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Digital Literacy Adoption with Academic Technology: Namely Digital Information Literacy to Enhance Student Learning Outcomes

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DIGITAL LITERACY ADOPTION WITH ACADEMIC TECHNOLOGY: NAMELY DIGITAL INFORMATION LITERACY TO ENHANCE STUDENT LEARNING OUTCOMES

by

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ABSTRACT

Digital Literacy Adoption with Academic Technology Namely: Digital Information Literacy (DIL) to Enhance Student Learning Outcomes?

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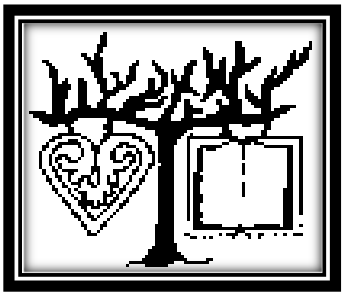
This study explores Arts & Science faculty and librarians' attitude of learning theory and perceptions of digital literacy (DL) and how digital information literacy (DIL) might improve and enhance student learning outcomes. Digital literacy (DL), information literacy (IL), and digital information literacy (DIL) consists of interaction with academic technology (AT) programs and tools. A literature review tracing the course in the rise of IL within the parameters of DL and discuss the birth of DIL, examine the modes of adoption and explore the levels of inclusion for faculty and librarians' concepts of DL with DIL instruction with AT, define the IL phenomenon, and how IL affects faculty and librarian pedagogy. The study reveals the tension and distinction between DL and IL. The key research question is how does epistemological perception bridge the connection between technology skills and technology self-efficacy, and subsequently; what are Arts & Science faculties' digital literacy (DL) epistemology? What is the librarian's/ library digital literacy (DL) epistemology perspectives? And what are Arts & Science faculties' concept of DIL?



NEA, “Tree of Life, Book of Knowledge and Heart of Learning”. © 1996.

This dissertation is dedicated to my wonderful husband Mr. Aaron Burleigh Turner, my parents Col John Ewing Adam (deceased 1972) and Mrs. Yvonne Walburga Adam, ne. Baroness Paola von Wecus (deceased 2000), and to all the teachers, instructors and professors who believe in the success of their students.

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A resounding “cheers” for all the encouragement I have received from my colleagues here at Bluefield State College, West Virginia. Especially remembering my colleague and dear friend Audrey L.A. Biggs, Director of the Virtual College (interim) for her positive encouragement and support to stay focused along this dissertation journey “Au revoir - Dieu bénisse - jusqu'à ce que nous nous retrouvons dans le grand bleu là-basaurevoir mon ami”.

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Introduction

Change is a natural phenomenon (Darwin, 1969), but how people respond to the influence of change makes a difference. Humans build relationships, behaviors, and methods of learning, which are both specific to and contingent on the type of information medium (Piaget, 1964, 1967). Human interaction with technology media or devices is not inherent or second nature to a person's behavior (Vygotsky, 1997). Contrary to traditional, Newtonian (1687) cause-and-effect mechanics, the idea of information exchange and the path of learning to achieve subject competency (i.e., knowledge) is no longer linear (Rynasiewicz, 2014). Kincheloe, Steinberg and Villaverde (2003) discuss prominent scholars' research—Kuhn (1970), Vygotsky (1997), and Freire (1970)—who argue that the post-modern notion of a paradigm shift becomes a schema of concepts, epistemologies, assumptions, and practices that shape academic instruction and learning. The nonlinearity of the cause-and-effect of (digital) information distribution, in digital literacy (DL) instruction and learning in an academic environment is shown in Figure 1.

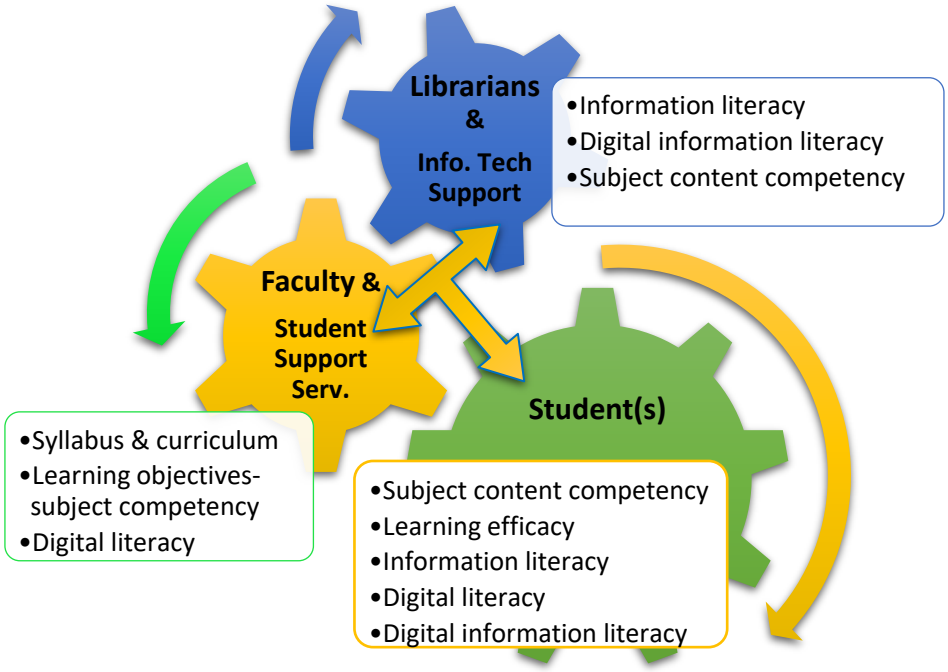


Figure 1. Non-linear learning process.

Bandura (1989), and Saracevic (2007) emphasize that cognitive, non-cognitive, and environmental relationships overlap as a nonlinear dynamic that influences people's learning perceptions and capacities. However, Piaget (1985) and Freire (2000) suggest that the human mind makes associative connections to and with information and experiences through cognitive thought and critical thinking. Chickering and Gamson (1999) argue that incorporation of technology should not foreshadow the value of education grounded in concept comprehension and development. Industry-sponsored research and student opinion express the expectation of better (digital) academic technology (AT) inclusion into methods of teaching and provision of services in higher education (Bertrand, 2010; Gates Foundation, 2015; Lumina Foundation, 2014). Prenksy (2009), Wesch (2011), and Oblinger (2014) argue that differences exist between people still learning and adapting to technological innovations—compared to most of the Millennial and X, Y, and Z generations who were born into the digital environment post 1980s.

Being a Generation X, Y and Z native does not preclude the need to learn how to exercise the best use of digital tools of DL to become more knowledgeable (Ng, 2015). Gonzalez-Patino and Esteban-Guitat (2014) argue that technology is part of people's lives, assisting, accompanying, and to some extent manipulating behavior. McLuhan (1964) suggested that the value of the artifact is not only the information message alone, but also the importance of the medium itself as it produces a message. Vygotsky's (1997) sociocultural theory describes human learning as a social process, suggesting that technologies are extensions of human abilities much like writing is an extension of thinking and thereafter memory.

Academic technology (AT) is an accumulation of multiple, digital components and formats, whereas technology is a generic term that means a manner of accomplishing a task in a technology process, method, or knowledge (Merriam-Webster, 2015). John and Pouder (2006) argue that a characteristic of the new millennium is integration and reliance on digital technology. Technology innovation drives industry and employment both in the United States and globally, creating new industries and employment. Debackere and Veugelers (2005) suggest that along the technological continuum of rapid digital advancements, enhanced relationships between industry and science, foster research in higher education. Voogt, Erstad, Dede, and Mishra (2013) argue that globally, there is a need for synthesis of digital technology implementation and integration in education.

Higher education faces a DL imperative, where new digital technologies include advantages, and limitations, requiring new literacies (Wesch, 2011, 2014). According to Badke, (2012), the general belief and comprehension of digital literacy (DL) and competency are inconsistent. This comes from the incongruence between the research literature's view of digital competencies as computer skills and/or knowledge learning applications and faculty/ librarian

actual instruction application of digital literacy (Badke, 2012). Gallardo-Echenique, de Oliveira, Marques-Mollas, and Esteve-Mon (2015) research implies the need for higher education institutions to be prepared to review and adapt towards the adoption of digital technology to understand and incorporate DL. Among the different types of institutions, there are different challenges that compound what faculty members report as negative factors (Badke, 2012). These factors constitute respective, unique environments.

Consequently, Belshaw (2012) states that embarking on the twenty-first-century journey involves being proactive in embracing both digital technology and popular DL trends. Digital technologies are the trends of the century, but as Flanagan (2008) asks, in providing students with AT, are educators enhancing student achievement, or replacing learning with computers and handheld devices? Nilsen (2012) suggests when considering ATs for the institution, that faculty and librarians should have the opportunity to offer input since they are expected to adopt them as part of pedagogy.

Digital Technology in the Academic Environment

Zurkowski's (1974) discussion of digital information technology recognized information literacy (IL). Kurzweil (2011) predicted that by the 1990s, a computer and Internet technology revolution would occur faster than Moore's (1965) law of exponential development, and by 2005, the world was fast approaching a technology tipping point. Gilliespie (1998, 2002) noted the incredible speed of technological developments would transform the academic ecology with continued importance that would neither disappear nor diminish, influencing higher education institutions (HEI). In the 1990s HEI's experienced unprecedented growth in the frequency of use of technology. Later, Thagard and Findlay (2012) argue that cognitive science combines perception, intelligence, calculation, reasoning, and finally conscience, articulating many

disciplines of science and technology—linguistics, anthropology, psychology, philosophy, neurosciences, and ultimately (computer) artificial intelligence. Thus, the innovation of cognitive computing evolved into thinking models and human relationships with computing. However, computer technological advances providing user-friendly interfaces does not change the reality that people must learn digital technology functions to achieve DL (Thagard & Findlay, 2012).

Sorcinelli, Austin, Eddy, and Beach (2006) argue that the application of (digital) information technology as DL is a compelling phenomenon, particularly where faculty and technology development are concerned. Matthews (2015) suggest that DL with (digital) information technology encompasses many formats of AT, which is synonymous with digital information, digital, virtual, and ubiquitous technologies. Beetham and Sharpe (2013) and Swanson and Jagman's (2015) definitions of DL discusses a spectrum of technology programs and digital tools that can be accessed through the Internet, including learning and content management systems (LMS), Web 2.0, open educational resources (OER), and handheld devices such as remote access units, or clickers, and iPads or Smart phones with Apps.

Discussing AT, Meyer (2010), Christensen and Eyring (2011) and Flavin (2012) report that higher-education institutions are investing in digital learning technologies and the virtual-learning environments (i.e., academic technology). Ramaley (2014) suggests that these ATs influence higher-education pedagogy, and consequently involve disruptive innovation that affects faculty and librarians. Hargittai and Hinnant (2008), Hargittai (2010), and Belshaw (2012) espouse the value of understanding dimensions of digital technology, digital information learning, discovery, and IL, where AT is the application of hardware and software applications that a person learns to use, thus, DL in the academic environment is the incorporation of the AT application into instruction. Christensen and Eyring (2011) argue that disruptive innovation

occurs when new digital technologies attempt to replace standard and/or traditional methods and programs, and comes with unforeseen consequences. Linder-VanBerschot and Summers (2015) discuss DL adoption, commenting on its dimensions and that institutions must accept a culture of change, and that difficulties often occur during transience of technology. Technology transience occurs as the lifespan of technology changes when constant innovation happens, imposing turmoil and its resulting influences. Thus, updates and revisions become constant, with which institutions, faculty, and librarians must keep current (Linder-VanBerschot & Summers, 2015). By focusing on the technological advancements is the human intelligence aptitude and physiology efficacy overshadowed?

Exploring components of digital literacy. O'Banion (1999) posits that DL adoption engages students in learning, and accentuates collaborative learning. Kurzweil (2011) considers positive influences of new technology, that digital advances improve communication—the ability to connect over great distances with accuracy and speed— thus enabling global community members to communicate. For example, in distance learning and hybrid classes, faculty and students exchange vast amounts of information for maximum learning (Renes & Strange, 2011). Connaway and Dickey (2010), and Cordell (2013) stress that digital technology offers practical advantages when used in education, and requires DL. Touminen, Touminen, Savolainen, and Talja (2005), Hargittai and Hinnant (2008), Brandtweiner, Donat, and Kerschbaum (2010), and Gross and Latham (2012) argue that ease of access does not ensure digital information literacy (DIL) competency. Whether students' DL and IL use is homogeneous, a combination of locations of digital technology access (i.e. the haves and have-nots), or sociodemographic technology skills, use behaviors have important influences on DIL skill development (Anderson & Horn, 2012)

Wesch (2008, 2011, 2014), Swanson (2010), and Swanson and Jagman (2015) advocate the benefits of DL with AT to have students integrate digital-virtual confidence with a subject, learning occurs as an interactive exercise between faculty and students, who combine multiple digital resources to achieve subject/topic learning outcomes. Hunt-Baron, Tracy, Howell, and Kaminski (2015) discuss how digital tools for faculty in rural environments have positive benefits. DL development is a core factor in AT that leads to DL competency and individual self-efficacy for faculty, educators' and librarians' professional. A favorable response to using online professional development training forums is establishment of collaborative communities that faculty report as useful support mechanisms when trying to learn new AT. However, one obstacle should be addressed—allowing sufficient face-to-face time for professional training (Hunt-Baron et al., 2015).

Bertrand's (2010) diagnosis of AT adoption in U.S. higher-education institutions criticizes the academy and faculty for lack of DL inclusion. He describes faculty, educators, and librarians as stereotypical digital laggards, resistant to change and unwilling/unable to transform pedagogy to incorporate the benefits of DL with AT inclusion, which is necessary for the United States to compete in the global community. The Babson Research Center reports (2012) and the Gates Foundation (2015) demonstrates that inclusion of DL with AT as a component of curricula and faculty syllabi in higher education is sporadic. AT limitations at both organizational and instructional levels are due partly to budget limitations and limited user computer knowledge and self-efficacy. The samples contained only limited two-year community college data, and the basis for results was faculty types of AT use frequency (Allen, Seaman, Lederman & Jaschik, 2012, June; Gates foundation, 2015).

With the higher-educational model in an altered state, challenges concerning adoption of institutional AT, DL, and IL influence pedagogy. The academy and faculty attitudes toward DL and IL make for continued pedagogical research of higher-education institutions. Blick, Dagnon, Burgess, Brown, and Miller (2014) suggest that a layered approach to DL with AT inclusion is a more efficient method for training and adoption. Another aspect is Selwyn's (2010) degrees of digital self-efficacy division since the compound nature of DL also influences faculties' and librarians' digital literacy perceptions. The ability to incorporate DL and use AT relies on a variety of competencies beyond basic computer operations. Badke (2012) argues that the variety of twenty-first-century DL competencies represents being multi-literate (p. 109). Selwyn (2010) refers to Carvin (2000), who outlines competencies as a range of skills, including (1) the ability to be information literate (i.e., discerning content quality), (2) being adaptively literate (i.e., developing new skills while using information computer technologies [ICT] and recognized universally as technology self-efficacy with AT), and (3) being occupationally literate (i.e., applying these skills in education, business, or domestic environments). These literacies are also reinforced and supported by a person's basic literacy competence (Carvin, 2000; Selwyn, 2010, p. 35).

Community College Academic Technology and the Faculty and Librarian Role

Regarding DL with AT inclusion strategies, Cohen and Brawer (2008) and O'Banion (1999) argue that community colleges are torn between supporting the newest digital technologies to promote student academic certificates or degree completion, and creating a career path for employment. Leeder's (2013) positive commentary relates to the self-perception of community college faculty, and so by extension librarians, as active practitioners, who expect to be hands-on to assist students. In community colleges, librarians are not typically visible, in

comparison to faculty and instructors, since most library services and electronic resources for research or class studies are offered seamlessly through technology (Leeder, 2013).

