) "Quantitative Models" course included students' presentation of information and that encompassed selecting the software as well as "following the principles of effective visual display of information" (p. 56). Dougherty et al. (2002) described the Royal Military College of Canada's Department of Business Administration's revised

"Introduction to Information Technology" course that promoted students' technology as well as presentation skills.

Collaboration. Instructors also developed collaborative assignments in the information fluency initiatives. Niedbala and Fogleman (2010) emphasized the collaborative nature of students' projects for the University of Rhode Island's "Introduction to Education" honors course. In this instance, the students worked in small groups to complete an Educational Context Report that required individuals' analyze data to illustrate a school as well as its district and the community. The article noted students also interacted in the class wiki.

Gehring and Eastman (2008) described Connecticut College's developmental biology course's "circular discussion" that sought to improve students' information fluency skills. According to the article, individuals answered critique questions that centered on the results and "a take home message" (58).

Technology Use

Technology figured prominently in the information fluency initiative's course assignments and was also used for course delivery. Technology use was linked to the initiatives' focus on promoting students' computer literacy, but the extent of technology use varied among the initiatives. Some efforts sought to exposure students to a wide variety of software, while other initiatives focused on enhancing individuals' familiarity to applications in a specific discipline.

Tutorials. Online tutorials remained an especially popular technology utilized in courses designed to enhance students' information fluency. Gehring and Eastman (2008) pointed to the availability of a tutorial that provided library skills training for students in Connecticut College's developmental biology course. The authors observed students practiced searches in science databases. Similarly, Overholtzer and Tombarge (2003) listed the technology utilized in Washington and Lee University's "Quantitative Models" course as a website and online tutorials as well as Element K.

Varied systems. Information fluency initiatives typically sought to expose students to technologies specific to their discipline. Dougherty et al. (2002) pointed to a wide variety of software employed in Auckland University of Technology's business degree program including the Microsoft Office Suite, Visio, Oracle, MYBO, SPSS, MS-Project, Photoshop, Lotus Notes Domino, Linux and the Apache Web Server. The authors

observed students received technical support from the school's information technology department, business faculty, and a help desk for students and faculty.

Enhance communication. The use of technology for collaboration and communication remained especially important for courses that incorporated information fluency components. Niedbala and Fogleman (2010) described the class wiki as "a shared workspace for the students, and as a repository for instructions, video-based tutorials and other supports" (p. 872). The article stated students also utilized Google docs, since it supported simultaneous text editing by more than one author. Zhang (2001) pointed to the use of WebCT for collaboration in Rollins College's information fluency course noting it allowed the instructors to "maintain constant communication with students" (p. 148).

Learning management systems. Course management software represented another form of technology characteristic of information fluency initiatives. The proposal for Calvin College's "Fluency with Information Technology" course listed technology as web pages and potentially the Blackboard Courseware. Utilizing modules and templates, the developers believed, would promote the replicability of the College's information fluency initiatives at other institutions. Rollins College's use of WebCT software for the institution's information fluency course supported online quizzes and exercises that provided instant feedback to student responses.

Assessment Measures

Assessment measures figured prominently in the information fluency initiatives. Hartman, Dziuban, and Moskal (2007) maintained assessment of students' information fluency will "transcend specific content areas" since the topic integrated "information literacy, technology literacy, and critical thinking mediated by communication skills" (165).

Institutional assessment. An examination of the effectiveness of these programs, especially those that included an institutional approach, revealed a variety of assessment measures. Beile (2007) referred to the University of Central Florida's assessment team that would review the institution's information fluency program. According to the author, assessment measures would encompass direct and indirect measures such as self-efficacy surveys and library anxiety scales, as well as standardized tests. Moreover, the University

planned to develop additional instruments and create rubrics to assess student bibliographies, writing quality, and information literacy skills.

The proposal for assessing Calvin College's "Fluency with Information Technology" course included a formative evaluation with quizzes in online skill tutorials to offer students and instructors feedback and guidance for the enrollment of subsequent courses. Summative assessment, the proposal stated, included Calvin Social Research Center's administration of surveys of graduating seniors to serve as baseline data for the control group. The project's developers also planned to include employers and graduate school advisors' assessment of students' information technology fluency.

Pre-test and posttest. Pre-test and posttest evaluations were popular assessment measures for information fluency initiatives that centered on single classes. The promoters at Kansas State University, Salina's information fluency initiative developed a pre-survey as well as a post survey for students to rate their perception and confidence levels in library instruction, computer literacy, critical thinking communication, ethics, and lifelong learning. A similar assessment was used at Birmingham Southern College for students in the "Foundations of Business Thought" course. Faculty used identification numbers to pair student responses between the questionnaires.

Multiple measures. Quantitative assessment approaches were often combined with qualitative efforts. The pre-test and posttest for Connecticut College's developmental biology course required students locate articles that provided data to answer research questions. The posttest focused on students' development of information fluency skills and especially students' abilities to differentiate between primary and secondary (indirect) literacy. The instructors also examined "students' progress through the assignments" to reveal learning (Gehring & Eastman 2007, p. 59).

Other assessment measures. The pre-test and posttest assessment of an introductory biology laboratory course focused on the role of class in changing student's perceptions of their confidence in individual's skill levels. Students were also asked to evaluate the characteristics of four information sources including: a "textbook, a review paper, a website and a journal article" (Lindquester, Burks, & Jaslow 2005, p. 60). In addition, the course developers tracked usage statistics for three databases faculty had recommended for student research.

On the other hand, Gehring and Eastman (2008) described the use of focus group interviews with students who completed Connecticut College's "Developmental Biology" course to better understand their utilization of scholarly resources. Dougherty (2002) noted a survey was used to assess the effectiveness of the case study approach in Haverford University's "World of Computing" course in changing student attitudes toward information technology.

Ongoing assessment of students' learning outcomes. Many authors pointed to continuous efforts to track students' progress in information fluency initiatives. Bowers et al. (2009) maintained the instructors for Birmingham Southern College "Foundation of Business Thought" course conducted informal assessments in their discussions of students "stumbling blocks and successes" (p. 118). According to the authors, librarians' recognition of students' research difficulties led to business faculty efforts to address these problems in the classroom. Similarly, Zhang (2002) maintained assessment occurred throughout her "Introduction to Information Fluency" course to determine student's abilities to "analyze a problem, post questions and search and evaluate information" with the skills learned (p. 361).

Solicitation of student feedback on course. Course developers also sought to obtain students' feedback on course content and delivery. Sadri (2007) outlined the students' assessment of the University of Central Florida's "Middle East Politics'" course. The article stated each module included an optional weekly anonymous survey for questions or "criticism of the lectures, readings and/or format" (p. 19). Zhang (2002) utilized an anonymous survey as well to assess students perceptions on "course materials, teacher, class activities, assignments, content organization and delivery materials" (361) for Rollins College's "Introduction to Information Fluency" course. Overholtzer and Tombarge (2003) employed a variety of assessment measures for their "Quantitative Models" course including student ratings of the course's peer mentors as well as the course website. In addition, the course's peer mentors provided recommendations on improving the course.

Faculty workshops aimed at instructors teaching first year experience courses with information fluency components were also assessed. Moore (2002) stated the "Evaluation of ACS Information Fluency Workshop for Journeys Faculty" at Hendrix College revealed the majority of participants found the workshop helpful. Likewise, the Macalester University's workshop first year experience faculty included an assessment survey

that centered on the goals and outcomes for the workshop. The project's developers also employed focus groups composed of the workshops past participants to obtain strategies for improving the class.