Vaughan (2006) confirms that community colleges have held a special niche since their inception by serving all segments of society with a comprehensive program to foster lifelong learning; they serve the community as a community-based, higher-education institution. Misconceptions are present in the value of a community college education, and the role of faculty and librarians. Leeder (2013) suggests that community colleges emphasize teaching and learning rather than research. Within this framework, the library strives to support that mission with services that sustain and expand DIL instruction, and reach everyone. Discussing DL inclusion and adoption using AT resources and advances in community colleges, Ramaswami (2009) uses Tallahassee Community College (Florida) as an example of effective practical implementation

Faculty/librarian collaboration with digital information literacy. Cordell (2013) argues that DL is a must in the technology era of the twenty-first century, and Leeder (2013) similarly argues that the community college library is not like other higher-education institutions' libraries, as the vanguard of libraries, because the college curriculum/faculty teaching environment serves and complements diverse student bodies. Community college librarians often have faculty status, and serve in several roles simultaneously as librarians, technology services, electronic services, and emerging technologies (Association of College & Research Libraries, ACRL, 2011). Providing a case for DIL, Head (2013) uses Project Information Literacy (PIL), an Institute of Museum and Library Services (IMLS)-funded research study, explaining that the ACRL research report asserts the need for increased DIL instruction due to students' lack of IL instruction in secondary schools. A primary objective of IL

and DIL advocates that librarians provide a collaborative role with faculty and institution during curriculum planning. Hence, new programs such as Embedded or E-brarian and Virtual Librarian provide the digital, technical instruction and support for students to improve learning outcomes (Head, 2013).

A Problem of Perceptions

A major problem is the paradigmatic differences with the adoption of digital technology and digital literacy application among faculty members' and librarians that implies a dichotomy of perception (McGoldrick et al., 2015). Is an individual's digital literacy self-efficacy competency dependent on their perspective of the actions attributed to the interpretation of the concept? Thus, does frequency of digital technology use demonstrate digital literacy (DL) self-efficacy? To put this in context the transience of technology has made an impact on DL understanding, incorporation and adoption, influences faculty DL adoption and the uses of digital AT as part of pedagogy.

Best practice models such as the technology acceptance model (TAM) or faculty learning centers (FLC) are not generalizable, but as Collins (2014) explains, onsite institutional collaborative review is necessary to identify a faculty development technology (FDT) approach best suited to support DL adoption. Studies of community colleges that discuss DL inclusion are inconsistent. Ianuzzi (2013) and Martin (2013) discuss the inconsistencies, where research focuses only generally on digital technology and IL, but must catch up with digital disruptive technologies of Web 2.0 and DIL's impact. Wesch (2008, 2011, 2014) and Belshaw (2012) argue that DIL remains an emerging topic because of multiple interpretations ascribed to its definition. If faculty are digitally literate, they must have the ability, not only the technology skills, for e-

learning pedagogy. Similarly, do faculty who are digitally literate integrate DIL as part of their curriculum?

Faculty digital literacy concerns with adoption and inclusion. Collins (2014) study of faculty issues to DL adoption with AT cites Gilliespie (1998, 2002), Gilliespie and Robertson (2010), and states that regarding faculty technology development, the primary barrier is lack of institutional funds, a common issue that dates to 1975, a year after Zurkowski's (1974) reference to IL (Collins, 2014). Cohen and Brawer (2008) report that a joint faculty DL issue was lack of time for faculty development participation, a salient issue at community colleges for adjunct faculty who often have more than one job. Allen and Seaman (2007) argue that faculty challenges to DL inclusion include low DL with AT confidence and competency as causes of slow adoption in pedagogy. Faculty members are discipline subject experts, much as librarians are information and digital information technology subject experts (Badke, 2012; Nilsen, 2012). The difference lies in that librarians support faculty and students across all disciplines regarding use of digital technology for IL and DL with AT programs. Criticism of faculty and librarians' latent AT adoption, is what Bates (2000) calls barriers—a degree of inertia—indicative of lacking support and institutional leadership to assist during transformation. Faculty and librarians are aware of another issue, which Scott-Clayton (2011) suggests is that students from underserved and low-socioeconomic backgrounds are not digitally information literate. Similarly, Bailey, Jaggars, and Jenkins (2015) point out that students from rural, underserved, and low-socioeconomic backgrounds might not have adequate access to digital technology. For that reason, faculty and librarian perceptions of the student body they teach might be a cause of their reluctance to introduce DL with AT programs into pedagogy.

Roberts and Hunter (2011) argue that generation X, Y and Z students expect technology since they are digitally adept, and these same students have the same expectations of faculty's digital versatility, and DL provision of institutional digital technology and learning services. However, Ng (2015) suggests that the issue is not instruction of generation X, Y and Z students but a case of teaching these students to be digitally literate, where its dimensions include technical operational literacy, cognitive critical thinking, and socio-emotion that relates to netiquette. The majority of generation X, Y and Z students use new technologies, but show disparities regarding engaging with educational technologies. Ng (2015) concludes that self-perceptions of generation X, Y and Z students are that they can be taught DL.

Assumptions on the lack of digital literacy adoption. Various findings on advancement of DL inclusion, coupled with criticisms of lack of adoption in academia, indicate that many areas require more research. Bent and Stockdale (2009) state that a criticism of digital (information) technology is that digital technology is ubiquitous with AT, and its use removes people's aspects and levels of thought processes. When using DL activities with AT programs information processing behavior is relevant to an individual's learning and self-perceived knowledge and self-efficacy. Consensus in the academic field suggests the importance of IL to student subject/discipline success. Through IL, students improve learning outcomes beyond class lecture information to expand their knowledge bases (Bent & Stockdale, 2009). To gain clarity of which factors influence faculty DL adoption and librarians' inclusion of DIL with the combined electronic resources and AT programs, the question of what causes the issues and identifying how to find solutions must be answered. For in-depth understanding, qualitative research reveals hidden or latent meanings for faculty and librarian DL reticence. On the topic of DL, it is imperative to understand that some issues create barriers for faculty and librarians, and recognize

that each institution has a unique, diverse, technology ecosystem and human capital demographics.

Purpose. This study addresses faculty attitudes of learning theory (i.e. epistemology) and DL adoption with AT inclusion while teaching, and their understanding of how to incorporate DIL at two-year community colleges. It examines two community colleges in Virginia and West Virginia, located in rural areas where digital technology and DL are difficult to implement in educational contexts.

Theoretical framework.

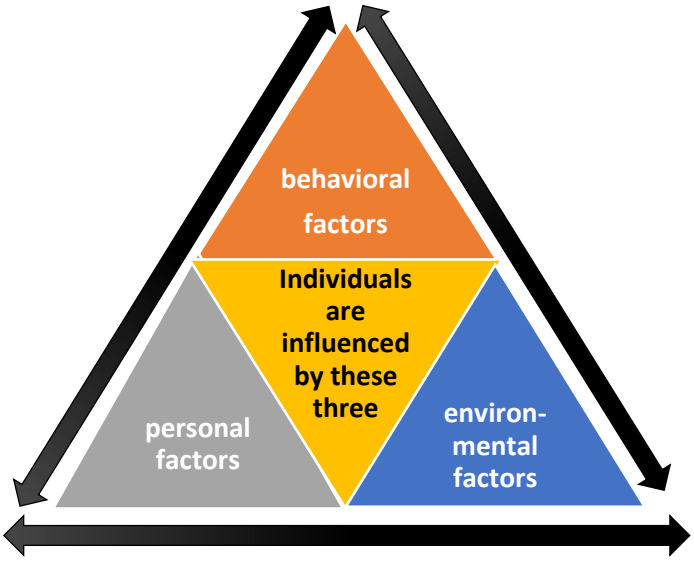


Figure 2. Bandura's (1989, p. 55) triadic reciprocal determinism model.

This study combines Bandura's (1989) triadic reciprocal determinism, Saracevic's (2007) subject/epistemic knowledge concept that relevance is not an action, and Fruge and Ropers-Huilman's epistemological congruency (EC) theory. Where Rogers (2003) applied the diffusion of innovation to human technology adoption as it relates to individual acceptance, shown in Figure 3., Bandura's (1989) model incorporates social cognitive theory, where a person's behaviors, cognitions, and environments are interacting determinants that mutually influence each other simultaneously, shown in Figure 2. The theory's relevance to the study is the

interconnectedness of the faculty, librarians and community college through use of digital technology to teach, and includes the instruction / inclusion of DIL. Frank (1955) describes EC as an effect between a person's local sense-making patterns and newly introduced information for learning. Fruge and Ropers-Huilman's (2008) EC (i.e., shared attitudes of learning) model describes the influences and implications of faculty and students' digital technology affect.

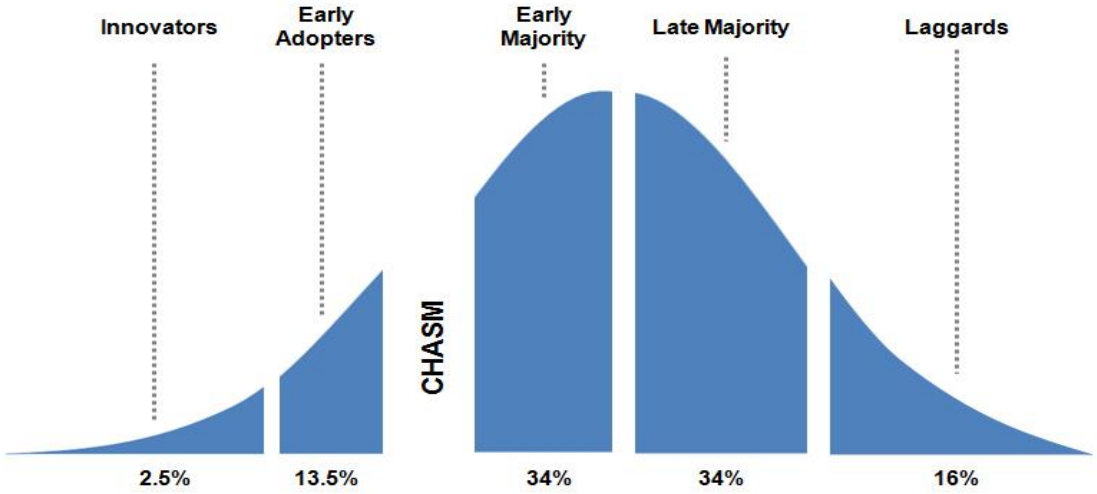


Figure 3. Technology Adoption Diffusion of Innovation (Rogers, 2003, p. 247).

Bandura's (1989) triadic model of an environment's effect on self and behavior variables is used to determine whether it explains faculty and librarians' perceptions and activities regarding DLs, shown in Figure 2. Participants are faculty and librarians, exploring and measuring their collaborative EC (i.e., shared attitudes of learning) with DL when using AT (Fruge & Ropers-Huilman, 2008). Saracevic (2007) adds behaviors and effects of relevance—that "relevance does not behave" (p. 2127). People behave in a way when looking at information or information objects to infer relevance. A person uses cognitive information as a thought process, and thus a person's comprehensions and perceptions of information influence actions (Saracevic, 2007). Hjorland's (2010) explanation of Saracevic's (2007) position is that a person's subjective knowledge view parallels the epistemic view. Self-efficacy can be a powerful

determinant of behavior transformation, as personal attitudes determine the initial decision for engaging in behavior: thus, influencing the effort a person expends and the persistence applied to the action (Bandura, 1989).

Rogers' (2003) research on AT adoption contends that people adopt new technology at varying rates. The speed of adoption follows a bell curve, where the primary difference is an individual's psychological disposition to innovation. An individual passes through four stages in the decision process; from knowledge of an innovation, to persuasion (attitude formation and change), then the decision (to adopt or reject), and lastly confirmation. The classic bell curve model shows the Innovation Adoption Lifecycle reinvented to show technology adoption (Rogers, 1995).

Therefore, diffusion of technology transformation has certain measurable areas such as; relative advantages, compatibility, complexity, trailability, and observability. The chasm is where technology infusion changes from being new to becoming more commonly incorporated having reached the threshold, thus, moves toward the tipping point of general acceptance shown in Figure 3.

The Study Research Design Model

When using a structured approach while incorporating these different theoretical concepts to develop the research framework, the conceptual framework might be unclear. However, by explaining how the concept of the framework is anchored, providing an example offers clarity (Cross, 1999). The design research model's name is a Point of Reference Spectrum (PRS) to show how an environment's effect on self and behavior variables is used to determine whether it explains faculty DL and librarians' perceptions and activities regarding DILs.

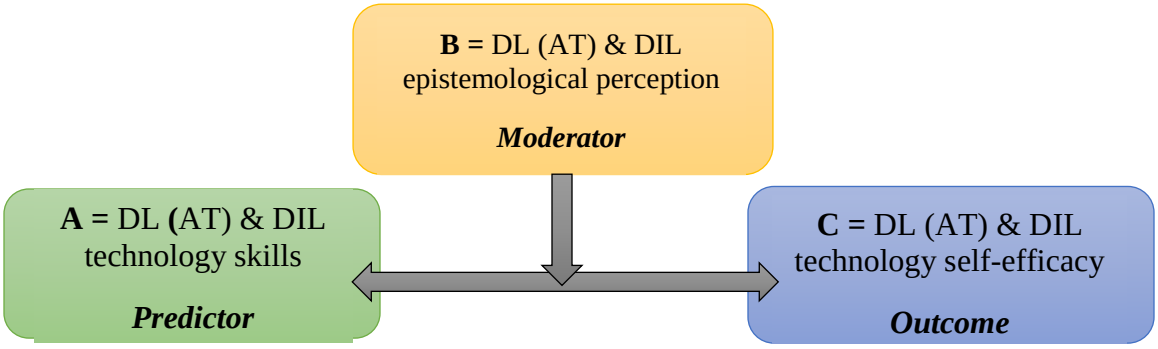


Figure 4. Research Framework - Point of Reference Spectrum (PRS) model.

The schema is A + B and B + C shown in figure 4; where A = technology skills (cognitive), B = participant epistemology (non-cognitive interpretation & learning), and C = technology self-efficacy (cognitive learning techniques). Thus, A is the predictor, B becomes the moderator, and C is the outcome.

This study investigates the foci above through the lens of community college faculty, instructors, librarians, and institution. Thus, gaining understanding of issues and obstacles these groups face when dealing with incorporation of DL with new AT in community college education programs (Mosley, 2011). The PRS provides a basis of recognizing participants DL cognitive and non-cognitive issue levels, and possible occurrence of correlation in the areas where clusters appear from the data analysis. The result provides a starting point from which to offer constructive recommendations to build collaborative solutions.

A summary of Chapter 2. The literature review is based on a chronological view of events from IL inception to DIL development—the transition of traditional literacy to the new DL. The definition and explanation of the elements contribute to the information learning continuum, starting with literacy, through the development of IL, to the inception and current establishment of DIL. The complexity of DL integration into higher education, supports

challenges during integration of IL and DIL, particularly for community college pedagogy and an institution's mission. Challenges and issues derived from an institution's concept of DL influence faculty and librarians' concept of DL adoption, and the possible benefits of DIL regarding student learning outcomes. To address the tensions and distinction between digital and information literacies, it is necessary to first define the phenomenon of DL with AT issues. That faculty and librarians experience with inclusion and instruction of DL, IL and DIL and how this influences student learning outcomes, especially from a humanities perspective.

Research Questions:

1. How does epistemological perception bridge the connection between technology skills and technology self-efficacy?

(a) What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

i. What are faculties' perceptions of the DL?

ii. When do faculty consider IL relevant to a course's topic?

(b) What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

i. What are community college librarians' (library's) DL perspectives?

ii. What are community college librarians' (library's) DIL instruction program?

(c) What are Arts & Science faculties' concept of DIL?

i. How do faculty consider DIL relevant to a course's topic?

ii. How might faculty & librarian DIL collaboration enhance student learning outcomes?

The Research Objectives

I. Generate baseline data on the current degree of DL attitudes, adoption with self-efficacy, and DIL provision for community college faculty, librarians, and community college personnel such as non-active faculty.

II. Develop recommendations for an exemplary organizational model and gap analysis, and encourage a management approach to embed DIL into all academic programs.

Glossary—Definition of Terms

Academic technology (AT). AT is a generic term that represents the manner of accomplishing a task in an academic context with use of a digital technology process, method, or knowledge. AT is comprised of digital content, which is high-quality, academic material delivered through technology. AT includes new engagements, interactive and adaptive software, classic literature, video lectures, and games, not simply digital documents or electronic slide presentations. AT is synonymous with digital technology and information computer technology (ICT). Examples include learning management systems and open education resources from the Internet.

Digital learning. Digital learning is any instructional practice that uses technology to strengthen a student's learning experience—a broad definition of what constitutes a learning tool, including curation tools and web browsers, and professional tools such as Google searches and Docs, social media, and programs such as Adobe and Microsoft cloud computing. Digital learning is synonymous with (electronic) e-learning, (ubiquitous) u-learning, and virtual learning, which express the same activity.

Digital literacy. Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (Digital Literacy Taskforce, 2013).