Lessons Learned and Future Plans

Emphasis on students' skill development. In their conclusions, authors underscored the value of information fluency and listed strategies to improve students' skills. Lindquester, Burks, and Jaslow (2005) emphasized students' abilities to critically evaluate information especially as the volume of materials available on the Internet continued to expand. Moreover, the authors identified three areas for continued attention: "execution and analysis of experiments, use of online resources, and familiarity with interlibrary loan" (p. 65). In addition, they noted students appeared confused over the "accuracy, potential bias, and content" of different resources (p. 65).

Bowers et al. (2009) stated post survey responses from their "Foundations of Business Thought" course indicated students still lacked confidence in their writing abilities. They suggested obtaining additional support from the institution's writing center to eliminate this issue in future classes. In addition, they pointed to the need to promote popular business sources, since they observed students often failed to use these materials. Likewise, Sharkey (2006) maintained additional class time for Purdue University's "Information Strategies" course should focus on enhancing students' critical thinking and promoting their efforts to create a "source analysis" (p. 82).

Changes in course delivery and assessment. Gehring and Eastman (2008) suggested the expansion of the some of the assignments in Connecticut College's developmental biology course could foster additional opportunities for promoting information fluency skills. In addition, Overholtzer and Tombarge (2003) believed evaluations and recommendations from Washington and Lee University's "Quantitative Models" class suggested enhancing communication between the peer mentors and the professor, providing more examples of term papers on the course website, and holding peer mentors' office hours in secluded areas. Bowers et al. (2009) identified one of limitations of study was its dependence on student's perceptions of their information literacy skills in its assessment.

Future plans. Lastly authors discussed future plans for their information fluency initiatives and these underscored the success of the projects. Zhang (2001) noted efforts to make Rollins College's "Introduction to

Information Fluency: Information Research, Evaluation, and Communication" a requirement for all first year students. Moore (2002b) discussed plans among Hendrix College's librarians and the institution's information technology department to host of luncheon to discuss topics related to information fluency such as "copyright, fair use, web site evaluation, library databases, topical web sites and collaborative learning" (p. 11).

Other authors linked the information fluency initiatives to fostering administrative changes at their institutions. Joyce et al. (2000) suggested the University of Richmond's new Center for Teaching, Learning and Technology would coordinate many of the future information fluency initiatives at the institution. In addition, the article described plans to increase the number of academic technologists and librarians/information specialists who would work with faculty to integrate information fluency into the university's learning environment. According to Smith et al. (2002) future internships for DePauw University's ITAP would center on "real projects, with real pressures, deadlines and opportunities" (p. 142).

Summary

This review illustrates the realm of possibilities for enhancing student's information fluency skills in academic institutions. Foremost, an examination of these initiatives underscores the importance of collaboration, goals, standards, course assignments, pedagogies, technologies, as well as assessments to facilitating the success of these endeavors. Moreover, by analyzing the components of information fluency initiatives as well as considering the lessons learned, readers can implement similar projects in their institutions at minimal costs. Higher education prepares individuals for lifelong learning. A major component of this preparation must include efforts to enhance students' technology and information literacies as well as critical thinking skills.

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Cover Art for Volume 3

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The cover art for volume 3 is the announcement for the 2014 Information Fluency Conference to be held at the University of Central Florida in Orlando, FL on February 26-27, 2014. The theme for this year is *The Age of New Media: Literacy in the 21st Century*.

The keynote speaker will be **Dr. James Paul Gee** who is the Mary Lou Fulton Presidential Professor of Literacy Studies at Arizona State University. He is a member of the National Academy of Education. His books include: *Sociolinguistics and Literacies* (Fourth Edition 2011); *An Introduction to Discourse Analysis* (Third Edition 2011); *What Video Games Have to Teach Us About Learning and Literacy* (Second Edition 2007); *How to Do Discourse Analysis* (2011); *Women and Gaming: The Sims and 21st Century Learning* (2010), *and Language and Learning in the Digital World* (2011), both written with Elizabeth Hayes. *The Anti-Education ERA: Creating Smarter Students through Digital Media* was published in 2013. Professor Gee has published widely in journals in linguistics, psychology, the social sciences, and education.

Dr. Gee embodies the conference theme, as well as the theme of this volume of the *Journal of Information Fluency*. As you read the articles in this issue you will notice a presentation on the current literature in information fluency, a position paper titled, "Knowing What to Do and Doing What You Know: Situated Technological Literacy in Hybrid Space," and another study of student's eTextbook practices. Each of these articles looks at how new media and technology are affecting the higher education classroom.

If you are interested in attending the 2014 Information Fluency conference, you may find additional information at www.ce.ucf.edu/if. All of the authors from this issue of the journal will be presenting at the 2014 Information Fluency Conference.

Knowing What to Do and Doing What You Know: Situated Technological Literacy in Hybrid Space

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Abstract

Recent advances in the sophistication of self-service technologies (SSTs) have created hybrid spaces of human-machine interaction, where each actor has a part to play to ensure the success of the transaction. The embedded performance support located within the SST is designed to accommodate a variety of levels of human performance, resulting in a condition of *situated technological literacy*. Nowadays, when we approach a well-designed, self-service kiosk, regardless of our experience, we will quickly know what to do to achieve our task goals. As a result, the line between novice and expert has begun to vanish, or at least blur, and the result is a homogenized culture of situated performance "experts." As situated experts, we now find ourselves employing this in situated technological literacy to operate within a new type of hybrid space containing both human and computer actors, each negotiating their own locations within the space. The specific strategies used by the technological actors within a kiosk's hybrid space to collaborate with the human actor can be varied and complex, covering a spectrum of support levels. This article will explore both the notion of situated technological literacy and how it is applied within the hybrid spaces of self-service technologies.

Keywords: *information fluency, technological literacy, kiosk, self-service, performance support*

> A display that could prompt the user through the series of steps required for programming [makes] the difference between a valuable, usable system and a next-to-useless one.
>
> - Donald Norman, *The Design of Everyday Things* (101)

> I…wonder about the wages, both personal and social, of spending so much time with a machine that has slowly absorbed into itself as many complications as possible, so as to present us with a façade that says everything can and should be "easy." I began by ridding my system of Microsoft...UNIX always presumes you know what you're doing. You're the human being, after all, and it is a mere operating system.
>
> - Ellen Ullman, *Salon Magazine*

Introduction

Do you remember the first time you used an Automatic Teller Machine (ATM)? Or a pay-at-the-pump gas station? Or an airline e-ticket kiosk? How did you know what to do? Although you never received any formal instruction in how to interact with the self-service technology, you were likely able to accomplish your task (e.g., withdrawing or depositing money) as successfully as an experienced user. However, not so long ago, to accomplish that same task, you needed the direct mediation of a professional bank teller or gas station cashier or airline ticket representative who had been trained how to use the required complex technology.

Recent advances in the sophistication of self-service technologies (SSTs) have created hybrid spaces of human-machine interaction, where each actor has a part to play to ensure the success of the transaction. The embedded performance support located within the SST compensates for any human's performance gap, resulting in a condition of *situated technological literacy*, where the user does not necessarily need to possess pre-existing knowledge of, or training in, how to interact with the technology in order to accomplish his/her goal. The literacy required to complete the interaction is context-specific and resident in the interaction of the human and the technology itself. Each actor in the interaction brings an important component to the collaboration. The human typically creates the hybrid nature of the space by approaching the technology and brings a unique set of pre-existing knowledge or skills related to how to use the SST. The technological system in turn meets the user on the user's terms and automatically accommodates for any knowledge or skill shortcomings. Thus, the necessary technological literacy is situated in each location and interaction—a hybrid space of human elements combined with electronic/digital elements.