The definition of digital literacy is inclusive of information literacy (IL) since IL applies to the digital technology format. Therefore, a digitally literate person has the ability to perform tasks in a digital environment. Literacy includes the ability to read and interpret media, reproduce data and images through digital manipulation, and evaluate and apply knowledge gained from digital environments (Jones-Kavalier & Flannigan, 2006). Digital literacy is synonymous with digital information literacy and digital information fluency.

Digital information literacy (DIL). DIL is the application of information literacy standards and skills with digital technologies. It is not only application of information research, but also involves incorporation of spheres of philosophy of information (i.e., epistemology) (Badke, 2012, p. 102). Another term used in this context is fluency; digital information fluency (DIF) is the ability to find, evaluate, and use digital information effectively, efficiently, and ethically. 21st Century Digital Information Fluency (DIF) project and model (2009, Oct).

Digital pedagogy. Digital pedagogy is the use of electronic elements to enhance or change the learning experience of education. Examples include electronic slide presentations, flipped classrooms, and online MOOC's (More Open Online Classes) (Croxall, 2012).

Epistemology. Epistemology is the theory of knowing; the study or a theory of the nature and grounds of knowledge, especially concerning its limits and validity. Epistemology is the branch of philosophy that investigates the origin, nature, methods, and limits of human knowledge (Merriam-Webster dictionary, 2015).

Epistemological congruency (EC). EC is the degree of similarity in beliefs regarding learning between a student and faculty member. Since academic integration ties with retention, studies into how epistemological beliefs influence students' intentions to remain in college are common (Fruge & Ropers-Huilman, 2008).

Information literacy. Information literacy is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively." *Information Literacy Competency Standards for Higher Education.* (American Library Association, 2000, p.2). Information literacy and digital literacy are not competing concepts; they are complementary areas for students in higher education. Digital literacy concepts and skills provide fundamentals of managing digital environments that students need to succeed in IL and their other areas of study (Cordell, 2013).

Metaliteracy (or Multi-literacy). Metaliteracy is a type of literacy that recognizes various forms and media in which information is found. This includes intermediality; people view information processes as both producers (i.e., information creator) and users (Badke, 2012, p. 96). Metaliteracy is also known as transliteracy (ALA) and hyperliteracy.

Self-Efficacy. A person's cognitive and non-cognitive abilities, and personal perceptions of his/her aptitude to learn, and that self-efficacy refers to a person's beliefs in their capability to organize and complete a course of action required for desired results (Bandura, 1989).

Web 2.0. Web 2.0 is a development of Web 1.0 that refers to the beginning of the web, as an electronic-publishing platform, where people went to multiple webpages to get content, but did not interact with the content. The switch to Web 2.0 occurs when users become content creators, not only viewing webpages, but also helping to create and interact with web-based

information content. The Web then becomes more user-centered and collaborative (Metronet Information Literacy Initiative (MILI), 2010).

Limitations and Delimitations of the Study

The faculty with the sample institutions are not all full-time or local, to expedite data collection a brief online survey is used. A limitation of this method is that self-reports carry an element of individual unreliability, so the researcher is relying on the participants' self-assessment of tacit knowledge by providing candid responses (Neuman, 2011). Instead of the more common randomized sampling purposeful sampling is used (Rosenthahl & Rosnow, 2008), because purposeful participants are representative of diverse perspectives on an issue being investigated, namely EC (i.e., attitudes of learning) relevant to DL adoption and DIL inclusion (Leedy & Ormrod, 2013). This study might not be generalizable, but it answers research questions that are unique to rural community college faculties' and librarians' DL and DIL issues and needs. The sample is representative of rural community college faculty and librarians, and therefore through identification of issues at rural community college sites, parts from general digital professional technology programs can be adapted to support integration and inclusion of DL and DIL. To avoid bias, a pilot study was used, with an interrater researcher to guide application of a measurement instrument and data analysis. Faculty and librarians might feel concerned that their digital IL epistemological beliefs and teaching methods are being evaluated. Therefore, it was imperative that a distinct purpose, with clear guidelines, was communicated to participants to understand the potential benefits of the study. Recommendations describe various approaches that can be applied to how to best include programmed IL instruction in tandem with faculty course curricula to benefit student self-efficacy at rural community colleges. The parameter of the study is a comparison of faculty and librarian epistemological positions on the

influence of DL in college, their impressions and values of DIL about learning objectives, and whether DIL incorporation enhances student learning outcomes. The study explores the basis for how and why faculty and librarian instruction incorporates or excludes digital information technology as part of a mode of pedagogy.

Since time was a limitation due to faculty availability regarding instruction and the semester schedule, the research questions do not include examination of DL inclusion and academic freedom. The American Association of University Professors (AAUP) defines new guidelines on academic freedom and DL inclusion with AT based on the new laws regarding digital technology. Academic freedom involves interpretation of law, contractual agreements, and an institution's curriculum policies. Therefore, consideration of DL inclusion and how it influences academic freedom is a topic for future research. Another concern is whether it is possible to identify a relationship between a person's epistemological beliefs and digital IL teaching practices. The contention of this study is that an epistemological belief is determined, but it is more appropriate to identify variables that affect digital IL other than faculty or librarians' epistemologies. Therefore, more research is needed in lieu of using EC to understand this phenomenon and improve DIL inclusion in curricula for better student learning outcomes.

CHAPTER II

Literature Review

The hallmark of contemporary education is academic technology (AT) inclusion that incorporates digital literacy, information literacy (IL), and digital information literacy (DIL). DL is the ability to use information and communication technologies to find, evaluate, create and communicate information, requiring both cognitive and technical skills (Digital Literacy Taskforce, 2013). DL is also the ability to use digital technology, communication tools, and networks to locate, evaluate, use, and create information, and the aptitude to understand and use information in multiple formats from a range of sources when it is presented through computers (Belshaw, 2012; Gilster, 1997). The definition of DL is inclusive of IL, since IL applies to the digital technology format. Therefore, a digitally literate person has the ability to perform tasks effectively in a digital environment. Literacy includes the ability to read and interpret media, reproduce data and images through digital manipulation, and evaluate and apply new knowledge gained from digital environments (Jones-Kavalier & Flannigan, 2006). Digital literacy is synonymous with DIL and digital information fluency. IL is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively" *Information Literacy Competency Standards for Higher Education* (American Library Association, 2000, p.2). IL and DL are not competing concepts; they are complementary areas for students in higher education. DL concepts and skills provide fundamentals of managing digital environments that students need to succeed with IL and other areas of study. DIL is the application of IL standards and skills with digital technologies (Cordell, 2013).

Constant advancement of digital innovation is challenging for all stakeholders (Wesch, 2011, 2014). Institutions and administrators want to incorporate DL because it promotes improved efficiency, in part where politicians and society instigate demand (Bertrand, 2010). The Lumina Foundation (2014) and Gates Foundation's (2015) deductive studies suggest that students prefer to engage in digital technology, and consequently, faculty and student support personnel are obliged to use the technology, but might not have the DL training or inclination to incorporate AT while teaching. Conversely, libraries, librarians, and information specialists engage in digital technology because the bulk of their services and resources are electronic programs. Hence, librarians design IL instruction to meet faculties' disciplines or students' needs (Badke, 2012).

IL influences teaching and learning in higher education, and consequently asks what are a faculty's perceptions of DIL and the influences on and benefits to student learning outcomes? Exploration of the literature aids understanding of DL inclusion and issues involved with IL. The literature review follows development of IL along the digital technology continuum into DIL. It encompasses the types of challenges DL and digital technologies pose for faculty and librarians. The literature discusses technology multitasking, but includes limited research in the area of faculty and librarian (liaison) collaboration on digital technology, which demonstrates the significance of this study. With emphasis on DIL and through the lens of faculties and librarians, this study addresses what constitutes DL adoption from these perspectives for improved student learning outcomes.

From Traditional Literacy to the New Digital Information Literacy

Neither institutional policy nor academic departments and faculty were prepared for the influence technology brought to academia and DL learning programs (Bertand, 2010; Ramaley,

2014). With the arrival of the new millennium, Marcum (2002) informed the library/education field that information literacies are ambiguous because of underlying assumptions of the information-processing paradigm. Misconceptions occur in cognitive and non-cognitive actions related to the connection between information and knowledge, and consideration of human-computer interactions. Kahneman and Klein's (2009) explanation of the misconception suggests that humans think heuristically (i.e. using intuition; a way of doing--learned from experience), engage in multiple, complex reasoning for naturalistic decision-making, and use preferences to make decisions. Carrier (1990) suggests that computers do not think the same way as the human mind; they engage in vast amounts of metadata and processing speeds—the process is a logical algorithm, comprised of a set of unambiguous rules that follow a linear analogic path.

Information literacies involve DL, which in turn is universal in influencing faculty pedagogy and student learning outcomes. Marcum (2002) suggests refocusing toward digital technical fluency, implying the inclusiveness of multiple information literacies as a part of the digital technology environment. Badke (2012) concurs, reiterating how Kuhlthau (1993) identifies challenges of the information search process (ISP) and information retrieval (IR) as an area of concern. Kuhlthau (1993) uses a constructivist approach that includes Dewey's (1996) sense-making theory, and incorporates affective and cognitive dimensions. From a review of the literature, comes a clearer picture and understanding of the transition from the traditional concept of literacy in the form of reading, writing, and comprehension of printed matter to the contemporary, full-digital displays of information and multimedia technology. After examination of scholarly works on these digital literacy characteristics, we learn of the complexity of DL and the challenges institutions, faculties, and librarians face.

What is literacy? To start with a basic definition, literacy is attained when a person can read, write, and comprehend the written word (Merriam-Webster Dictionary, 2015; Montessori, 1965; Piaget, 1967). Through basic literacy comprehensive, integration is an element during development of learning, whether learning occurs from teaching, nurturing, or self-motivation (Astin, 1984; Montessori, 1963, 1965). Literacy involves all senses, and thus is complex; multiple factors influence a person's abilities, from psychosocial and inherent abilities to instructional learning. Tinto (1993) and Vygotsky (1997) explain that the elements of literacy involve a combination of cognitive and non-cognitive abilities. Freire (2000) prompts further discussion, suggesting that with IL and critical thinking, people develop the power to perceive the world in which they live critically.

Before contemporary technology was a significant source of information creation/production and access, the traditional method for the manufacture of information was ink to paper, which led to print. Germano (2010) discusses that as a resource, books functioned as information record-keepers of events—history past and present—and descriptive information leading to information distribution for learning. A traditional argument is that through books, we discover knowledge, the epistemology of what we know, and who we are (Germano, 2010). The printed word has value and meaning only if a person is literate (Piaget, 1967), and hence all senses are involved in literacy during stimulation and acquisition of learning (Chickering & Gamson, 1999).

The term *literacy* is central to many academic disciplines and societies; all changes to media environment mean that the focus shifts from print to information technology (IT), (Säljö, 2012). During the past two decades, traditional literacy expanded to include information, digital, science, visual, and multimedia literacies. Therefore, the current DL term is an overarching

keyword often used as a synonym for (digital) learning competency and knowledge. Säljö (2012) argues that literacy competency allows a person to engage in modern digital literacies, it alters an individual's epistemic practices in many ways. At higher education levels, the change is both to how information is accessed and incorporated such as learning management systems (LMS) and network learning resources. In the context of these electronic tools and the digital environment, learning builds on a person's literacy skills, and hence the merger between digital (virtual) tools and human reasoning becomes closer to integration of new digital tools, and the challenge is overcoming both a person's ability and epistemic practices. In the modern concept of literacy, literacy is the root of all other technical or digital literacies. These new six foundational literacies are demonstrated in Figure 5. (Digital Literacy Task Force, 2013; Mackey & Jacobson, 2011).

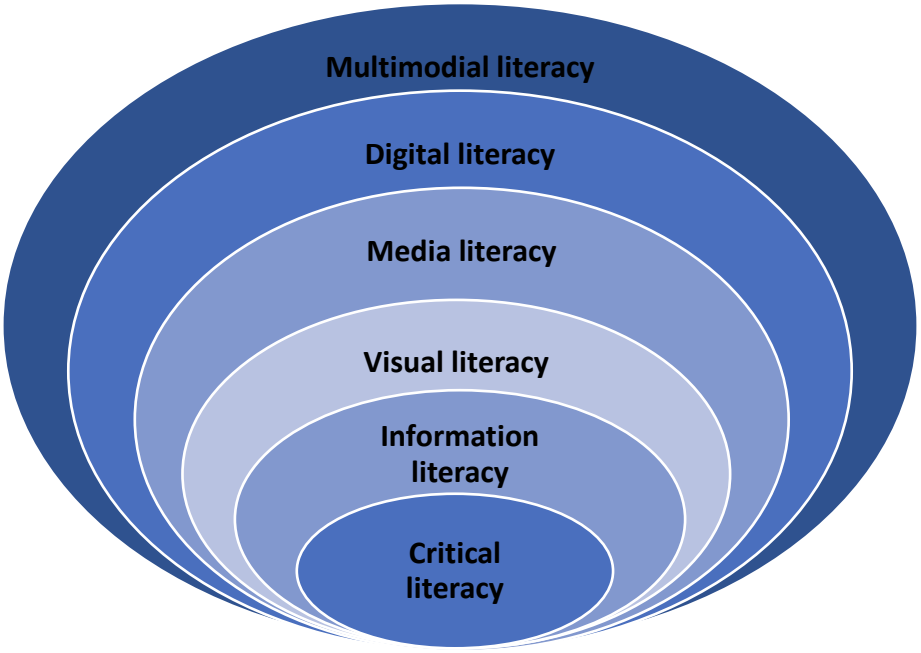


Figure 5. The New Six Foundational Literacies

Consequently, according to Mackey and Jacobson (2011) scholarly definitions of the six foundational literacies include: (1) critical literacy views readers as participants during reading.

Critical literacy focuses on issues of power and promotes reflection, transformation, and action (Freire, 1970); (2) IL is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively" (American Libraries Association, 2000, p. 2); (3) visual literacy is the ability to understand, interpret, and evaluate visual messages (Bristor & Drake, 1994); (4) media literacy is the ability to access, analyze, evaluate, and communicate information in a variety of forms, and is interdisciplinary (National Association for Media Literacy Education, n.d.); (5) digital literacy is the ability to find, evaluate, use, share, and create content using information technologies and the Internet; and (6) multimodal literacy is the ability to "interpret the intertextuality of communication events that include combinations of print, speech, images, sounds, movement, music, and animation," and "the integration of multiple modes of communication and expression" (Jacobson & Mackey, 2011, p. 12; National Council of Teachers of English, 2013).

The range of modern literacies is a unified term known as the family of metaliteracy. Mackey and Jacobson (2011) describe metaliteracy as an overarching literacy term of a self-referential framework that integrates emerging technologies and unifies multiple literacies. Metaliteracy challenges traditional, skills-based methods of IL, and recognizes related literacy types by incorporating emerging technologies (Mackey & Jacobson, 2011, p. 12). These terms—literacy (also known as critical literacy), IL, DL (also known as multi-literacy or trans-literacy), and DIL (also known as multimodal-literacy)—are recognized literacies within subtopics shown in Figure 6.