When we approach a self-service kiosk, regardless of our experience, we typically will know what to do and how to do it because the machine will help us. The embedded performance support located within the SST compensates for a human's performance gap. In these systems designed to support everyday tasks, at least, the line between novice and expert has begun to vanish, or at least blur, and the result is a homogenized culture of situated performance. I have labeled this phenomenon elsewhere as the "Kiosk Culture" (Cavanagh, 2008a; 2008b). The kiosk culture is a technologically-enabled self-service expectation, both on the part of the provider and the consumer. In some respects, the kiosk culture is emerging as the overarching societal interface for the postmodern actor/consumer. It's worthwhile to note that the growing ubiquity of SSTs and the

ease with which a huge, untrained population uses them is due in part to the limited nature of the transactions they enable. Skills requiring advanced study, practice, or training—such as in the arts and athletics—are beyond the abilities of today's performance support technology. For example, while the concept of artistic performance support (see Cavanagh, 2008b) continues to expand, there does not yet exist any sort technologically situated artistic ability that eliminates the very wide gap between novices and experts in the playing of a musical instrument. Kiosks do what they do very well for a very large population but we must also recognize that what they do is intentionally limited.

Exactly how is this situated technological literacy achieved? Kiosk designers employ a number of strategies to meet users on their own terms. These strategies can be placed on a continuum of transparency called the Spectrum of Support (Cavanagh, 2004a). In this case, transparency refers to how aware the user is of being technologically assisted to complete a performance task. The more effort that the human must exert to access the performance support, the more visible it is to him/her and the less transparent. The Spectrum of Support provides a helpful construct in which to envision the human-machine hybrid space of the kiosk culture. Each category of the spectrum describes the changing roles of the actors in the space based upon the complexity of the performance support technology employed in the interaction. In all categories, however, the hybrid nature of the space remains. The space is still occupied by technological and human actors. If either was absent, the space would not be hybridized. For example, a technological system with support so transparent that no human is even necessary for a transaction to be processed would be automation and could exist in a purely machine space. SSTs are uniquely hybrid because the space only exists when both the human and the machine occupy it together for a common objective. How that objective is accomplished is via the notion of the human actor's situated technological literacy, which is in turn enabled by the technology in a recursive dance of give and take.

The Spectrum of Support offers a high-level construct for framing the types of support that facilitate technological literacy in any SST hybrid space. The five categories of the Spectrum of Support, from most opaque to most transparent are:

- External, where the support is completely separate from both the task and performance environment. External support represents the lowest level of support, as well as the least

transparent to the user. The user must take direct, intentional action to access the support, which exists completely *abstracted* from the task environment (for example, a printed instruction manual for a piece of electronic equipment).

- Extrinsic, where the support is separate from the task itself, but still contained within the performance environment. External support is not contextual—the user must break the task context, even if the performance environment remains constant, making it *hyper-contextual*. The support context is only meaningful after the support has been accessed (for example, a software application's Help function which it is separate from the task of using the software itself but is still resident in the same semiotic domain).
- Intrinsic, where the support is inherent in the task context, but is event-driven. Because launching the support is event-driven, Intrinsic support is considered *reactive*. The human user must take some intentional action to trigger the support function. However, the user is not required to break either the task context or workflow to benefit from the support. Despite being reactive, the integrated nature of Intrinsic support means that it better accommodates the human user and makes it easier to achieve the performance outcome for both novices and experts (for example, the use of a software application's "Tool Tips" or "Balloon Help," which support both expert and novice users by requiring the user to hover his/her cursor over an interface feature for its explanation).
- Intuitive, where the support is seamlessly integrated into the task context in a predictive capacity. Rather than being event-driven and reactive, intuitive support is proactive, meaning that the support itself takes some level of independent initiative to improve the task process. Because it independently compensates for human error and ignorance, Intuitive support is considered *adaptive*. The machine part of the hybrid space actually changes to accommodate for deficiencies in the human part (for example, word processing software that "auto-corrects" misspellings as a user types).
- Intelligent, where the support is indistinguishable from the task itself. As theorized, Intelligent support is *prescient* because it anticipates what the user wants to do before the user does and

compensates for shortcomings before they are even apparent. The user may not even be aware that he/she is receiving assistance (the domain of advanced artificial intelligence, this type of support is primarily speculative at this point—technology has not yet caught up with the theory).

Table 1. Spectrum of Support (based on Cavanagh, 2004a)

External	Extrinsic	Intrinsic	Intuitive	Intelligent
Abstracted	*Hyper-contextual*	*Reactive*	*Adaptive*	*Prescient*
Paper-based instruction manual	Software "Help" menu	Integrated software interface "Balloon Help"	Word processing spelling auto-correction	Artificial intelligence

The Spectrum of Support's overarching framework is useful to consider when examining the specific strategies that kiosks and other SSTs use within this new hybrid space to achieve situated technological literacy. Exactly how are SSTs successful? What usability strategies do effective kiosk implementations employ? It's also important to keep in mind that any given interaction may involve more than one type of support. For example, if, during a self-checkout interaction that is primarily extrinsic and intrinsic, your receipt tape runs out, you will not be able to complete the transaction without the direct intervention of external support in the form of a human cashier.

Among the many usability theorists and practitioners publishing today, perhaps none are as well known as Donald Norman. In his groundbreaking book *The Design of Everyday Things*, Norman presents a series of usability principles designed to ensure that any item is properly understood and correctly used (1988). These principles can certainly be applied to the design of kiosks and other SSTs and, in the most successful implementations, they are clearly evident. Norman's tenet that "the device should explain itself" is a mantra for situated technological literacy. When considering literate action in hybrid human/machine social spaces we need to first grasp how machines communicate with us and implicitly set conditions for literate interaction that is subtly mediated by the levels of support they provide. When the performance resides in the situation, whether that situation is an ATM, a pay-at-the-pump gas station, a self-scanning grocery register, a job application kiosk, an online airline check-in, or any number of other context-specific, self-service interactions, the user need not possess the knowledge and skills necessary to complete the transaction prior to starting it. The required literacy is resident in, as Norman would say, "the device." As outlined in "The Design of Everyday

Things," (1988) Norman lists the following rules (p. 188-189) that successful kiosk designers often apply to ensure that the human actor in the kiosk's hybrid space completes his/her transaction successfully:

1. Use both knowledge in the world and knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible: bridge the gulfs of Execution and Evaluation.
4. Exploit the power of constraints, both natural and artificial.
5. Design for error.
6. When all else fails, standardize.

These guidelines are consistent with general user-centered design principles and, when followed, provide a user with a pathway to navigate through the self-service interaction.

However, most people who have interacted with more than a few self-service implementations have undoubtedly experienced frustrating situations where self-service technologies actually decrease the task efficiency. These are what writer Stevenson Swanson has called "inevitable snags" in a widely-read critical column on the proliferation of SSTs (2005). Norman contends that if the user fails to perform a task, the device, or in this case the performance support technology, is at fault. These technological failures are essentially an analog for human customer service failures. If true transparency is to be realized, we should not be aware of the support being provided. Nothing could shine a brighter light on the opacity of performance support technology than its own failure to support. Such failures are evidence that we have not yet achieved total transparency and that we have yet to completely enter the true *post-training* era likely desired by retail business and kiosk manufacturers, where novices and experts can achieve the same level of task performativity in all technological interactions. Such total transparency, assuming it is both possible and desirable, would allow every consumer to access the kiosk technology, increasing corporate productivity with even fewer cashiers and other checkout personnel.