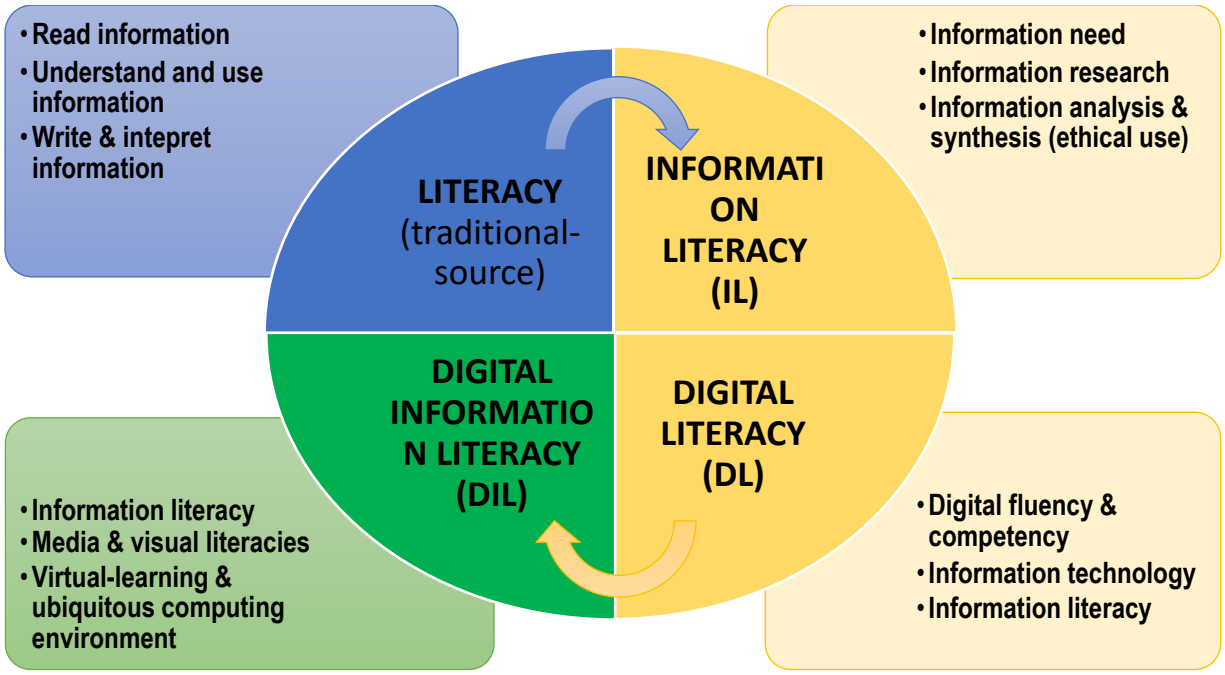


Figure 6. A Meta-literacies diagram.

The meta-literacies diagram demonstrates their interactive connections, whether as an application or applied skill, and indicates transitional development from traditional literacies to IL to DL, and ultimately DIL. Consequently, qualities applied to literacy are as simple as a visual image, sound, odor, or more involved scholarly, printed matter and full-scale theatrical/television productions. With modern technology, these elements can be produced digitally (Schwitzer, Ancis, & Brown, 2001). Wesch (2008, 2011) argues that technology superimposes onto the traditional literacy proponent, culminating in DIL, virtual learning, and ubiquitous computing environment. The effect, by extension, is that IL develops further into digital information literacy (DIL). The change from IL to DIL has implications that influence a person's behaviors regarding information processing, and alter learning process comprehension (Wesch, 2008, 2011).

What are the cognitive and non-cognitive abilities involved? To understand what the abilities are, methodical observations explain the processes. In a study on behavior and the effects of relevance, Saracevic (2007) states, "relevance does not behave" (p. 2127). People

behave in a particular way when looking at information or information objects to infer relevance. A person might question whether relevant inferences do change a person's judgments and/or the method in which they apply the task. That person is using cognitive information as a thought process. Thus, retrieval of the topic approach derives topical or non-topical relationships, and then analysis of information for relevance, and from that relevance, the person decides how to behave (Saracevic, 2007). Freire (2000) argues, "by developing critical consciousness, students learn to take control of their lives and their learning to become active agents, asking and answering questions that matter to them and the world around them" (p. 193).

Fruge and Ropers-Huilman (2008) explore epistemological relationships between faculty and student learning perceptions as they relate to learning activities and class disciplines to meet expected learning objectives. The study explores epistemological congruency (EC)— how participants, faculty members, and student perceptions share a degree of common agreement on learning and knowledge acquisition, and how disparate perceptions of the value of learning affects student learning outcomes. An online learning environment magnifies divergence in perceptive attitudes, and faculty need to give clear directions regarding the value of content, and the importance of all elements of the class so students achieve learning outcomes (Fruge & Ropers-Huilman, 2008).

What is information literacy? To understand what information literacy (IL) means, we must first explore who initiated the term, and why, including information from; (1) The American Library Association's (ALA) definition of IL, and (2) IL standards (Association of College and Research Libraries, 2000). IL standards in academic research define the complexity of IL comprehension and application. IL has a broad influence on everyone when dealing with information, especially when using information technology. IL influences basic research skills,

to include understanding information, how it works, and especially regarding development of students' critical-thinking skills (Association of College and Research Libraries, 2000). The Association of College and Research Libraries (ACRL) (2000) suggests that people are information literate when they "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (p. 2). Virkus (2004) and Machin-Mastromatteo and Virkus (2013) add that ease and success of use depend on a user having both IL awareness and the capability of use, and digital technology self-efficacy. Bandura (1989) suggests that the definition of self-efficacy depends on a person's cognitive and non-cognitive abilities, and personal perceptions of his/her aptitude to learn a skill. Bourantas (2008) argues that self-efficacy refers to a person's beliefs in their capability to organize and complete a course of action required for desired results.

When discussing the IL continuum as it relates to digital technology from Wesch (2008, 2011), Swanson (2011), and Belshaw (2012), technology innovation appears as a continuous, infinite cycle. Consequently, the current new literacy is digital literacy, where DIL is a descendent of IL. The four elements that encompass DL are digital-age literacy, inventive thinking, effective communication, and high productivity. These elements are part of visual, media, computer, network, and information literacies, and Web 2.0. (Belshaw, 2012; Swanson, 2010; Wesch, 2008, 2011), and all interrelate. Shown in figure 7 demonstrates a model on the IL continuum.

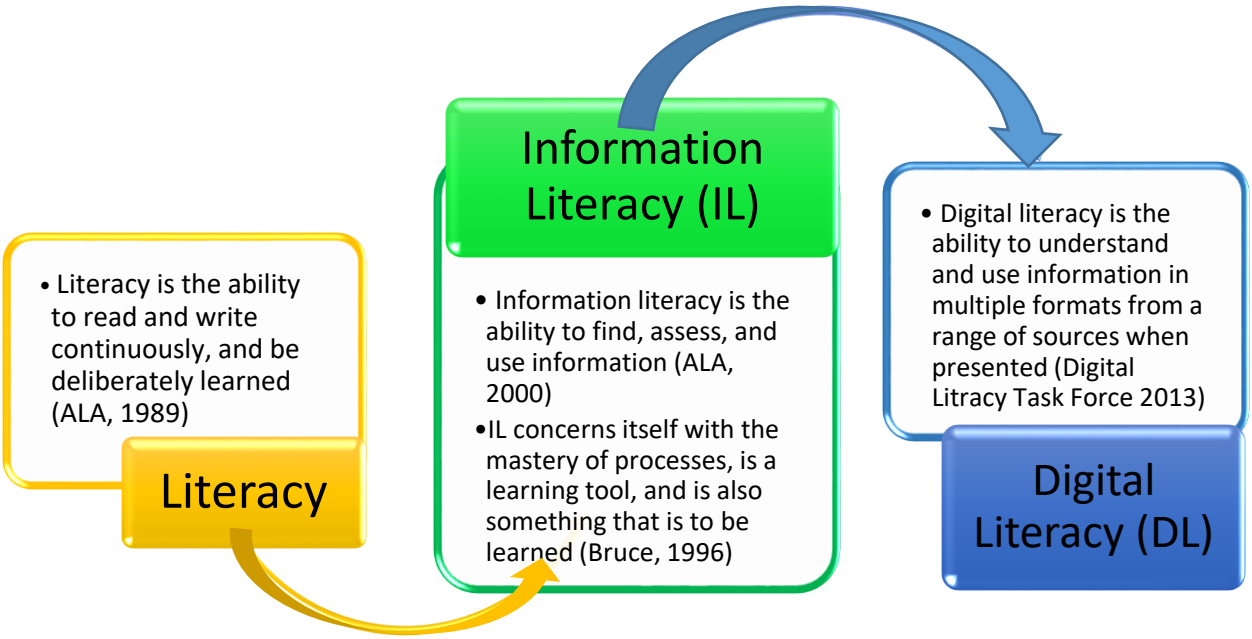


Figure 7. A Model on the information literacy continuum.

The term *information literacy* (IL) was introduced 40 years ago by Zurkowski (1974), attributing IL to the influence of innovative technology. Expansion of computer digitization of information, and digital access programs, emerged in the United States during the 1970s (Zurkowski, 1974). At that time, approximately 60 percent of the U.S. population had some comprehension about emerging information access routes (i.e., information technology). The new technology influenced the economy and the professional and social lives of everyone concerned; it was incumbent that the population recognized the need to be information literate. Both Badke (2012) and Bird, Crumpton, Ozan, and Williams (2012) report that Zurkowski (1974) held a vision of the creation of a major national and universal IL program by 1984, believing IL skills were critical elements to creating wealth and a blueprint for the nation's economic recovery.

Bruce (2002) contends that IL connects with many forms of information technology practices and critical thinking in information and communication technology environments.

Pollock (2002) describes IL as an active methodology and logic a person applies while searching for information and/or discovering the answer to a question. A person relies on cognitive knowledge to fulfill an information task, and so influences information behavior epistemologically (Pollock, 2002). Bruce (2004) argues that IL acts as a catalyst to transform the information society of today into the learning society of tomorrow. IL is also described as an overarching literacy that is essential in the twenty-first century. Information and communication technology (ICT), a subset of information science (IS), associates IL with information practices and critical thinking (Gross & Latham, 2007). From the American Library Association (ALA) and higher-education accreditation institutions such as the Middle States and Southern Association of Colleges and Schools (SACS), IL is the underpinning for learning in our modern environment of continuous technological advancement; IL is a natural extension of literacy in today's information society (Gross & Latham, 2007).

The appeal of inclusion of IL from outside of the library has been established by state, educational, and professional organizations that recognize IL as a necessary part of higher education (Rockman, 2004). These outside forces encourage acceptance internally, and create opportunities to incorporate IL into curricula. Information management skills are one of eight broad categories needed for twenty-first-century skills (Swanson, 2011). When instituting an IL curriculum, there is need for creating collaboration, helping the library engage in cooperative partnerships to further IL as a goal. These internal partnerships improve learning while using community colleges' limited resources efficiently (Srikantaiah & Koenig, 2004).

Rockman (2004) found that when IL is included in general education courses, it represents a strategy for closing the gap across curriculum boundaries because general education courses form the foundation of a common learning experience. Through collaborative alliances

with faculty and library personnel, students develop a process of personal empowerment by becoming and remaining information literate throughout life (Rockman, 2004). Ragains (2006) argues that incorporating IL into subject classes instills in students the ability to think and act creatively, which is required in today's higher education system. The American Library Association (ALA, 1989) Presidential Committee on Information Literacy report suggests that what previously sufficed as literacy no longer counts as effective knowledge; there is great need for computer, civic, global, and cultural literacies for the United States to compete in the world economy (ALA, 1989). Kerr (2012) states that IL has had a profound influence on education, employment, and quality of life, especially in contemporary, information-driven and information-rich environments. IL is one of many literacies that appear in the digital educational environment, often described as an overarching literacy (Koenig & Srikantaiah, 2004; Srikantaiah, Koenig, & Al-Hawamdeh, 2010). Therefore, IL includes aspects of multi-literacy, as information management, information technology, and DL. Many of these areas are indirect components of information-learning skills (Swanson, 2004). Nearly thirty-five years after Zurkowski (1974), President Obama declared that October is National IL Awareness Month, spurred by the influence digital technology is having on education and IL (Obama, 2009).

The majority of IL publications are confined to library and information science journals. Many contemporary, scholarly journals in higher education make minimal reference to IL, and instead many articles in the same journals examine critical thinking and student research ability, the terminology of which contains elements of IL (Badke, 2010). ALA and ACRL (2000), and Badke (2010) disagree with the criticism of the IL term and description because IL is the correct technical descriptor of the discipline. Badke (2010) explains the dichotomy of understanding between faculty and librarians regarding the definition of IL. IL is not limited but a dynamic,

digitally dispersed learning method that challenges the concept of IL instruction (Badke, 2012). Bucks County Community College's pilot IL project for online students offered personalized library and IL experiences. Findings suggest the importance of developing strong relationships between faculty members and librarians, and building a foundation of IL instruction for faculty members (Hemmig & Montet, 2010), thus creating questions concerning what is digital learning and how to adapt pedagogy to fit with digital technology learning methodologies (Maddison, 2013).

What is digital literacy? Digital Literacy is a contemporary technology concept and an integral part of IL. Therefore, DL now takes prominence because IL and all subsequent literacies are a part of the whole literacy topic group. Each has its definition and value, often working together to complement one another. Each topic also stands independently, but all have a common denominator. Consequently, DL, and so IL as a subset, stems from literacy as the core source of the foundational six root literacies mentioned above (Figure 5). According to Lankshear and Knobel (2011), DL is an all-encompassing literacy that engages in the application of AT, and Bawden (2008) identifies attributes that define DL, the top four of which are: (1) reading and understanding non-sequential and dynamic material, (2) retrieval skills, plus critical thinking for making informed judgments about retrieved information, with wariness about the validity and completeness of internet sources, (3) knowledge assembly for building a reliable information hoard from diverse sources, and (4) awareness of the value of traditional tools in conjunction with networked media (Bawden, 2008). Lankshear and Knobel (2011) reiterate that there is a combination of cognitive and non-cognitive factors that influence a person's digital literacy ability and success, and these factors interact and influence one another in any number of combinations.

For a clearer picture to understand what the new literacy of DL means is to study the concept with a breakdown of consummate parts. Examining each subtopic, to discover interrelationships, why interconnections influence each component, and how they influence a component or result. Similarly, to recognize types of people, academic or otherwise, who engage with digital technologies, consequently identifying cause-and-effect links, when and where there are issues connected with the phenomenon? Thus, research identifies possible solutions.

What is digital information literacy? Digital information literacy (DIL) is the evolution of information available in myriad digital forms, and as such, IL is a component of information computer technology (ICT) (Virkus, 2004). A dichotomy surrounds IL; IL incorporates information technology skills, known as information retrieval (IR), and information search processes (ISP) (Kuhlthau, 1999, 2004, 2007). DIL is the application of IL standards and self-efficacy skills with digital technology (Badke, 2010), where Figure 8 shows the interactive relationship between IR and ISP as activities involved in IL.

Kirk (2007) explains the framework for information search process (ISP) is based on research on users' perspectives of IL and formal organized sources from information systems, interacts with people for sources from everyday life experiences to review cognitive and affective aspects of information seeking. Students conduct information searches, a process of construction that involves the whole experience of the person, feelings, thoughts, and actions involved throughout the IL process. As is demonstrated in Figure 7 the interconnectedness of the actions between IR-ISP and IL components, and DIL is applying those IL benchmarks in the digital format (ALA, 2000, Digital Literacy Task Force, 2013).

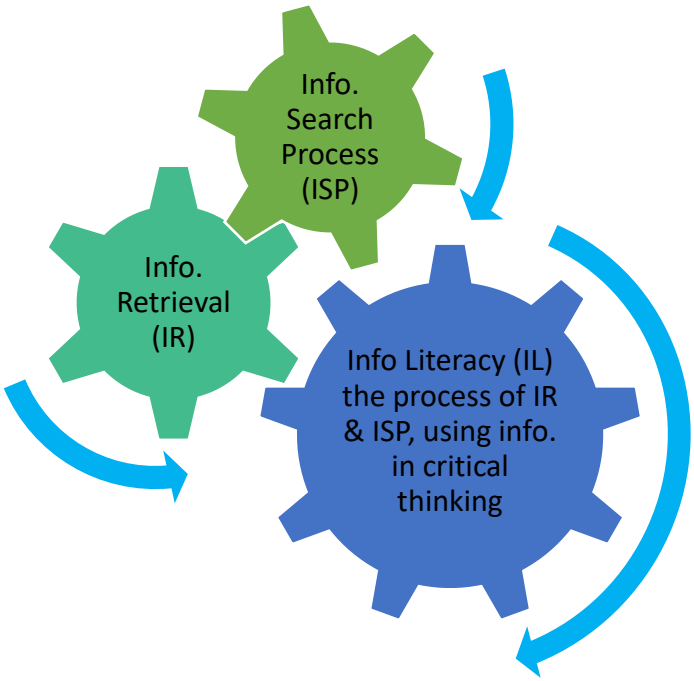


Figure 8. Interconnections between IR-ISP & IL components (Kirk, 2007).

Understanding information is represented by the relationship between IR and ISP skills, and use of information and critical thinking skills (Kirk, 2007). From Virkus (2004) and Abbitt (2011) discuss DL is at a premium, how expectation affect performance and a person's ability with AT applications, of which DIL is an integral part. Both are necessary attributes for everyone to have the opportunity to be successful in the global market. Successful use of digital information is contingent on the user, be it a faculty member, librarian, or college student, who demonstrate both IL awareness (Association of College and Research Libraries, 2000) and DL self-efficacy (Abbitt, 2011; Virkus, 2004,).