Interestingly, technological designers use "rhetorical" strategies in how they craft their products. As in any rhetorical communication, the audience/user brings his/her own frame of reference to the interaction. Each situation is unique based upon the variables of location, context, specific objective, and gaps in user knowledge/skills. The user's literacy (or lack thereof) of how to navigate the hybrid space of the interaction can be mitigated with the proper use of these "rhetorical" design principles. From this rhetorical perspective, James Paul Gee might find a useful comparison to a breakdown in his notion of discursive building tasks (2005). Gee

states that we actively construct our social spaces through both language and other means, including actions, interactions, symbols, systems, technology, and values. This is an apt description of *situated technological literacy,* where each interaction exists in a human-technology hybrid space and is based upon the unique place, context, technological rhetorical strategies, and user frame of reference. Gee describes seven distinct discursive "building tasks" and it can be useful to consider an SST interaction as a localized instance of discursive formation. These seven building tasks describe areas of reality that we construct when we communicate. Keep in mind that the human and technological actors in the hybrid space of the SST interaction communicate with each other in various ways. However, when an SST interaction breaks down, it is likely due to a failure of one or more of these communicative building tasks, such as "building an activity" or "sign systems and knowledge."

However, as designers rapidly evolve the nascent technologies behind self-service installations, the incidence of failure should decrease exponentially. As validation, consider how few errors occur with relatively mature self-service instances such as ATMs and pay-at-the-pump mechanisms. The rest of the kiosk industry will soon catch up. Within a few years, self-service airport ticket kiosks have become the default method for airline check-in. Refinement of retail checkout lanes will follow, as will restaurant ordering, movie ticket purchases, and other applications. With the Spectrum of Support as a general backdrop, this chapter explores several key design strategies of successful kiosk design, allowing any user, regardless of experience, to achieve situated technological literacy.

Context

In the context of the Spectrum of Support, Stary and Totter have offered a structured technique for measuring a system's capability to provide accurate interaction features for individual users and their (situative) needs: Accessibility through Adaptability, or ActA (2003). Stary and Totter astutely observe that successful human-machine interaction must be situated, since (especially in the case of self-service cash registers) the users vary but the performance situation remains constant. The system must adapt as transparently as possible to the human actor's varying knowledge and skills. Workforce performance expert Marc Rosenberg (1995) has written about this in the context of Electronic Performance Support (EPS), a specific instance of the

performance support technology described by the Spectrum of Support: “The goal of EPS is not competence that resides in the individual, but rather *performance that resides in the situation*” (p. 97). [emphasis added]

Example adaptive support technologies employed to make kiosks more human-centered and easier to use include motion sensors that detect when a user approaches (and can trigger an audio greeting) and infrared (IR) readers for wireless data transfer. A motion sensor triggered by an approaching user is an example of Intuitive support since the electronic system takes independent action to offer an audio greeting with possible instructions. Recalling that the hybrid space is created when the human physically approaches the SST, the motion sensor also literally extends the concept of the kiosk’s hybrid space further from the device itself, enlarging that space to provide more support. Depending upon how it is implemented, an IR reader could also be used in an Intuitive manner. For example, there are grocery carts that allow items to be automatically scanned as they are placed into a shopping cart. Sophisticated systems available today could record all the items in the cart through IR technology and automatically charge them to a credit card number on file in a database. The Intuitive technology can take independent action to recognize the human actor’s intentions (to purchase items) and then pay for them on the human’s behalf. The human would never need to stand in line at a register. Such a construct further blurs the boundaries of the hybrid space, encompassing not just the physical store but also the connected cyberspace of the database. The space becomes the ambulatory shopping cart and wherever it is located.

When examining how video games function as models of instructional design, James Paul Gee (2003) lists situated meaning as one his 36 Learning Principles. Certainly, when interacting with a kiosk or computer screen—along with the concomitant icons, menus, links, audio cues, video clips, and “if-then/action-reaction” Boolean interactions—the user is in the same semiotic domain as video games. According to Gee, “learning in any semiotic domain crucially involves learning how to situate (build) meanings for that domain in the sorts of situations the domain involves” (p. 26). Learning always occurs in a kiosk encounter, even if it is accomplished transparently through intuitive design and embedded performance support technology, just as it is when you engage with any interface (such as a software application, an automotive instrument panel, or an office copy machine). How did you know what to do when confronted for the first time with a pay-at-the-pump gas station? You learned in the pay-at-the-pump’s semiotic domain via the technology’s own situated meaning and

accomplished the task—even as a novice—with an acceptable performance competence. Very likely the gas pump used Extrinsic support, such as a posted set of numbered instructions. You needed to take action to access the instructions, but they were still contained within the general task domain. The mechanical/social hybrid space becomes natural to us because of the implicit assistance we receive from the performance support technologies.

Kinetics, Inc., a leading developer of self-service kiosks which has produced approximately two-thirds of the airport e-ticket kiosks in the United States, employs several key design tenets in the development of their systems. These tenets work directly to address Davis' Technology Acceptance Model, which describes the *perceived usefulness* and *perceived ease of use* of a system as key variables in user acceptance of new technology (1989). The Kinetics principles include supporting a task that already needs to be done (not merely inventing a task and providing a computer to do it); starting with simple, discrete tasks and then adding additional or more complex tasks once users become familiar with the technology; improving the task not just by improving speed but by expanding user options and control; and designing for each implementation's unique requirements (Fishman, 2004).

NCR, a major manufacturer of self-service retail systems (who eventually acquired Kinetics), employs graphical user interface design strategies that they call in their marketing materials a "more inviting look and feel" and "larger more 'touchable' buttons" on their touch screen systems. NCR even adds a level of mechanical personification when they refer to the system interface as "friendly" (NCR, 2003). Clearly, these are attempts to mitigate any issues associated with Davis' "perceived ease of use." These interface strategies are also examples of Extrinsic and Intrinsic support, depending upon how they are implemented.

Using a technique called "multi-pathing," good self-service technologies accomplish Constantine and Lockwood's "instructive interaction" (2004), which is an effective technique for accomplishing situated meaning. An example of instructive interaction is the elegant implementation of graphical user interface (GUI) Tool Tips, also known as Balloon Help and found in software such as Microsoft Word. Due to its embedded but reactive functionality, Balloon Help is considered an Intrinsic implementation of performance support within the Spectrum of Support.

Placing the cursor over an element of a software application graphical user interface (GUI) causes a small window to appear that explains its name and/or functionality. By doing so, Balloon Help offers users exactly what they need when they need it and accomplishes that delicate balancing act of supporting both novice and expert users at the same time—satisfying another of James Paul Gee's learning principles gleaned from video games: the Explicit Information On-Demand and Just-in-Time Principle, where information is provided just at the moment where it can be understood and used (p. 138). He refers to this type of learning as being situated in context (p. 132). Aaron Marcus has properly observed that typical software interfaces contain a multitude of graphical/iconic information and that "For better or for worse, most computer users must master as novices an astonishing range of signs" (Marcus, 2003, p. 40). So how can a performance support strategy such as Balloon Help mitigate this issue?

Balloon Help supports a novice by providing him/her with quick explanations for everything he/she may need to access. These explanations, however, are not simply unloaded on the user in a long list, such as might be found in a glossary or index, but are presented in a context-specific fashion, offering support without significantly altering the task flow. Experts can also profit from the delayed display feature of Balloon Help. In most cases, even veteran application users won't know or remember everything about how to use the software. In situations where rarely used or new features must be accessed, experts can rest their cursor over the element and, after a brief delay, the explanation is provided. The support does not become visible unless the cursor remains motionless for a moment; therefore, the support will not distract the expert with unnecessary help when accessing familiar features (because, presumably, there will be no need to linger over the iconic element) (Cavanagh, 2004b).

By using such a delayed display tactic, Balloon Help also demonstrates a successful implementation of one of Donald Norman's recommendations (1988) for user-centered design, specifically that "the design should not impede action, especially for those well-practiced, experienced users who have internalized the knowledge" (p. 189). In short, the performance support technology enables novices to achieve expert task performance without impeding the proficiency of the genuine expert. This is just as true for a self-service checkout system as it is for Balloon Help. The performance support technology completely collapses traditional stage-based expert-novice developmental models, which "represent learning in terms of increasingly complex

levels of a particular domain of knowledge" (Freedman, 2003, p. 72). With performance support technology such as Balloon Help, *there are no levels*. A novice and an expert can each perform the same task without compensatory instruction.

NCR promotes the intuitive user interface (UI) of its kiosk systems as a competitive differentiator. According to NCR marketing literature, their Human Factors Engineering (HFE) team has incorporated audio instructions and animated demonstrations into their FastLane© self-service retail register system. Like the delayed display strategy of Balloon Help, these compensatory technologies are linked to "timing mechanisms" so that they are only activated "if a user takes too long to perform a specific function, such as placing an item in the bag." According to Marcia Crosland, an NCR Human Factors Engineer, NCR's "self-checkout has to accommodate the range of capabilities and skills in the retail population…The very skilled worker won't even have to look at the user interface" (NCR, 2003, 7). These strategies are clear examples of how device designers have used Intrinsic and Intuitive support strategies to create a kiosk's hybrid space. The space's level of hybridity is tied to the transparency of the performance support technology, which is in turn based upon the user's level of expertise. An expert user will not trigger the timing mechanism and audio help, thus rendering the support completely transparent and the hybrid space tilted more toward the human actor's performance. However, a novice user who invokes the timing mechanism and audio instructions becomes more aware of the performance support technology (less transparent) and the hybrid space becomes more dependent upon the device.

Supporting novice and experienced users is critical, since no business wants to alienate any segment of its customer base. In Regina Colonia-Willner's extensive analysis of Automatic Teller Machine (ATM) usage (2004), she observes the importance of the ATM 'time out' parameters as functions of transaction complexity. She concludes that system designers should pace complex information so that it is presented on several screens rather than all at once. Unfortunately, she found that this often was not the case. ATM machines allow the same amount of time for both simple and complex transactions. Users are "timed out" or the process is shut down when customers take too long on a complex activity. When this happens frequently, customers are prone to abandon ATM activity, opting to take their business to the bank teller, instead.

Counterpoint

Yet, lest we become too enamored with the benefits of combining user-centered design and performance support technology in the service of situated technological literacy, it's worthwhile to recognize that there is another side. Bolter and Gromala (2003) reject the notion of absolute transparency as a design goal. They challenge some of the traditionally-held assumptions about the usefulness of invisibility as an engineering objective, observing some of the ways such thinking can limit innovation. Eschewing the metaphor of a window representing transparency, they instead suggest the trope of a mirror. They replace transparency with reflectivity, suggesting that any human-computer interaction consists of a fluctuation between instances of each. Bolter and Grusin (2001) observe that "the transparent interface is one more manifestation of the need to deny the mediated character of digital technology altogether. To believe that with digital technology we have passed beyond mediation is also to assert the uniqueness of our present technological moment" (p. 24).

Tapscott (1998) offers his own position relative to our present technological moment, one where the very definition of transparency may be revised by a generation raised from infancy in the world of digital culture. He feels that as new media technology expands, "a new kind of transparency is emerging. Increasingly, N-Geners [*the Net Generation born in the 1980s and 1990s*] don't see the technology at all. They see people, information, games, applications, services, friends, and protagonists at the other end. They don't see a computer screen, they see their friend's messages, their 'zines, their fan clubs, their chat groups" (p. 39).

To such users, the interface is *already* transparent. They live their lives in hybrid spaces, continually moving back and forth between the tactile and the electronic. Their perspective is that the interface isn't some mediating mechanism allowing them to accomplish specific tasks, it is intrinsically grouped into the "stuff" of their digital lifestyles. It is invisible because they don't think in those terms. Like a Magic Eye picture, where a viewer relaxes his/her eyes and "discovers" a hidden image embedded within a seemingly random design of shapes and colors, today's digital generation views their networked world with permanently "relaxed" eyes. They automatically see the hidden picture and don't even realize that it's supposed to be obscured by shapes and colors. It is Marshall McLuhan's "Medium is the Message" revisited for the postmodern consumer.

This chapter began with epigraphs from Donald Norman and Ellen Ullman. After spending a considerable amount of time analyzing device usability strategies, it seems appropriate to include Ullman's

perspective as part of the chapter's last comments. Ullman has been very critical of the notion of "user-friendly" interfaces. To her, the very idea of a technology that so compensates for a user's mistakes results in a system that can only be considered insulting to the human—what she calls a vision of the user as an imbecile (Ullman, 1996). For critics like Ullman, design constraints are no more than electronic shackles—unique to this hybrid space of human-machine interaction—preventing us from doing what we really want. It is a way to keep us in our places so we don't mess up the electronic system. Such a mindset is anathema to genuine performance support, which posits that the electronic system must adapt to and compensate for the performance needs of the user. When systems are designed in the manner described by Ullman (and there are plenty of examples), they privilege the non-human actor over the human one.

Is it healthy for designers of self-service systems to consciously or subconsciously assume their users are idiots? Probably not. But, as Ullman so acerbically points out, the mindset has its utility. And the consequences of this attitude have implications for the central notion of the kiosk culture as a postmodern societal interface. Ullman would likely agree with Tapscott and others who oppose the rise of the Kiosk Culture for various reasons. She compares kiosks to toddler's toys, with animated pictures and push buttons. In her view, these toys are inadequate substitutions for the satisfaction of interacting with a live human within touching distance (Ullman, 1996). The risk, as always, is the sacrifice of our humanity in the service of task efficiency. Where we each fall on that continuum is dependent upon our individual contexts and may be dynamic based upon particular situated needs. We must each negotiate our own path through this particular hybrid space, whether that space exists in a retail kiosk, an ATM, a gas pump, a software application, an automotive dashboard, or any number of other technological/social interactions.

Conclusion

When they are well-designed, self-service technologies act as the means to an end, not the end itself. When they are effective, it is via a transactional, situated technological literacy—an ability to navigate the context-specific interaction regardless of knowledge or expertise. Through performance support technology of varying complexity, classified into a Spectrum of Support, the mechanical system compensates for the human participant's performance shortcomings, meeting the human wherever he/she happens to be in relation to his/her own technological literacy. As Rosenberg said, "the performance resides in the situation." With the user

and his/her task kept firmly in mind, SST developers can apply the strategies described in the Spectrum of Support and still avoid the pitfalls expressed by Ellen Ullman, recognizing that the technologies themselves implicitly shape the social situation of their interactions.