The new millennium brought change in society's opinions about understanding DL attributes in higher education, and thus by extension DIL. From the perspective of faculty members, Nelson, Courier, and Joseph (2011) argue that the primary challenge is the number of digital literacy definitions. Their research surveys teaching faculty at a mid-sized, southeastern

U.S. university. Reiterating Hargittai (2010), evidence suggests that the influence of the range of student computer literacy depends also on student demographics (Nelson et al., 2011). Nelson et al. (2011) incorporate Covello's (2010) research in a review of computer information literacy (ICT), IL, and DIL, and add Web-literacy, thus demonstrating that DL is a much broader discipline, representing an umbrella framework that incorporates interrelated sub-literacies. Findings suggest that faculty perceptions of DL are not a single component, and nor is DL assessed by one type of test (Nelson et al., 2011).

Belshaw (2012) argues that the global economy changed from industrial to an information-technology knowledge economy. The definition of literacy in post-secondary education is amended to include DIL in the fullest sense (Belshaw, 2012). Implications of this newest digital form and format of literacy in education are in question. Jones-Kavalier & Flannigan (2006) state that academia has not chosen a formula for digital teaching inclusion since instructors and faculty members tend to be linear thinkers. Research on digital technology with DL inclusion and predictability of improved student performance remains nascent.

Swanson (2011), Hennifer (2013), and Meland (2014) argue that digital technology continually permeates the way institutions, faculty, and librarians provide instructional teaching and educational administration of academic programs, from the fundamental activity of information processing protocols to technology used as a platform to provide a learning environment. DIL also includes technology tools used for learning information production (i.e., personal computers, tablets, and smartphones), and a multitude of interactive technology instruments and programs available off-the-shelf (Hennefer, 2013; Meland, 2014; Swanson, 2011). Although digital technology has become popular with the public, benefits gained from multiple digital avenues of access to information technology are influenced by geographic and

demographic factors (Hargittai & Hinnant, 2008; Jaggars, 2012; Jaggars & Bailey, 2010; Kruger & Gilroy, 2013). Many information-processing actions are conducted with, by, and even because of technology. There is no avoiding the influence of digital technology, whether in a school/college, at work, or for personal entertainment. Hence, IL also benefitted from technology innovation, where accessibility is possible with even more diverse methods of digital access (Jones-Kavalier & Flannigan, 2006).

Bruce et al. (2006) and Kuhlthau (2008) argue that a universal IL program is not conducive to student learning (Bird et al., 2012; Lloyd, 2010), and Nelson et al. (2011) and Ianuzzi (2013) suggest that a single-component DIL program lacks sufficient structure since digital literacy and DIL agency involves interaction and successful efficacy of digital competencies in academia and life. Faculty understand both students' digital competencies and technology perceptions when considering curriculum adjustments to include digital technology (Ianuzzi, 2013; Nelson et al., 2011). Lea (2013) suggests a provision be made for DIL and web literacy, and included as subject-discipline specific. McLuhan (1964) and Vygotsky (1997) posit that integration of digital technology advantages with thoughtful modes of practice should be developed and built on established connected learning theory (Gonzalez-Pitino & Estevan-Guitart, 2014).

The evolution of IL to DL, and now DIL, where each has been born out of the other indicates the innovation and development of digital technology as an integral component of education, information learning and knowledge. The interconnectedness of all three—IL, digital literacy (DL), and DIL—adoption in pedagogy introduces the incorporation of AT to achieve learning outcomes. To add another layer to the list of terms in the digital literacy family, synonymous with digital learning is (electronic) e-learning, (ubiquitous) u-learning, and virtual

learning, used to express the same types of digital learning activity. Similarly, IL developed such ambiguity, with more than one definition depending on a person's individual perspective or discipline base, thus, the same inconsistency arises with DL.

Higher Education Faces a Digital Literacy Imperative with Academic Technology

In higher-education, universities, colleges, and community colleges agree that the professional environment involves a combination of instructional learning, higher research, service, and administration (Bok, 2013; Cohen & Brawer, 2008; Thelin, 2011), where teaching and learning are central to their missions. Proactive commitment from faculty members, librarians, students, and administrators serves an institution's various constituencies. The ALA, Digital Literacy Task Force (2013) and Wesch (2011) provide a definition for digital technology in higher education as use of electronic (digital) resources to create, communicate, and analyze information in a digital context. Therefore, digital technology encompasses use of computer information technology, software, Web 2.0, and digital media (Digital Literacy Task Force, 2013; Wesch, 2008, 2008, October, 2011, 2014). A college president, Ramaley (2014), expressed interest in and concern about the influence of digital technology in higher education, and poses, "How disruptive is this technology revolution?"(p.12). The concern is about the AT inclusion, and what types of challenges occur once basic scholarship from teaching practice is depreciated and therefore research on teaching disappears. During virtual learning, boundaries that once separated teacher from student are lost (Ramaley, 2014). A review of Oblinger's (2013) reflections clarifies that no longer is a "classroom" limited to a physical location and face-to-face interactions. Due to digital technology, essential information is available whenever and wherever, and not stored alone in a physical form in a library. Institutions, curricula, faculty members, librarians, and other educators must meet this challenge (Oblinger, 2013).

O'Banion (1999) advocated a reformed education environment that included technology, and argued that multiple learning does occur, shifting faculty members beyond lecturers/teachers to facilitators. DL with AT programs engages students during learning, and accentuates collaborative, shared learning (O'Banion, 1999). Higher-education institutions experience constant change, where institutions regularly expect faculty members and personnel to demonstrate inclusion of (digital) AT as part of their pedagogy. During a review of a sample of higher-education institutions, Bates (2000) explains how AT was deployed in colleges, concluding, "Where technology was being used successfully for teaching, strong leadership was a critical factor. Without leadership and a strong sense of support for a change in an organization, the barriers of inertia can be great" (p. 43). Tirrell and Quick (2012) further explain that the seven principles of good practice reflect assessing AT in student learning theory. They also demonstrate that faculty cannot transfer traditional lecture material and teaching styles directly to an AT program on a technology platform (Tirrell & Quick, 2012).

Institutional academic technology and information literacy. The National Center for Educational Statistics (NCES) defines post-secondary education as:

> an academic, vocational, technical, business, professional and home school…and may be grouped in the following manner: universities, colleges offering programs leading to bachelors and graduate degrees, as well as community/junior colleges two-year programs offering programs that lead to associate degrees, diplomas, and professional certificates of completion." (cited in Putnam, 1981, p. 3)

Cohen and Brawer (2008), Thelin (2011), and Bok (2013) discuss the uniqueness of the American higher education system, suggesting that post-secondary education is a person's journey of development during attainment of higher qualifications, with the intention of entering

a profession or career. Thus, the expectation is that higher education is responsible for providing academic programs to meet current professional and career standards and expectations. In opposition to K-12, higher education has no federal policies that mandate DL adoption and use of AT in curricula. However, higher education institutions must adhere to accreditation standards in geographic locations. Within these standards, accreditation commissions' directions outline criteria that the institution follows for compliance, and address the institution's administration and learning outcome goals. Universities and colleges might be advised to incorporate DL, but to what extent is left to individual institutions since each institution is responsible for supporting its campus community constituents (Bok, 2013; Cohen & Brawer, 2008; Thelin, 2011).

Tension and distinction between digital and information literacies. The basis of this review cross-references education learning theory with faculty and librarian digital technology and DIL applicable to higher education, and especially community colleges, exploring how faculty digital technology use advocates epistemological congruency and influences faculty members' experiences and integration into academic teaching. Fruge and Ropers-Huilman (2008) examine faculty and students' epistemological congruency (EC). EC is the degree of similarity between belief values (epistemology is learning attitudes) and congruency (similarity of agreement). Frank (1955) argues that EC is explained as an effect between a person's local sense-making patterns and the newly introduced information for learning. It is change brought about by coincidence as a shared experiential basis (where thought plus information achieves decision) on which to build constructive analogies that provide further learning (i.e., knowledge) and digital self-efficacy between digital technology instruments and tools (Frank, 1955). Fruge and Ropers-Huilman (2008) argue that DL, AT tools, and programs enhance faculty subject discipline content and teaching capability, offering enhanced subject learning objectives, and

hence improving student interactions and academic outcomes. This characterization mirrors Hjorland's (2010) explanation of Saracevic's position that a person's subject knowledge view is a parallel to the person's epistemic view.

Sinclair (2007) posits that research is a journey toward an endpoint, and is a guide to understanding theoretical and conceptual frameworks. Hence, research is a foundation for improved knowledge creation (Sinclair, 2007). This literature review targets faculty forms of pedagogy, specific learning concepts and teaching methods of academic research (Sinclair, 2007). In discussions of faculty AT and teaching DIL, Adeyemon (2009), Wesch (2008), and Swanson (2010) observe that the combination of digital literacy and IL into DIL must be a collaborative effort of learning facilitators involved in curricula, learning modules, and learning environments such as off-campus and online instruction. An initial search of the literature found some studies on IL and student technology self-efficacy, but sparse research exists concerning inclusion of DIL instruction programs in community colleges (Bailey et al., 2015; Ianuzzi, 2013). For this reason, broadening the study to include the nature of teaching and experienced learning relationships between DL and DIL within the ethnographic sphere of higher education was necessary (Hughes, 2014). Hughes (2014) explains that study participants' ethnomethodology conceives the individuals as sense-making theorists, who design their own motives for cognitive and non-cognitive meaning. The parameters of meaning are thus understood contextually and developed by participants in ways particular to unique situations and information environments (Hughes, 2014).

For the literature review to identify gaps or oversights, Samuels (2007), Laurillard (2008b), and Mitchell (2012) suggest a coordinated strategy on the theme of teaching as a science with discussion about the building of pedagogical patterns using AT for learning, From a

defined outline, search and develop comprehensive knowledge about the history of IL and its development to its current state of DIL, and review scholarly materials through the lens of faculty and librarians to explain the intricacies and anomalies of the interactive relationship in higher education contexts. Faculty and librarian opinions, whether (digital) AT has become pervasive, suggests a need to emphasize and combine recognized pedagogy with AT. Particularly relevant is research from the perspective of a community college, and whether digital literacy is in the foreground of academic discourse (Laurillard, 2008a; Mitchell, 2012; Samuels, 2007). The literature contains multiple discussions on the question of faculty/student effective interactions, and myriad types of IL programs from one-shot to faculty-librarian embedded courses, but no articles on the epistemological congruency (i.e., perceptions and attitude toward learning) of faculty and librarian pragmatic approaches to the new DIL. Therefore, Gallardo-Echenique et al. (2015), Bucker and Kim (2014), and Marzilli et al. (2014), and similarly The Gates Foundation, Babson Research Survey Group, and Educause research group, suggest that contemporary, post-secondary education systems must be prepared to question traditional models and corroborate infusion of digital technology to complement pedagogy (Allen & Seaman, 2011; Allen et al., 2012; Dahlstrom et al., 2014; Luma Consulting, 2014; McGoldrick et al., 2015).

Recently, there has been an abundance of studies conducted on digital literacy, but only limited research on DIL, suggesting that the latter, in disparate academic contexts and regarding library instruction, is multidimensional and complex, an area that also needs more research. Hjorland (2007, 2008) states that the impression was that directional information research (DIR) contradicted established, traditional information learning, and IL status quo and programs. DIR appears in the conversation on the relevance of IR and information science assumptions of IL. Hjorland (2010) continues with a discussion referring to Saracevic's (1975) original declaration

that the fundamental perspective of relevance in IR was the "subject knowledge view" of relevance, which is synonymous with "epistemological view" (p.217). Hjorland (2010) reiterates that the concept of relevance is influenced by the type of approach a person uses during information searching and discovery, which is explained by Kuhlthau's (1999, 2004) concept of IR and ISP interaction of IL *(see figure 8, p.37).* Covello (2010) and Littlejohn, Beetham, and McGill's (2012) response concerning how faculty respond to inclusion of digital technology and DIL as components of educational practices suggest that recent studies demonstrate continued need for expanded faculty/librarian pedagogical collaboration and development for research.

Gallardo et al. (2015) suggest new trends that society and global markets require everyone to use technology in some way. In educational contexts, all new digital technologies offer advantages, uses, and limitations that require new literacies (Gallardo et al., 2015). Thus, in contemporary higher education, faculty members, librarian liaisons, and students must have the ability to use digital technology and understand how the technology itself is a conduit to information learning in the digital knowledge era. Bailey, Jaggars and Scott-Clayton. (2013) and Scott-Clayton (2011, 2012) studies on educational technology reform continue because more technology in a classroom does not ensure a bridge over the digital divide between the haves and have- nots, which is especially noticeable in rural areas. Lamoureux (2012), Digital Literacy Task Force (2013), Bucker and Kim (2014), and Gallardo et al. (2015) report that research suggests that incorporation of advanced information and communication technology (ICT) in a classroom is problematic because students' personal perceptions do not necessarily match digital literacy and IL capabilities or self-efficacy.

Constant, developing change of human epistemology (i.e., attitudes towards learning) with digital technology, in Bertrand's (2010) view, requires faculty to learn to adapt and use

technology. The phenomena of abundant information in various forms, printed hardcopy, and electronic textual, visual, and auditory materials might arguably mean that digital technology accelerates learning. Digital technology advocates argue that digital technology provides greater access to the community by offering the potential for achieving better and faster information production, and processing and retrieval for the individual in any environment (i.e., in college, at work, and at home) (Bertrand, 2010; Lumina Foundation, 2014; Wesch, 2011, 2014).

O'Banion (1999) mentions that Dewey (1996) alluded that learning in the digital context generally builds on previous literacy skills, and implies that new habits of learning must be developed. The issue of literacy has changed in the current new media ecology. Swanson (2011) and Säljö (2012) emphasize that the focus is no longer on printed matter, but is inclusive of digital media. So, literacy gets confused with terms such as knowledge, competency, and learning technology. Engagement with digitally produced information emerged because of recent information technology transformations, mediated by communicative practices and the learning environment (Belshaw, 2012; Säljö, 2012; Schraw, 2013).

Swanson (2011) and Säljö (2012) argue that the benefit of digital technology programs, as part of the pedagogical process, relies on users; both teacher and learner must possess technological ability and self-efficacy with the digital program to interact with the information contained and develop new learning. The advantage of digital technology is potentially contingent on the condition that each person has the right equipment, access to technology connectivity, and the ability and skills to both use and make meaning with the digital technology for the purpose of learning to achieve knowledge. Digital technology reconfigures the ways in which faculty and students engage in learning and access learning community spaces (Swanson, 2011; Säljö, 2012; Schraw, 2013).

Considerations of the Ecology of Learning Technology. Discussing the ecology of learning environment change, Wheeler (2007) argues that Piaget (1967) and Perry's (1970, 1981) theories are foundational to epistemology beliefs. In keeping with research from Perry (1970, 1981) on cognitive and non-cognitive thought processes, the dynamic interpretation is similar to Dewey's (1996) recognition of digital literacy—the human coordinated process of interpreting the scene image to the recognized thought and understood response (Wheeler, 2007). Balacheff, Ludvigsen, de Jong, Lazonder, and Barnes (2009) expand on Schulte (2008), who states that the issue of learning technology incorporates philosophy of the mind, cognitive psychology, linguistics and semiotics, philosophy of language, and computer science, tracing to early debates on relationships among language, knowledge, and representation from Plato and Aristotle. Their study explains digital technology that involves a semiotic perspective, which is triadic because of the presentative combinations of images, attributes of the image, and perceptions of the image, per Peirce's (1998) and Atkin's (2005) discussion of theory of signs or semiotics (Balacheff et al., 2009). As a matter of conjecture, Shommer-Aikins, Unruh, and Morphew (2015), following Schraw's (2013) discussion, explain that the coevolution of literacy, digital literacy, and epistemic practices of external memory systems comes with the new concept of a hybrid, human, digital mind. Human cognitive, communicative, and non-cognitive activities integrate with complex symbolic and material cultural tools presented through digital technology (Schraw, 2013; Wheeler, 2007). By engaging with resources, users develop epistemic practices and literacy skills. These skills are coordinated specifically to the information format, be it printed matter or digital information. The implication for the user is the notion that learning and literacy skills change as they adapt to the functionalities of digital tools.