Ironically, there is a certain freedom in being limited by a device in the service of successfully completing a task. When a user interacts with a relatively mature SST such as an ATM, he/she knows that that the system is designed to ensure transactional success. This knowledge is now an inherent component of his/her own technological literacy. The user's stance, level of apprehension, confidence in accomplishing task, and ultimate success are determined by his/her technological literacy, as situated in the interaction. The user navigates the hybrid space with confidence. Knowing that our failure will be constrained is itself a meta-awareness of our growing technological literacy within the hybrid space of the kiosk culture.

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Figures

Figure 1. Kinetics© TouchPort II Airline e-ticket Kiosk
Retrieved 25-Jul-2008 from http://www.ncr.com/images/rhss_touchport_lg.jpg

Figure 2. NCR FastLane© Retail Self Checkout System
Retrieved 25-Jul-2008 from http://www.ncr.com/images/rhss_fastlane_lg.jpg

Exploring Students' eTextbook Practices in Higher Education

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Abstract

Textbooks in higher education are beginning to transition to the digital realm, enabling actions that may support student learning practices such as sharing notes, engaging in discussions, and taking interactive assessments. However, inconsistency with digital devices and platforms, along with a lack of understanding of student practices are potential barriers regarding eTextbook integration. In this paper, we share a survey that explores eTextbook use at a large university in the United States. It was found that while eTextbooks were minimally adopted, device ownership did not appear to be a major factor. Neither students nor instructors were actively using the interactive features of eTextbooks. Students generally preferred eTextbook features that enhanced studying and reading, while the social-peer component was not considered influential by students or instructors. Implications from this survey identify practical ways in which instructors and institutions can guide students to become more information and technology literate in this new 21st century learning environment.

Keywords: *device ownership; digital textbooks; information fluency; learning practice; mobile learning; professional development*

Following the path of many other educational resources, textbooks are transitioning into the digital realm. By its simplest definition, eTextbooks are textbooks offered in digital form. Some are identical reproductions of the print textbook offered in a fixed format such as a pdf file, and may allow basic studying features such as highlighting or annotating. This kind of eTextbook offers convenience, as students can access multiple books on a portable device such as a laptop or tablet. However, it does not take full advantage of the technological platform in which it is offered. A more developed line of eTextbooks is currently emerging and strives to take advantage of the digital affordances not possible in a print textbook, including interactive content such as class polls, quizzes, 3D simulations, hyperlinks, and multimedia. These features support learning by allowing students to check their understanding as they read, compare their understanding to peers, and

connect the content to external Internet resources. Research has shown that students learn more meaningfully in groups than isolation (Johnson & Johnson, 2011). With that in mind, some eTextbooks also enable heightened social connections, allowing students to share notes and engage in discussions with others directly within the book. These innovative features encourage students to not only efficiently access the information, but also effectively use the information to construct new understanding.

eTextbooks are slowly growing in popularity in higher education. In a recent study, over half (58%) of college students preferred digital over print textbooks, which is an improvement from the year before when students preferred print over digital (Pearson Foundation, 2012). Results from the 2012 Educause Center for Analysis and Research survey indicate a 15% annual increase (from 32% to 47%) of students that wish their instructors would use eTextbooks (Dahlstrom, 2012). In addition to traditional publishers, there is a recent influx of digital content providers such as Google and Apple that are offering eTextbooks. Open access textbooks also pose an alternative to traditional publisher textbooks, and it has been found that instructors believe that open access textbooks have the potential to facilitate more innovative opportunities (Petrides, Jimes, Middleton-Detzner, Walling, & Weiss, 2011). Opportunities to write your own textbook are also on the rise, which provides authors more flexibility to personalize and update the resource (Bona, 2012).

Despite the potential benefits, there are some concerns associated with adopting eTextbooks. First, access is an issue. While the majority of students are bringing digital devices to college (Dahlstrom, 2012), they are not all bringing the same ones. There is currently no unified format of eTextbooks, and they are available on varying digital devices (laptop, tablet, phone, eReader). This inconsistency is problematic when students need to access and skillfully use an essential course resource like a textbook in order to successfully perform in class. Second, while eTextbooks afford new opportunities for learning, their use does not guarantee that enhanced learning will transpire. Reading digitally demands a different set of skills than printed texts do (Rowsell & Burke, 2009). While reading a print textbook is typically a linear experience, readers of digital texts tend to jump around more, depending on the nature of the text (Kress, 2003). Therefore, effective use of eTextbooks requires that students exhibit information fluency skills such as being able to select, manage, and evaluate the information contained in the resource (Drenoyianni, Stergioulas, & Dagiene, 2008). A student using an eTextbook will have to navigate and manage web links, view multimedia elements, take notes, and

communicate effectively with others. Since eTextbook reading is a fairly new practice, these skills are not often explicitly taught to students (Rowsell & Burke, 2009). A more informed understanding of the design of digital texts helps bridge the gap between traditional and digital conceptions of information fluency.

This study focuses on the adoption of eTextbooks, namely the devices being used for access, and how eTextbooks are being utilized in higher education. The research questions are: (1) Are college students and instructors using eTextbooks? What devices do college students and instructors have for accessing and engaging with eTextbooks? (2) How are students and instructors utilizing eTextbooks? What features are valued as influential toward adoption? A clearer understanding of eTextbook practices encourages higher education institutions to implement more student-centered support and services, as well as support instructors to adapt their teaching practices to develop digital reading skills among students.

Literature Review

Because technology often moves at a faster pace than research, empirical research regarding eTextbooks in higher education is in relatively early stages. In this section, previous findings about eTextbook adoption, devices, utilization, and features will be discussed.

Despite the increase in eTextbook availability and prevalence of student-owned digital devices, the adoption of eTextbooks in the United States is low. Kaplowitz and Zell (2012) reported that only 3% of all textbook sales in the United States are in electronic form, and Greenfield (2013) found that only 3% of students used a digital textbook as their primary course material in a semester. Several factors have been identified to explain this low adoption rate, such as high cost, availability, and portability. For example, Grajek (2013) found that students were frustrated they could not use eTextbooks on their primary devices, while Jesse et al. (2013) reported more student difficulty when using tablets to access their eTextbooks. Additional information about the student population regarding device access and use is needed in order to successfully adopt eTextbooks across the university setting. It is also important to determine if a certain device is particularly popular and/or useful for eTextbook adoption and use. Another factor concerns institutional support. In 2013, only 5% of institutions in the United States had broadly deployed eTextbooks, with 45% sparsely deploying them (Dahlstrom, Eden, & Dzuiban, 2013). Adoption is typically limited to pilots or individual faculty (Donaldson, Opper, & Adkins, 2013).

Previous studies have found that there is a tendency for students to underutilize the features of eTextbooks. For instance, Grajek (2013) shared that students in an eTextbook pilot reported that they did not change their reading or studying habits. Concerning specific features, Dennis (2011) found that over half of the students reported that they did not make annotations. This is problematic considering that some preliminary research findings suggest that students experience positive results such as improved course performance and efficient review of concepts when actively utilizing the features such as highlighting and searching for keywords (Kaplowitz & Zell, 2012; Kissinger, 2013). Evidence suggests that multimodal texts (video, simulations, games, and interactive exercises) significantly improved student performance over traditional texts (Smith, 2013). Despite these positive findings, other findings suggest that students still perceive more learning value in print textbooks than digital (Greenfield, 2013). These mixed findings illuminate the need to better understand what students value in an eTextbook (Lindshield & Adhikari, 2013).