Lea (2013), reexamining Littlejohn et al.'s (2012) discussions of learning at the digital frontier in theory and practice, argues that there is an expectation where the educator and learner interact with digital technology as part of learning processes. In education, a primary concern for instructors, faculty, and librarians, as subject experts, is student learning outcomes. Reimann and Markauskaite (2010) contend new learning influences on old methods, and that e-research might change the technology and enhance learning research. They highlight that an unexploited source of educational development is the capacity of the educator to innovate (Reimann & Markauskaite, 2010). To understand faculty and students' tacit (implicit) practical thought patterns versus explicit-abstract beliefs, people tend to think implicitly, but also be influenced by explicit beliefs (Hjorland, 2010; Saracevic, 2007). Schommer-Aikins and Easter's (2009) epistemological questionnaire, Schraw (2013) epistemological beliefs inventory (EBI) are further development from Schommer–Aikins (2002) and Hofer's (2002) epistemological beliefs questionnaire are three prominent instruments, each of which demonstrates part or all of three epistemological world views—the realist, contextualist, and relativist (Säljö, 2012; Schraw, 2013; Shommer-Aikins, Duell, & Baker, 2003).

Shommer-Aikins et al. (2003) promote discussions of faculty epistemological beliefs, since attitudes of learning theory and beliefs influence how teachers, and thus faculty, solve problems of practice. The influence of epistemological beliefs about teaching and learning affect how people interact with new information, and beliefs about that knowledge might influence strategy use (Shommer-Aikins et al., 2003). Since the technology ecosystem has developed and grown exponentially, the environment is populated by a variety of information, both produced and provided, in traditional printed format and digitally. When it comes to the topic of whether access to information is more accessible, there exists some consensus, as the topic expands to

include current digital equipment, Internet access, and connectivity support. In some rural areas and communities, full digital access and support remain under development (Bailey et al., 2013; Kruger & Gilroy, 2013; Scott-Clayton, 2011, 2012). The U.S. Broadband Technology Opportunities Program (BTOP) is administered by the Department of Commerce, which mandates facilitation of broadband service access to consumers who reside in unserved and rural areas (NTIA, 2012).

According to the Association of College and Research Libraries (ACRL, 2000), Ivanitskaya, Duford, Craig, and Casey (2008), and Badke (2010), IL and DIL literacy skills are lifelong, and a prime example of interaction between people and information. The DIL process links people with the information they need (Ivanitskaya et al. 2008; Badke, 2010). Gross and Latham (2007, 2012) recognize a problem in which students generally resist IL and DIL. Other findings suggest that student barriers to IL, and subsequently DIL, might come from being unaware of the meaning of IL and DIL (Gross & Latham, 2007, 2012). Weigel, Straughn, and Gardner (2010) questions whether it is possible to identify a student's cognitive factors responsible for IL resistance. Knowing why students resist and find IL needless provides useful insights to both faculty and librarians. If faculty and librarians identify these cognitive factors, it would be possible to improve the design and implementation of teaching with digital technology, and IL and DIL learning interventions (Weigel et al., 2010). The contention is that new digital media (NDM) is a controversial topic, since Bauerlein (2008) and Healy (2002) argue that influences from NDM makes humans less intelligent and might harm the brain.

In the knowledge era, society requires more than basic literacy, to incorporate technology in which digital competency is now an essential concept (Bertrand, 2010; Hughes, 2014; Wesch, 2011, 2014). Thus, digital literacy competency, computer and media literacy, and e-literacy skills

are the types of technology skills and understanding learners and faculty members must master. The drawback is that there is no clear, definite digital literacy/competency concept; it is multifaceted. Evaluating these digital concepts is complex, allowing for information origination, production, dissemination, and generation of new technologies. In an educational environment, new digital technologies include advantages, and limitations, requiring new literacies (Badke, 2010; Belshaw, 2012; Gallardo-Echenique et al., 2015; Wesch, 2011, 2014). Gallardo-Echenique et al. (2015) do not establish a single definition, but explore how digital competency is described systemically, identifying aspects to discover connections among disparate definitions and understand how digital competency and digital literacy interconnect. The literature demonstrates ambiguity regarding a definition of digital competency and digital literacy, in part from a variety of names attached to technology skills. Across the literature, general perceptions of digital competency and literacy are inconsistent because some researchers view digital competencies as computer skills and others as learning/knowledge applications (Badke, 2012; Gallardo-Echenique et al., 2015). Multiple DL terminologies are sources of the problem. As Virtue, Dean, and Matheson (2014) point out, terms used for IL in the digital environment vary, and a similar situation exists for DIL in digital learning, representing a dilemma of jargon, found in library science and elsewhere. The variety and inconsistency of terms include digital literacy, e-learning, virtual learning, and ubiquitous learning. With no consensus, terminology and definition confusion and complexity are common (Virtue et al., 2014).

Digital literacy, pedagogy, and content technology study models. Cox and Graham (2009) describe a framework developed to address how educators use emerging educational technologies, and expand on Shulman's (1987) knowledge and teaching research into pedagogical content knowledge. Polly and Brantley-Dias (2009) discuss how technological

pedagogical and content knowledge (TPACK) expresses a way educators might consider knowledge associated with integrating DL into a learning environment. Bandura (1994), who introduced the analysis, identifies self-efficacy as a person's perception about their abilities in a domain. The theory of self-efficacy is useful for shedding light on the difficult problem of personal technology skill assessment and personal perceptions (i.e., relative to a person's epistemic perceptions of digital technology). Abbitt (2011) continues the discussion of primary influences described by Bandura (1994, p.3) regarding a dynamic relationship between pre-service teachers' three levels of knowledge, DL technology, and self-efficacy. The framework explains how technology-rich projects demonstrate educators' teaching of content and pedagogy to deliver and meet course objectives (Polly & Brantley-Dias, 2009). Koehler and Mishra's (2009) introduction of the TPACK model influenced the field of educational AT, inspiring educators and educational technologists to reevaluate technology in the classroom. TPACK was developed from Shulman's original construct of pedagogical content knowledge (PCK) adding technology knowledge to the framework.

Koehler and Mishra (2009) investigate the relationship between self-efficacy beliefs about technology integration and TPACK among pre-service teachers. Findings suggest a positive correlation between self-efficacy beliefs and technology integration. Assessments of pre- and post-test data demonstrate that over time, the predictive relationship between knowledge in subjects' TPACK and self-efficacy changes, illustrating the complex relationship and malleable nature between knowledge and teachers' technology self-efficacy. TPACK domains highlight these attributes shown in figure 9.

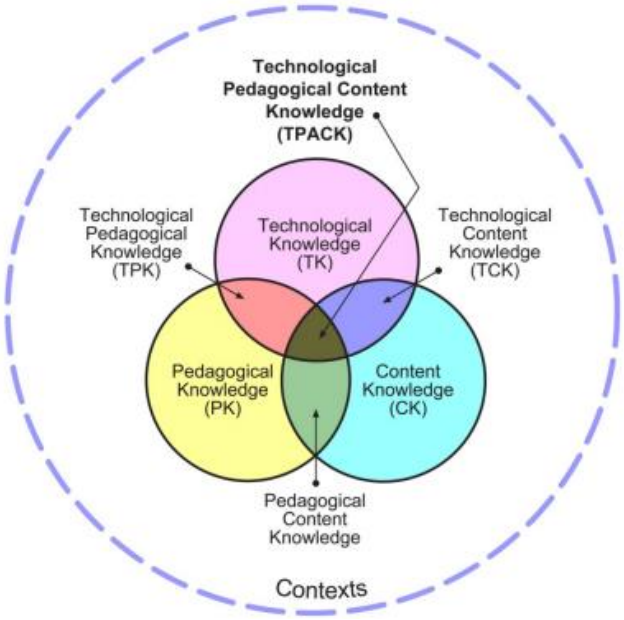


Figure 9. TPACK **(**Koehler & Mishra, 2009, p. 63). Reproduced by permission of the publisher, ©2012 http://www.tpack.org.

On the one hand, Cox and Graham (2009) argue that TPACK's three-pronged approach is definition of pedagogical knowledge that emphasizes an educator's knowledge of general pedagogy used in a course, technical knowledge of how to use emerging technologies, and course content. These concepts overlap and interconnect, resulting in a) technological pedagogical knowledge (TPK), which is knowledge of pedagogy in which a teacher engages while using emerging technologies, b) technological content knowledge (TCK), which is knowledge specific to a topic while using emerging technologies, and c) technological knowledge (TK), which is the ability to use emerging technologies. The combination results in TPACK, and the model recommends a rigorous framework for thinking about educators' knowledge related to integrating technology into courses (Cox & Graham, 2009). On the other hand, Wiggins and McTighe's (2012) criticism of the TPACK graphic model in Figure 9 is that all three elements are represented with equal weight (i.e., size and shape) in a Boolean logic

chart. Thus, each concept circle is identical, leading to an assumption of equal importance. In reality, overall knowledge of pedagogy should hold the greatest importance (Wiggins, 2007).

In comparison, another model was designed by Puentedura (2006)—substitution, augmentation, modification, and redefinition (SAMR; Figure 10). When considering DL adoption in a curriculum and style of pedagogy, using SAMR builds beyond the (traditional) lower level tasks of remembering, creative assessment, and augmentation to include higher levels of Bloom's revised taxonomy, in relation to Anderson and Krathwohl's (2001) taxonomy for learning, teaching, and assessing, a revision of Bloom's Taxonomy of educational objectives (Anderson & Krathwohl, 2001; Puentedura, 2006).

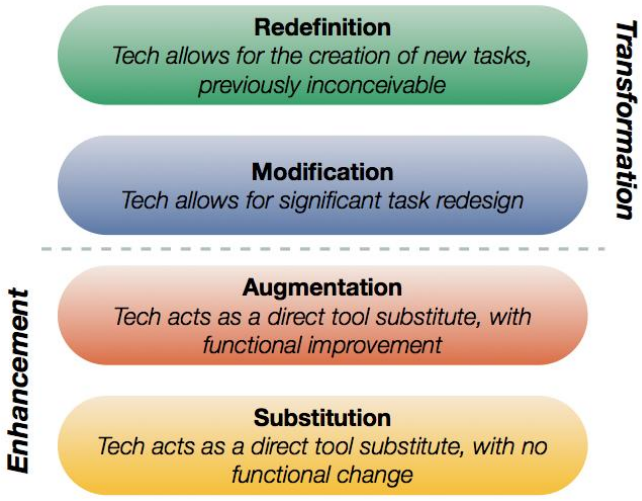


Figure 10. Puentedura's Substitution, Augmentation, Modification, and Redefinition (2009).

Burke (2013) advises that Puentedura's (2009) adjustment and integration (for DL inclusion in a curriculum) of SAMR is a deterministic behavior modification framework offered as a supportive sociological and psychological tool for those who struggle with adjustment to assimilation (Burke, 2013, p. 57). Whereas Abbitt (2011) suggests that continued use of TPACK offers a model on which to build a knowledge base that augments self-efficacy beliefs for DL

technology integration in classrooms. There have been ongoing, self-reported measures using TPACK, as Schmidt, Baran, Thompson, Mishra, Koehler and Shin (2009) describes, but more research is needed to assess whether self-reported measures predict classroom practices (Abbitt, 2011).

Marcelo, Yot, and Mayor (2015) expand on Abbitt's (2011) analysis of TPACK. The study was conducted in Andalucía, Spain, to discover faculty frequency of technology use when designing a teaching-learning process, and to what degree DL was incorporated in pedagogical learning designs (Marcelo et al., 2015). Marcelo et al. (2015) argues that technology alone does not change a learning environment; for learning to occur intervention is required during DL instruction where AT accompanies teaching. Digital resources are based on learning strategies that prioritize acquisition of knowledge. AT adopted in class content is relevant to appropriation of knowledge by students. Hence, for AT to achieve learning goals, faculty must teach using interactive, productive, experimental, or communicative learning methods of instruction (Marcelo et al., 2015). Marcelo et al. (2015) also claims that DL inclusion rests on the questionable assumption that in a culture of change, educators/faculty motivated by technology demonstrate that DL with AT accords with their teaching methodologies, and that AT is compatible with activities consistent with a pedagogy. Results of the study suggest coherence, in which the primary component is content, transmitted through a variety of digital media. Faculty engaged intensively in technologies that supported teaching and learning strategies, and 16.7 percent of faculty who integrated technology were younger lecturers, but most others incorporated technology sparingly (Marcelo et al., 2015).

Different partnership support for digital literacy adoption. Albright and Nworie (2008) discuss how DL adoption partnerships comprise college personnel from outside

information technology (IT) departments. From the perspective of teaching and learning with technology and a foundation of instructional support, DL needs to commonly align with faculty development, librarians, and distance or continuing education, and IT departments support campus telecommunications, networks, and administrative computing. Albright and Nworie (2008) define instructional digital technology as a field, function, or focus of service, in comparison to ICT programs, which refers to a campus organization that provides the services. Bertrand (2010) reports that a fair percentage of academia needs to overcome its late response, emphasizing what Bates (2000) calls barriers of inertia as despondent faculty reactions to technology. An institution and its leaders must instead embrace digital technology's potential (Bates, 2000; Bertrand, 2010).

Kezar (2009, 2011) continues Margolis (2008) discussion of how technology, namely DL is changing the way learning occurs in higher education, transforming higher education into more of a market business model, as opposed to the traditional, regulated public sector. In some instances, the combination of technology and the new business model has been adopted by community college leaders (Kezar, 2009, 2011; Margolis, 2008). Margolis (2008) expresses the continued discrepancy between technology haves and have-nots of underserved minority student demographics, where technology has not democratized the education system. Wesch (2008, 2008, October, 2011) advocates that embracing and achieving the benefits of digital technology imply that all constituents must learn to use institutionally adopted technologies. Davis, Lawrence, Miller, and Sanchez (2014), using the term *digital leviathan*, discuss the complex process of faculty development during e-learning at a small liberal arts college, and the tendency of faculty as adult learners to resist (digital) AT, where faculty (both full and part-time), librarians, and student support personnel experience the challenge of change, and adapting to

incorporation of AT and understanding program learning objects (Davis et al., 2014). Lumina Foundation (2014) and Gates Foundation (2015) research suggests a mixture of consensus in popular attitudes toward (digital) AT in higher education; both industry-sponsored research and student opinion suggests expectations of better DL inclusion with AT programs into methods of teaching, and provision of student services in higher education.

Pedagogical research of higher-education institutions. During the last two decades, there have been a number of scholarly studies that research higher-education institutional academic status quo and effectiveness of student learning outcomes (Allen & Seaman, 2011; Allen, Seaman, Lederman & Jaschik, 2012, June; Dahlstrom, Brooks & Bischel, 2014; Luma Consulting, 2014; McGoldrick, Watts & Economou, 2015). Zurkowski (1974) suggests that IL needs to be an integral part of the details of an accredited program curriculum (Gross & Latham, 2012). A national commission, the Carnegie Foundation, studied undergraduate education environments of research universities, and assessed academic ecosystems, recommending need for a new blueprint for undergraduate education (Boyer Commission Report, 1998). The Boyer Commission Report (1998) proposes ten suggestions for improving education. Highlights from the report reviewed IL and pedagogy when "reinventing undergraduate education" strategies, where students engage in learning environments that require IL competencies; gaining skills in IL multiplies opportunities for students' self-directed learning (Boyer Commission Report, 1998, p. 4). During a self-directed learning environment, students construct a framework for learning how to learn as a foundation for continued growth, carried out in their roles as informed citizens and members of the community (Boyer Commission Report, 1998).

The American Library Association (ALA) final report suggests that what used to suffice as literacy no longer counts as effective knowledge. There is a need for computer, civic, global,

and cultural literacies for the United States to compete in the world economy. The committee suggested continued effort to develop and incorporate IL into higher education pedagogy, but IL is incorporated at the national accreditation level (ALA, 1989). By 2000, four of the primary higher-education accreditation commissions developed standards that included IL as criteria, indicating inclusion of IL as a pedagogical strategy. Commissions and the standards they identified included the Middle States Association of Colleges and Schools (MSACS) Commission on Higher Education, The New England Association of Schools and Colleges (NEASC); The Southern Association of Colleges and Schools (SACS) Commission on Colleges (COC) and The Western Association of Schools and Colleges information literacy (American Library Association, 2000; Middle States Association of Colleges and Schools Commission on Higher Education, 2009). These standards demonstrate the commissions' consensus that IL and thus DL incorporation is a priority.