A common theme in previous studies is that the role of the instructor is crucial to the successful implementation of eTextbooks (Donaldson et al., 2013; Grajek, 2013; Graydon, Urbach-Buholz, & Kohen, 2011). When the instructor is actively engaged with the eTextbook, students tend to prefer the digital format more than those with disengaged instructors (Dennis, 2011). Active instructor use better supports students' learning outcomes (Grajek, 2013), and certain features like instructor-created annotations are considered valued and useful (Dennis, 2011). Smith (2013) highlights the flexibility of digital texts to support different teaching styles and modes. However, there is evidence to suggest that instructors are generally not actively utilizing eTextbooks (Grajek, 2013; Internet2 Spring Report, 2012). Grajek (2013) found that less than half of instructors in a pilot eTextbook implementation actively incorporated the eTextbooks in their teaching. Instructors used at least one feature (such as highlight, annotate) in a little over half (57%) of the courses. Support for students' digital reading is minimal. Grajek (2013) reported that only 40% of students in an eTextbook pilot reported receiving an orientation in class. Reasons for this underutilization are still being explored. DaCosta (2010) found that many instructors believed that students can acquire information literacy skills on their own and do not need to be explicitly guided through the process, which could have contributed to the underutilization. Instructors need additional training on the integration of eTextbooks into existing classroom practices (Fowler, Morrone, & Diaz, 2013; Jesse et al., 2013). As with other emerging technologies,

faculty struggle to find time and support to effectively adopt eTextbooks (Grajek, 2013). While evidence suggests that institutions have been placing the impetus on instructors to lead and guide eTextbook integration, the research literature suggests that instructors require more institutional support (Dahlstrom et al., 2013; Fowler et al., 2013).

There are several limitations and gaps regarding research on eTextbooks in higher education. First, the majority of research about eTextbooks in higher education takes place through the use of course or campus-wide pilots, in which students are required to use an eTextbook and are often given a device for access (Donaldson et al., 2013). In these pilots, universities partner with eTextbook publishers and providers, with the overall focus on reducing textbook cost (see eTexts at IU, 2013). Less research is collected about universities that do not have a focused pilot or initiative. In this case, it is often challenging to gauge how many students use eTextbooks, since there are many providers and publishers which offer them. Beyond that, it is difficult to track which devices are being used since they are often personal. In addition, a search of the Education Full Text database reveals that research focusing on information fluency in higher education often centers on library instruction or the role of the library (see Magnuson, 2013; Pinto, Fernandez-Ramos, Sanchez, & Meneses, 2013) or general information fluency skills not applicable to a particular technology (see Pierce, 2009). Few studies were found that applied information fluency to specific technologies (see Coulter & Draper, 2006), and none were found that specifically focused on eTextbooks. Our study aims to collect this fundamental information to fill this gap. Before we can thoroughly explore how eTextbooks are being utilized to support learning, we need to understand how many students are using them, how they are accessing them, and what features they value.

Methods

Since there is little previous research in the area of eTextbooks with respect to students' learning practices, we developed a survey questionnaire to explore the landscape issues such as basic access and use, and identify preliminary barriers to the integration of mobile and eTextbook technologies on the college campus. The survey was approved by the university IRB office and tested by experts for content validity. The survey questionnaire includes both closed and open-ended questions which are based on previously distributed surveys available online (Dennis, Duffy, & Morrone, 2010; Dennis, 2011) and surveys previously

distributed by the university. The findings on mobile technologies were published in Chen and deNoyelles (2013). This paper primarily focuses on the findings regarding eTextbooks.

Data (N = 1082) was collected in summer 2012. Participants were undergraduate (N=809) and graduate (N=133) students at a large, southeastern university in the United States. The participants were surveyed in 84 courses (in face-to-face, blended, and fully online courses) from 12 different colleges. The sample was 69% female, 60% Caucasian, and between the ages of 18 and 63 (M = 26; SD = 8.17). In addition to the student survey, we slightly changed the wording of the questions and recruited 16 course instructors to complete the survey as well.

Results

Research Question One: How many college students and instructors are using eTextbooks? What devices do college students and instructors use when accessing and engaging with eTextbooks?

Our results revealed that the use of eTextbooks is relatively unpopular among students. When participants were asked about the use of eTextbooks in their classes, less than half (42%) of the students (N=427) responded that they had ever used one. Among the students who had, 47% indicated that they had heard about the option from the instructor. 42% of students said they became aware of the eTextbook option on their own, while 6% heard from peers. Among the students who reported never using an eTextbook, 10% of them said the instructor had not informed them about this option, while 7% indicated that they simply did not know it was an option. 13% indicated that they were not familiar with eTextbooks, while 9% did not think they owned the right device to access them.

Awareness and familiarity emerge as themes to explain this finding. The top reason for not using an eTextbook was the preference for the familiar print textbook (38%). Cost was mentioned as an influential factor as well; 12% wanted to sell the print textbook back, while 5% indicated cost in general. Students expressed a strong wish for significantly lower prices in eTextbooks compared with print textbooks.

To investigate the devices used to access eTextbooks, students were asked about their general device ownership. Over 91% of the respondents (N=849) indicated that they owned a small mobile device (e.g. an iPhone, Android phone, or iPod Touch, etc.). However, only 37% respondents (N=290) owned a mobile tablet (e.g. iPad, Android tablet, Kindle Fire, etc.) and 27% (N=186) owned an eBook reader (e.g. Kindle, NOOK,

etc.). Considering the limited ownership of eBook readers, it is not surprising that the majority (84%) of students who had previously used eTextbooks used the computer the most frequently to access them, 12% used the tablet, and only 1% accessed eTextbooks using an eBook reader or a small mobile device respectively. These results suggest that basic access to eTextbooks does not appear to be an issue since most students have access to computers. However, the mobile convenience and capabilities of the eTextbooks are not being fully utilized.

The findings from the instructors' survey show that the majority of the instructor participants owned both a small mobile device (87.5%) and a tablet (81.25%). The ownership of eBook readers was low (19%). Almost half of them (43.75%) said that they had previously used an eTextbook for teaching, but students were the ones that informed them of the availability of the book.

Research Question 2: How are students and instructors utilizing eTextbooks? What features are valued?

The potential strength of eTextbooks is that they offer features that are not available in a print textbook, which may enhance learning of the content. Over half of students who had used an eTextbook at least once in their college studies reported they did not actively use any features that facilitate reading, studying, and communication with peers. Additionally, it was reported that 75% of instructors that had used eTextbooks in their classes were also not actively using these features. In other words, neither students nor instructors effectively utilized eTextbooks for accessing or understanding the information as the technology promises.

Students were asked to rate certain features from 'not at all important' to 'very important' in their decision to adopt an eTextbook over a print textbook. Based on past reports and our experiences with many eTextbooks, four basic categories of features were proposed: reading and navigation (e.g. search for keywords, search and view multimedia elements), studying (e.g. taking and compiling notes), instructor (e.g. view instructor's highlights and notes), and social (e.g. sharing a passage on Facebook, sharing notes with peers). The top rated features among students were reading and navigation features (78%), study features (76%) and features to interact with the instructor (71%). However, only 60% believed that eTextbooks would be as effective as a print textbook in learning. The features that enable social interaction with peers and others were rated low (37%).