Facets of Digital Literacy Adoption

Digital literacy impact alters the higher-educational model. Growth of the higher-education organizational structure has become a complex system. Vaughan (2006) and O'Banion (2011) argue that institutions remain gatekeepers of information and the educational environment. Northouse (2013) suggests that the post-secondary system has diversified to such an extent that organizational structure no longer fits the traditional model, a linear relationship between cause and effect. Today's reality exhibits how prediction of outcomes is problematic, with all diverse factors involved. Consequently, emergent systems demonstrate these multiple levels of educational methods, teaching formats, and DL with AT applications (i.e., face-to-face, web-enhanced, and fully online classes) used in faculty pedagogy (Northouse, 2013).

Digital literacy challenges to the institution. Institutional challenges are three-fold: understanding what causes an issue, the effect the issue has, and finding a solution when the institution is itself multi-dimensional. At the forefront is the primary challenge of finance, affected by continued budget cuts, continuous updating and maintenance of technology, and annual equipment cost inflation. Compatibility with legacy systems and practical application of new systems means training and acceptance of the human capital community, including administrators, faculty, students, libraries, and information technology, and other personnel. Considering incorporation of new DL concepts of AT applications in the existing institutional culture, Schein's (1988) model shows the flow of the information transfer cycle (McKinney, 2011); an organization's information transfer cycle starts with basic assumptions, and then moves on to espoused values and artifacts that include information systems incorporation (Figure 11). Through the flow of information, there is a connection among the three stages that reconnect to the beginning, with the intention of leading to incorporation of DL methods of learning and curriculum (McKinney, 2011, p. 8).

Schein (1988) posits a need to understand organizational culture theory, which creates the possibility for a level of comprehension regarding how and where decisions are made, and who makes them shown in figure 11. Through organizational culture theory, either a macro- or micro-level investigation into an institution's structure enables uncovering of the levels of DL adoption and AT acculturation and acceptance, leading to incorporation of DL methods of learning and curriculum (McKinney, 2011, p. 8). As Greenleaf (1996) and Northouse (2013) advise, there is need for constant transparency from leaders to the campus community so a culture of change will happen.

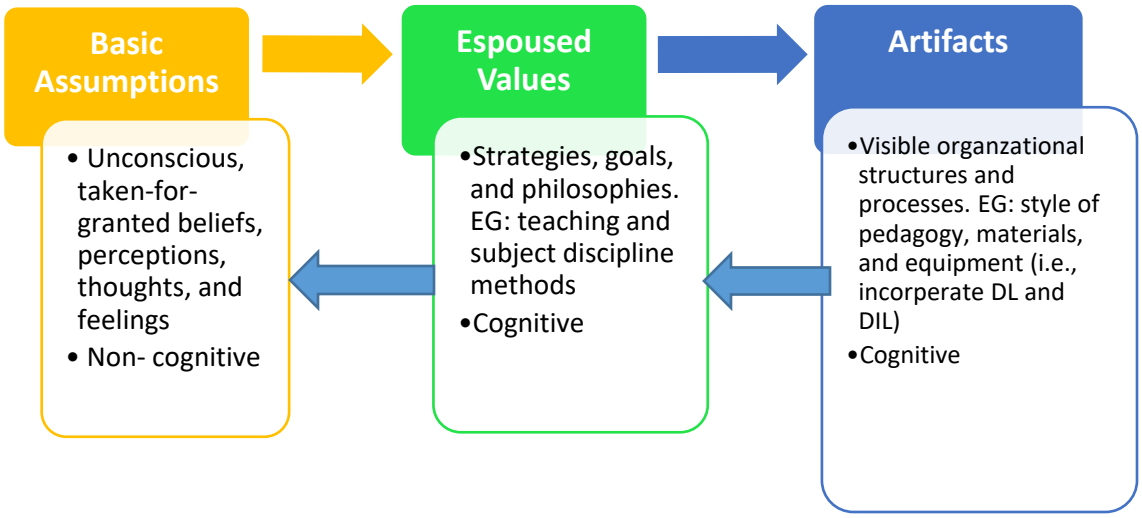


Figure 11. Schein's Model of Organizational Levels of Culture (McKinney, 2011, p. 8)

In many situations, DL with technology adaptation requires a collaborative approach to transformation, acculturation, and accommodation. At the institutional level, there is consensus among research from senior administrators and faculty. Administrative technology is effective and helpful, but DL with AT incorporation is a different matter. Faculty are divided in their opinions regarding the benefits of DL with AT applications toward student learning outcomes within their respective disciplines since faculty are on the frontline dealing with factors concerning students' academic learning and DL (Collins, 2014; Sipple & Lightner, 2013). The assumption being made is that students arrive at post-secondary institutions with IL awareness and DL self-efficacy preparedness. Subsequently, Katz (2007) recommends continued effort when incorporating AT, whereby indirect incorporation of IL and DL concepts appeared in Educational Testing Service (ETS) questions on college-readiness tests, thus confirming recognition of IL and DL by the establishment. Both of these factors are important to the institution, aiding faculty advisors and counsellors when registering students for classes. Not all

students entering post-secondary education are ready for immersion in a digital technology environment as a learning system (Hargittai & Hinnant, 2008).

Regardless of constant technology changes and challenges, institutions must maintain compliance for accreditation and currency with digital technology for a competitive reputation to continue to attract and graduate students. Therefore, the institution and all constituents have no option but to adapt and adopt AT. One positive aspect is that there are plenty of best practices guides to assist during development of DL inclusion, and many professional associations offer professional development conferences and workshops for added support when learning new technologies. Many digital technology providers also offer training to assist a changeover to learning new digital teaching tools and programs.

Digital literacy influences on institutional pedagogy. Bertrand (2010) argues that the information revolution in education relates to production and delivery of courses, and American universities should reassert their prevalence and the statuses of preeminent institutions for social change and innovation in global higher education. Challenging American academia to become more technologically applied and international, for example, by conducting a meta-analysis and redesigning information-technology-delivered higher education that is learner centered and uses problem-oriented learning driven by a new wave of research (Bertrand, 2010). Bertand (2010) refers, to what Bates (2000) called barriers of inertia as a "Techno-sclerosis of higher education" (Bertrand, 2010, p. 1). Scholarly groups such as Babson Research Group, Educause, Lumina, and the Community College Research Center (CCRC) identify many institutional and faculty AT barriers as legitimate issues that might be overcome (Lumina Foundation, 2014; McGoldrick et al., 2015;), though they do not agree with Bertrand's (2010) negative critical assessment of faculty and the higher education system as a whole.

In higher education research, a majority of researchers agree that higher-education research institutions must be more efficient and use technology competitively. In support of this position, Samuels (2007) and Badke (2012) argue that institutional research requires redefinition and reform of the traditional lecture model, and should identify faculty members as coaches instead of traditional scholars and instructors. Thus, students become interactive colleagues during learning, creating commitment to a student-centered pedagogy that drives the increase in technology and computer-based instruction (Samuels, 2013; Wesch, 2011, 2014).

When considering the new literacy agenda for higher education composition, technology, and academic labor, Samuels (2007) highlights Cynthia Selfe's *Technology and Literacy in the Twenty-first Century*. Selfe (1999) asks, "How do universities at the same time utilize new information technologies and remain critical of the same technologies?" placing the institution into a challenging situation (Selfe, 1999, p. 137). The National Academy of Sciences' study, *Preparing for The Revolution: Information Technology and the Future of Research University,* (NAS, 2002) suggests high stakes are involved through billions of dollars invested by federal research funding. Hence, government policy encourages the current push for universities to integrate DL with new technologies and literacies into undergraduate instruction (Samuels, 2007, 2013).

Samuels (2007) develops a way for research to examine the possibilities and problems of introducing multiple literacies into undergraduate programs. The model focuses on incorporation of computer technology into U.S. universities, including the new literacy agenda for student-centered classrooms regarding use of technology when teaching composition skills. Samuels's (2013) method highlights the possibilities and problems of introducing multiple literacies into undergraduate programs, demonstrating how the new literacy agenda was conceived as

compromising the qualifications and job security of faculty, and the erosion of faculty expertise when teaching student-learning outcomes (Samuels, 2007, 2013). Contrary to Samuels's (2013) opinion on DL inclusion, other scholars are unconvinced (Bertrand, 2010; Wesch, 2008, 2011). Others promote technology advocacy since their studies maintain that digital technology inclusion enhances faculty and student learning effectiveness, in effect, implying that technology enhances learning (Bertrand, 2010; Lumina Foundation, 2014; McGoldrick et al., 2015; Samuels, 2013; Wesch, 2011, 2014). Therefore, if the assumption is that institutions are gatekeepers to educational attainment, then faculty and librarians should be viewed as gatekeepers of course pedagogy (Nilsen, 2012).

Academy attitudes toward digital and information literacy. Bertrand (2010) demonstrates an unfortunate trend in that academia has not kept pace with research on the influence of information technology on higher education and society, and has been slow to foster the portability of knowledge. The American education system is tied to a discipline-centric hierarchy (Bertrand, 2010). Regardless of how much evidence supports technology use, Bertrand's (2010) contention is that faculty question adapting to new digital pedagogy, but that the traditional hierarchical, top-down pedagogical methods are ineffective ways to either teach or learn, but these styles persist as dominant forms (Bertrand, 2010). Wesch (2011) explains the debate regarding misrepresentation of how digital learning occurs and how forms of digital information delivery create positive learning. In addition, Rogers (2003) and Wesch (2011) identify the contentious attitude between DL with AT inclusions that are not in pedagogy, calling it a crisis of significance that thwarts faculty/student interactive learning experiences. Digital information is different from traditional hardcopy that faculty are accustomed to using, so there is a need to rethink information learning and education methodologies (Wesch, 2008, 2014).

Support for digital literacy adoption with academic technology inclusion. Where does the responsibility for developing and establishing the overarching incorporation of AT lie? AT can be prescribed by a state education agency or at the institutional level, where administrators make the choices. There are few exact rules, and therefore each state and institution makes its own decisions on what technologies to use. Ultimately, faculty, librarians, and other personnel must learn and adapt. Libraries and librarians already use technology as much of a library's information resources and management systems are now electronically based. However, there might be an issue regarding on whom the responsibility for developing and incorporating DL to include AT resources to fit into curricula lies. Consequently, faculty members, as disciplinary experts are often given the task of developing DL with AT resources. Luther and Pickering (2015) found that generally, faculty might have basic familiarity with learning management systems (LMS) such as Blackboard or Moodle. In many institutions, with expansion of the Internet and digital technology, there might be an instructional technology designer or webmaster (Luther & Pickering, 2015). Surveys from the past ten years indicate that faculty use some forms of digital technology, primarily e-mail, and a close second is in-class Internet videos, followed by content for web-enhanced classes. Some faculty members engage fully in digital technology inclusion. What makes the difference during DL adoption and inclusion with AT applications might lie in whether an institution provides training and adequate support (Gates Foundation, 2015; Lumina Foundation 2014).

Hawkins and Rudy's (2006) summary of the Educause Core Data Service (CDS) (2005) indicates that higher-education institutional IT departments provide instructional technology services, but instructional technology support was non-existent. The Spellings Commission*, "A Test of Leadership, Charting the Future of U.S. Higher Education"* (U.S. Department of

Education, 2006) comments that technology adds value by strengthening academic programs, increasing access, and providing improved models for curriculum development and delivery. Newman, Courturier, and Scurry (2004) argue that both new policies from politicians and expectations handed down from institutional administrators regarding digital AT enhance learning and teaching. Use of digital technology systems enables institutions to track both student learning outcomes and institutional performance better (Newman et al., 2004). McMillen (2010) suggests that both politicians and administrators believe that incorporating more digital technology into learning and teaching provides data that enable better decision-making and performance management.

Faculty attitudes toward digital and information literacy. DL successes in digital self-efficacy perception and digital information learning affect faculty, librarians, and instructors as educators, and students as learners. These groups have different learning capabilities and teaching styles. Jones-Kavalier & Flannigan (2006) argues that there is a variety of digital literacy approaches and perceptions among faculty. So, there might be a possibility that they are stymied technologically, as Bertrand (2010) points out. Jones et al. (2006) explain that by definition, faculty members, must learn the how, what, when, and where of DL in the application of AT as they became available and integrate into professional contexts and education. The classification is not a conclusive result that generation X, Y and Z natives born into a technology-driven world are naturally and intuitively successful with AT (Jones-Kavalier & Flannigan, 2006). Tapscott (1998, 2008) and Prensky (2009) agree on an important factor—everyone inclusive of the generation X, Y and Z natives must have the opportunity to engage with AT as long as adequate training, time, and support are provided.

Luther and Pickering (2015) continue the research of Maloy, Verock-O'Loughlin, Edwards, and Wolf (2013), that considers the influence of student populations' learning styles and academic ability diversity. As educators, faculty need to offer a variety of AT in their teaching so students express their learning abilities fully (Luther & Picker, 2015; Maloy et al., 2013). The study defines the particulars of integrating two types of Web 2.0 technology—blogging and glogging—into curricula, also called a weblog. A blog is an online journal, a combination of text, images, and sound. The universal design for learning (UDL) is a new model of educational philosophy in the interactive Web 2.0 (i.e. Internet and electronic resources such as databases) learning environment that advocates multiple academic technologies for students to demonstrate mastery (Luther & Pickering, 2015). Luther and Pickering (2015) suggest that Maloy et al. (2013) indicate that Web 2.0 includes interactive tools that "encourage nonlinear, dynamic presentations that expand on how students think about topics" (Maloy et al., 2013, p. 224), offering students multiple paths to reaching learning goals. Using UDL, faculty are more likely to engage fully and motivate student involvement (Luther & Pickering, 2015). Prior to UDL, Jacobson and Mackey (2013) reported that the classroom lecture style is prevalent, but the generalization is unwarranted since teaching style depends on the faculty and type of education environment. In discussions of discipline and information media's constant innovations, there is a wave of change because information dissemination and publication are through digital media on websites, blogs, and Twitter, for example, and alternatively through podcasts and YouTube videos (Jacobson & Mackey, 2013).

When training new and current educators Luther and Pickering (2015) recommend consideration for all digital learners at the varied levels of digital capability, and that understanding of digital learner educators/faculty is needed during professional training and

support from institutional or technical instructional designers. Examples include meaningful Web 2.0 applications, demonstrating Seung's (2013) prediction that learning motivates students and enhances their experiences. Incorporation of blogging and glogging from the Web 2.0 (i.e. Internet and web applications) environment into curricula have a positive effect, and maintaining ethical use of information within the parameters of copyright, and inclusion of digital technologies, offer great potential (Luther & Pickering, 2015).

Faculty and student digital literacy interactive benefits. In the continued discussion of AT, Beetham and Sharpe (2007) suggest that AT helps all levels of educators understand how students learn since technology offers rapid response and the possibility for immediate student feedback, and student potential to act as co-designers of learning. In higher-education institutions, practical and theoretical constructs of best practices for improvement of pedagogy during e-learning and distance education focus on types of rethinking of pedagogy. Redesign brought about by digital learning in contemporary contexts is where e-learning represents use of technology as a platform for a digital classroom and the AT environment (Beetham & Sharpe, 2007, 2013). Beetham and Sharpe (2007, 2013) also acknowledge that pedagogy remains a guide for how a learner learns, what it takes for a student to learn, and whether fundamental learning theories remain the same. However, DL with AT enables an active form of student learning. For example, open educational resources (OER) technology programs over the Internet democratize access to learning resources and related material (Beetham & Sharpe, 2007, 2013).

Beetham et al (2013) and Luther and Pickering (2015) emphasize that development of information and communication-technology education experienced a paradigm shift. When building on that shift, both illustrate how technology-rich learning environments call for holistic analysis at the system level, and DL adoption of AT designs for learning in concrete, disciplinary

contexts. In contradiction to the popular opinion of other scholars, Badke (2012), Dubicki (2013), and Luther and Pickering (2015) advocate interdisciplinary collaboration, with shared, faculty/librarian, agentic DL cooperation to achieve optimum student learning outcomes. Beetham and Sharpe (2013) promote active incorporation of many educational contexts such as face-to-face, self-directed, blended, and distance-learning environments, suggesting multiple ways to reconsider flexible learning needs of individuals, institutions, and societies. A variety of resources elucidate learning design projects, demonstrating innovative models of designing for learning alongside novel standpoints of pedagogy (Beetham & Shape, 2007, 2013). From a faculty perspective, the progression of technology into their academic work and pedagogy might be challenging since DL is a continually changing environment, and demand from institutions and students to include DL that use AT applications is also constant.