Instructors shared the same view in terms of eTextbook features, as the social features were rated as the lowest among all. When they were asked why they would not integrate eTextbook technology in their class, the biggest concern was technical difficulty. They were also concerned that there was no consistency or uniformity of eTextbook format in the market and the technology might not work well with the course management system.

Discussion

The results yield two main insights that may be beneficial for promoting the effective use of eTextbook in higher education settings.

Finding One: How to help students facilitate learning via eTextbooks?

The survey revealed that the use of eTextbooks is relatively low, with less than half of students ever using one in their college studies. This is a lackluster finding, since technical access to eTextbooks was not a barrier, given that computers were the most commonly used devices.Awareness and familiarity emerged as important factors to explain lower use. For those who had not used an eTextbook, some indicated they were not familiar with the platform or did not think they had the right device, among other reasons. In addition, only around 60% participants believed an eTextbook is as effective a learning tool as a print textbook. Considering that the textbook remains a key resource to students' academic success in higher education, we believe that students are reluctant to take a risk and switch from a print-based textbook to an unfamiliar medium. For these reasons, it appears that eTextbook use is still in the early "access" stage, and learners are not taking advantage of the digital features for evaluating, managing, using or sharing information.

Implications at the university level can be drawn. It is important to promote campus awareness of the current resources that the university offers for eTextbooks. Bookstores and libraries emerge as important resources. These academic spaces can support students who are interested in the eTextbook option but are unfamiliar with the technology as a learning tool. Since it is important to exhibit how an eTextbook can facilitate reading, studying, and communication, it would be beneficial for these spaces to encourage the use of eTextbooks, allowing students to try them in the store under supervision or rent them free for a period of time. Information fluency initiatives that span the university and include key resources such as the library and technology centers are important to form a common vision (Fowler et al., 2013). To illustrate the point, this

study is part of a research effort that is funded by an information fluency grant. Expansion of initiatives like this will bring attention to effective use of new technologies such as eTextbooks for teaching and learning.

While the majority of eTextbook users still rely on computers for access, tablets were the second most used device. Tablets emerge as powerful learning devices because they are small and portable for students to bring to campus, and the screen size allows students to be able to retrieve and compose information more easily than small mobile devices such as smart phones. The display screen with touch capabilities and mobile nature of tablets complement eTextbook reading nicely. We predict, along with others (see McFadden, 2012), that eTextbooks will rapidly become more accessible on tablets. Given that less than half of the survey participants reported owning a tablet, students need more opportunities to gain access to tablets. We recommend that university promote programs that loan mobile tablet devices to students. Schools could also work with companies to offer tablets to students at a reduced price, or more lending opportunities, partnerships, etc. Gaining access to the device is the first step to support and increase students' digital literacy skills.

Student preferences regarding eTextbook features inform us about what they value. The findings strongly suggest that students place a great emphasis on the ability of the eTextbook to support their performance in the course; they want it to enhance their reading and studying of the material. They also prefer that the instructor to be involved, available to interact with and share knowledge. In reality, however, only around half of students who had used an eTextbook actively used these learning features. This is an alarming finding, since the true benefit of using eTextbooks beyond convenience is the use of features that support learning. Students may not be aware of the features altogether, or understand how to utilize these features to enhance learning. Trainings targeting the purposeful use of eTextbook features would help users gain the skills in order to become more effective digital readers and learners. With the rise in digital technologies, these skills are critical to gain.

The low ranking of social features suggests that this would be a non-essential add-on feature. This is surprising since social media is popular among young people (Chen & Bryer, 2012). One reason is that social features are not readily available in most eTextbooks in the market. Students have not truly experienced the benefits of collaborating with peers on eTextbooks as the technology has promised. We recommend that

publishers work with educators to build easy-to-use social features that would create a user-friendly online collaborative experience where users can easily share notes, compare their understandings with peers and connect what they are reading to other sources on the Internet.

Finding Two: How to help instructors learn and integrate technologies into curriculum?

From the instructor's perspective, we see opportunities to facilitate specialized professional development to help instructors learn and integrate eTextbooks into the curriculum. In the survey, students who had previously used an eTextbook reported that around 75% of instructors did not actively utilize the features that facilitate reading, studying, and communication. Instructors indicated the same trend in the faculty survey. It is imperative that instructors model the use of eTextbooks for their students by actively using them in class. First, instructors need to actively use the teaching features, such as making highlights and annotations for the class, which are valued a lot by learners. It is also important to model the practices that facilitate reading and studying for students, such as searching for keywords or making annotations since students may not be aware of the features altogether, or understand how to utilize these features to enhance learning. To take full advantage of the digital features, instructors need to capitalize on functions that print textbooks simply cannot provide. For instance, social features such as sharing notes with classmates and engaging in class discussions offer heightened opportunities for peer and teacher interaction to interpret and collaborate regarding content. All of these actions would exhibit the digital reading skills the students need.

Since eTextbooks are fairly new in higher education settings, it is likely that instructors do not have a firm understanding of how to effectively utilize them. There are several implications for instructors interested in integrating eTextbooks into the curriculum. We agree with past literature that instructors need institutional support in order to integrate eTextbooks effectively. One opportunity is to facilitate specialized professional development to help instructors learn and integrate eTextbooks into the curriculum. Instructor development includes not only technical training, but also how best to select and integrate eTextbooks into classes to improve students' learning motivation and performance Faculty development sessions would include encouraging instructors to consider the characteristics of their learners, along with the overall objectives of the course. If it is determined that an eTextbook can support learners and enhance the learning of objectives, the next step is the selection of an appropriate eTextbook for the course, keeping in mind if the technology

integrates with the learning management system or compatible with various learning devices. Awareness of the eTextbook option, device requirements and information about technical support can be explicitly addressed in the syllabus or other orientation activities. Instructional designers, along with librarians, can aid the selection of an effective eTextbook and also work with instructors to design and develop lessons that support its active use, ensuring that they are embedded seamlessly in the curriculum. Above all, the goal of the professional development training is for instructors to consider using sound pedagogical practices to support the integration of eTextbooks in their curriculum.

Conclusion

Digital content in U.S. higher education is on the rise; however, eTextbooks are still not being adopted as rapidly as other technologies. This study is significant because it adds to the growing body of literature about eTextbooks and information fluency-related principles. In this study, we collected data of students' personal ownership of mobile devices and eTextbook using a diverse sample from a large university. In addition, we explored students' digital learning practices with eTextbooks and focused on the interactions among technologies, contents and pedagogies. The results indicate that students need support to learn about eTextbook features and effectively integrate them for learning. The findings also help clarify future directions of faculty development. Instructors will need to gain knowledge of eTextbooks and integrate them into the curriculum with sound facilitation and assessment strategies, as well as be able to support the literacy practices of students.

Based on the survey results, our future plans include: (1) promoting campus awareness of the current resources that the university offers for eTextbooks such as loaning tablet or eBook reader devices to students and campus discount programs to encourage wide access to eTextbooks; (2) establishing a faculty focus group for eTextbooks and other digital technologies to further discuss how instructors are using these technologies in the classroom settings; and (3) creating faculty development opportunities particularly on the topic of eTextbooks, such as designing technical or logistical job-aids, delivering periodic face-to-face and webcast events and offering one-on-one consultations to help instructors to devise class or assignment-specific strategies in a pedagogically-sound and meaningful way.

Further research in this field will help guide other initiatives to encourage effective use of eTextbooks in teaching and learning. We hope that our survey results will encourage such research.

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