Faculty issues with digital literacy. When it comes to the technology boom and overall faculty attitudes toward DL inclusion and AT, rather than citing a list of scholars repeatedly and belaboring the message, it suffices to say that unless a state or institution has a mandate for DL inclusion, individual faculty members make their own choices. Wesch (2008, 2011) and Swanson (2010) agree that education and learning are delivered on multiple platforms, but agreement ends on the question of the traditional method of teaching during a lecture-style, classroom presentation. In comparison to face-to-face, an in-classroom, lecture-style format has been translated into the modern practice of a learning management system (LMS) that uses AT application for instruction purposes; faculty and students engage in interactive learning, opening the classroom environment to question the subject and topic context, and investigate the value of subject content. For some faculty, the change seems radical (Swanson 2010; Wesch, 2008, 2011). Jumonville (2014) and Luther and Pickering (2015) explain that Blackboard, Moodle, and

Adobe Connect provide teaching instruction in asynchronous and synchronous online classroom environments. Both Jumonville (2014) and Luther and Pickering (2015) maintain that policies define secondary level institution inclusion of DL concept with digital technology and digital teaching in schools, within common-core standards. At postsecondary/higher-education levels, the decision to adopt and incorporate AT is left to the state and/or individual higher-education institutions to adapt and interpret these policies. Therefore, faculty depend on their institution's procedures and systems to determine what becomes designated as accepted DL inclusion to develop and adapt into curricula (Jumonville, 2014; Luther & Pickering, 2015; Swanson, 2010; Wesch, 2011, 2014).

Is academic freedom impacted by digital literacy adoption? Nelson (2010), president of the American Association of University Professors (AAUP), posits that the academy is still learning how to apply academic freedom to the new DL pedagogical, technological, cultural realities that did not exist when the concept was defined. AAUP is a primary source of documents outlining principles of faculty academic freedom rights and possible DL responsibilities. Academic freedom broadly encompasses both individual and institutional rights to maintain academic standards. It establishes a faculty member's right to stay true to his/her pedagogical philosophy, preserving intellectual integrity of the educational system (Nelson, 2010). Thus, it gives faculty the right to ignore college or university regulations. When discussing faculty academic freedom in relation to the inclusion of AT, there must be collaboration between the institution's administrative policies and faculty senate to define what academic freedom means regarding DL's levels of AT adoption, and how it is defined (Nelson, 2010).

Responding to an appeal in the Supreme Court of New Hampshire (*Sweezy v. New Hampshire, 1957*), Justice Frankfurter concurred that at institutions of higher education, the faculty body has a primary responsibility of academic decisions that determine who may teach, what they teach, how it should be taught, and who may be admitted to study. Poskanzer (2002) explains that the extent that the legal concept of institutional academic freedom (or institutional autonomy) influences adoption of new DL inclusion into faculty pedagogy depends on the faculty as a body, or individually, and their position on First Amendment rights; where the "legal decisions on academic freedom is considered as an aspect of freedom of speech protected by the first amendment, the term is equivocal" (Bilgrami & Cole, 2015, p. 174). Many judicial opinions recognize that institutional academic freedom might be viewed as the sum of acts of individual faculty academic freedoms. The interpretative meaning, in layman's terms, is that the only reason courts side with institutional policies is because the faculty are considered involved with decision-making. Therefore, faculty as a body have the voice in the approval of policies dealing with AT inclusion (Poskanzer, 2002).

Since faculty academic freedom is an integral part of job responsibilities and satisfaction, Jaschik and Leederman's (2015) survey of college and university faculty workplace engagement comparison of two and four year institutions informs that faculty at community colleges strongly agree, both the mission of their institution and the job is important. Related to faculty job satisfaction showed 42 percent of faculty, who strongly agreed that they have academic freedom, and full-time faculty, as opposed to part-time faculty have the impression of greater job security.

Faculty meeting the challenge of digital literacy integration. Multiple research surveys from the Gates Foundation, Lumina, Educause, and Babson Research Center examine how faculty members have differences of opinion regarding online education and the

pervasiveness of new technologies, online education, and DL. The surveys discuss issues and challenges faculty face with digital technology, DL adoption; probing whether online learning modality is a useful method of rapid expansion of knowledge is debated among faculty members. Recent studies argue both for and against DL, online education and instructional AT (Allen, & Seaman, 2011; Allen, Seaman, Lederman & Jaschik, 2012, June; Allen, Seaman, Lederman & Jaschik, 2012, August; Dahlstrom et al., 2014; McGoldrick et al., 2015). A review of these national research studies and surveys suggests that 40 percent to 60 percent of faculty members use or are interested in using administrative AT, and half that number, 20 percent to 30 percent, are using AT to teach. Survey samples consisted of faculty from two- and four-year public and private institutions, with some administrative membership (Allen, & Seaman, 2011; Allen, Seaman, Lederman & Jaschik, 2012, August; Dahlstrom et al., 2014; McGoldrick et al., 2015). Findings indicate that even with faculty support, skepticism is common regarding AT benefits with learning outcomes. An Inside Higher Ed (2013) survey used a Gallup poll of 2,251 professors and found that 30 percent of respondents believed online courses achieve learning outcomes equivalent to face-to-face. Another 50 percent agreed or strongly agreed that within a discipline or department, online learning produces the same learning outcomes as face-to-face (Jaschik & Lederman, 2013). Contrary to Jaschik and Lederman (2013), Mitchell (2010) criticizes online education, where boundaries between disciplines are blurring, meaning faculty members should work in collaborative teams in two or more disciplinary contexts, and therefore participate in teaching or research in multiple disciplines. Consequently, faculty experience even more pressure to adopt DL that engages in AT (Mitchell, 2010). Gappa, Austin, and Trice (2011) argue that online education and digital technology add workload. The pressure on faculty from institutions and students encourages a disconnected feeling, attributed more so to adjunct faculty.

To overcome this, the organization must offer robust and continuous DL and AT online training and support for all faculty members (Gappa, Austin, & Trice, 2011).

Different types of faculty digital training and digital literacy support. Cox and Richlin (2004) describe the faculty learning community (FLC) movement, with roots in future new, junior, mid-career, and senior faculty members' desires for a collaborative, transdisciplinary learning community that supports investigation and implementation of new AT in teaching and DL learning approaches and opportunities. Developing an FLC program involves changing the institutional culture with a design that enhances teaching effectiveness using group discussions of shared experiences (Cox & Richlin, 2004). In discussions of a community-college (CCCSE) (2010) survey, Sipple and Lightner (2013) offer an interesting discovery—development of an FLC is an important and valuable aspect of AT. FLC success is also credited to establishing a faculty learning cohort community, particularly when designing FLCs at two-year colleges for faculty professional learning. A critical factor was connections between collaborative, structured FLCs, and student-learning persistence. However, FLCs have the potential to offer two-year college faculty opportunities to develop scholarship of teaching and learning (SoTL), making even more connections between two- and four-year faculty members, and closing the gap between full-time and adjunct faculty members (Sipple & Lightner, 2013). McKinney (2006, 2007) explains that SoTL involves post-secondary practitioners conducting scholarly inquiry into both teaching and learning in a higher-education context, with the public sharing and reviewing such work through presentations, performances, and publications (McKinney, 2006, p. 39, 2007). As an example, technology FLC brings together faculty members from all disciplines for e-learning and information instruction design support that encourage expansion of creativity and application of IT to pedagogical redesign. Sipple and

Lightner (2013) provide an example, showing the advantages and disadvantages of the FLC structure, and that there is no universal model. However, the model is implemented in either the short- or long-term. FLCs develop a collaborative environment among faculty members, and essential elements of effective faculty encouragement (Sipple & Lightner, 2013).

Librarian challenges to adopting digital literacy changes. At the American Libraries Association Midwinter meeting in New Orleans, ALA President, Berry (2001), said that as the gatekeeper of information and with the Internet making electronic information accessible, libraries are balancing access and control in a networked world. Therefore, incorporation of new (digital) AT is a continuous process for libraries. According to Andrade and Zaghloul (2010) and as the literature demonstrates, there has been restructuring of librarian (i.e., librarian-liaison) roles, redefining the librarian's academic purpose in many academic libraries. Librarian-liaison roles differ at each institution, if an institution even has such a position. The librarian-liaison role collaborates as an intermediary with faculty on subject content resource development, which is influenced by new digital technology and AT adoption. Arendt and Lotts (2012) focus on research support services connected to restructuring the liaison librarian team at the University of Arizona Libraries, 2007 through 2009. The library's restructuring between 1993 and 2000 occurred due to the addition of an information commons (i.e., learning center), changes to customer needs and expectations, budget reductions, and especially adoption of new technology (Andrade & Zaghloul, 2010).

Andrade and Zaghloul (2010) conclude that altering a liaison librarian team to the real simple syndication (RSS) model affects the library and influences librarians' and information professionals' morale. The move from subject to domain specialist changed librarian identities, with unanticipated effects on the organizational structure. Thus, the influence revealed that more

conversations should occur concerning subject-specialist roles, communication and marketing, and outreach directions. Evaluations of a library's change to the RSS structure to assess its effectiveness regarding meeting customer needs are also warranted (Andrade & Zaghloul, 2010).

The literature suggests that faculty and their respective academic departments are unaware of whether their institution's library has a librarian-liaison program. Arendt and Lotts (2012) discuss what librarian-liaisons say about themselves and what faculty members say about their liaisons. The study was a survey of librarians and faculty members at colleges and universities across the United States, identified from the Department of Education's integrated, postsecondary education data system (IPEDS) and using 2008 data. Faculty participants ranged across multiple disciplines, with three groups of participants: faculty, matched-group librarians, and unmatched-group librarians. Findings suggest that faculty are ambivalent, often because they are unaware of their availability. In universities at which faculty members were aware of a library-liaison program, faculty members spoke highly of their collaboration and services (Arendt & Lotts, 2012). Arendt and Lotts (2012) argue that librarian (librarian-liaison) and library-information professionals are unsure of what faculty members perceive they need or want.

Vakkari (2008) suggests that faculty view librarians and libraries as valuable when providing electronic resources and other material in support of their teaching and research, and are the appropriate agency for document preservation. Faculty attitudes suggest that the electronic resources librarians provide aid their work, but decrease physical use of the library, reducing students' perceptions of a library's value (Vakkari, 2008). So why has there been little change in faculty attitudes toward librarians? Badke (2012) suggests that the librarian's role is often perceived by faculty and students as traditional, stereotyped support to the academic

support role, and not a proactive, instructional role. However, changes are occurring, with more institutions and faculty considering what is called embedded librarian instructional incorporation as part of academic curricula (Badke, 2012).

Librarian and pedagogy information literacy challenges and issues. Bruce et al. (2006) and Badke (2010) comment on lack of IL assessment, but Oakleaf (2011) brought the issue to the foreground. IL is frequently omitted from assessment in higher education, in part because faculty and co-curricular professionals expect students to possess IL skills before entering college (Badke, 2010; Bruce et al., 2006; Oakleaf, 2011). The consequences are not something faculty focus on in their courses; instead, the assumption is that the librarian (instructional-librarian-liaison) attends to students' IL needs. The American Association of Colleges and Universities (AACU) designed an assessment in the form of a holistic rubric to overcome IL obstacles. The new, comprehensive, IL rubric—valid assessment of learning in undergraduate education (VALUE)—was tested and used in an IMLS-funded, three-year grant study during 2010 and 2011. The rubric assessment of information literacy skills (RAILS) study investigated five higher-education institutions. Feedback from student participants suggests that the primary barrier to the project was lack of time and coordinated structures for assessment. The most notable outcome was that adoption of the VALUE rubric as a catalyst improved evaluations from institutions and collaboration among faculty, co-curricular professionals, and librarians (Oakleaf, 2011).

Bruce, Edwards, and Lupton, (2006), Head, (2008), Kuhlthau (2008), and Latham and Gross (2013) argue that IL is a complex phenomenon. The definition of IL is an overarching parent term and subtopic child term, depending on context. Complicated further by institution, organization, faculty, and discipline attitudes is that IL is a set of universally applicable skills

that can be learned regardless of context or practice within a discipline. As Cope and Sanabria (2014) suggest, there is reason to reconnect with faculty, especially since education is experiencing expansive installation of (digital) AT. In-depth comprehension of how academic departments/faculty members understand IL is required because IL is an important step during development of institutional IL programs and support for academic curricula. At community colleges, regardless of a faculty member's discipline, students come from diverse academic backgrounds, and thus teaching must address fundamental literacies. Discussing IL depends on a student's capacity and academic needs, but faculty from community colleges focus on rudimentary skills related to IL (Bruce et al., 2006; Cope & Sanabria, 2014; Head, 2008; Kuhlthau, 2008; Latham & Gross, 2013.

A few studies explore faculty perceptions of IL beyond library information science (LIS). DaCosta (2010) examines faculty perceptions and activities related to IL in the United States and England, and found there is a skills gap to be bridged. Cope and Sanabria (2014) hypothesize that disciplinary training influences faculty IL perceptions. Interviews during 2012 and 2013 examined whether librarians and faculty members "speak the same language" (Cope & Sanabria, 2014, p. 475), using a phenomenological method and interviewing faculty from two- and four-year colleges. The study assesses two factors: (1) whether faculty members' disciplinary backgrounds influence perceptions of IL, and (2) whether LIS professionals' perceptions of IL differ from faculty members' (Cope & Sanabria, 2014).

Cope and Sanabria (2014) examine individual professors' IL perceptions, with responses suggesting that faculty members' personal IL concepts contradict LIS IL standards (Association of College and Research Libraries, 2000). Hence, Cope and Sanabria's (2014) argument supports DaCosta's (2010) findings that differences of opinion on how IL should be taught between

faculty and LIS professionals represent an area of misconception and miscommunication. Cope and Sanabria (2014) emphasize the importance that indifference requires assessment. Faculty participants believed that IL is a combination of learning basic library skills (not necessarily IL skills), and is part of the academic discourse in a discipline. Faculty realize that students face many hurdles, and fundamental literacies are skills that support their studies and learning. Students use a basic range of abilities to find information, relying especially on the Internet for knowledge. The contemporary information environment magnifies the IL issue and problem of information overload. Consequently, findings demonstrate an emergence during which student IL skill patterns relate to a contextual, textual, and empirical theme. Thus, Cope and Sanabria (2014) identify many IL instruction programs, considering that IL learning skills occur linearly, except the adoption of DL technology self-efficacy adds a non-linear aspect.

Faculty do not see IL as a distinct academic course but as embedded in a discipline, and perceive that they already incorporate IL into their teaching structure (Cope & Sanabria, 2014). These two points demonstrate some of the current hindrances that limit IL and therefore DIL success since information/subject learning is not a linear process (Hjorland, 2010).

Swanson (2011), Swanson and Jagman (2011, 2015) and Wesch (2008, 2008, October) argue that research suggests, at both secondary and post-secondary institutions, that faculty, (instructional) librarians, and teachers are incorporating various forms of AT to energize and reengage students, brought to the foreground partly by the influence of open-source (OER), readily available technology (Swanson, 2011; Swanson & Jagman, 2015; Wesch, 2008, 2008, October). Jacobson and Mackey (2013) comment on a change in library facilities, electronic services' design, and digital information management to a learning environment set up as a learning commons to promote cooperative student DL interactions with technology. Providing

the environment promotes student, faculty, and librarian DIL and AT access. Students find support and information access for their studies 24/7 through digital electronic technology, an essential tool for the commuter or distance learner to facilitate classes and learn (Jacobson & Mackey, 2013).

A developing theme is threading through all of these areas. From the viewpoint of institutions, faculty, and librarians, the literature suggests that a person's concept of what defines DL adoption and AT engagement in the higher education environment varies considerably. These varying degrees comprise issues that challenge inclusion of AT, and influence achievement of student learning outcomes, where consideration of faculty and librarians' aptitudes and acceptance of DL inclusion with AT ties with their perceptions of DL's value toward student academic learning outcomes and success.

Community College Pedagogy and Information Literacy

The community college mission and information literacy. The national agenda stresses that more American students should reach degree completion, but community college goals are much broader; the outcome is not just for degree completion or transferability, but to have portable credentials of market value in careers for sustaining good wages (American Association of Community Colleges, AACC, 2012; Silverman & Williams, 2014). The 21st Century Commission on the future of community colleges, Reclaiming the American Dream, states the importance for community colleges to sustain open access (AACC, 2012, p. 29). Both Kahlenberg (2013) and Bailey, Jaggars and Jenkin's (2015) assessment of the Reclaiming the American Dream report observes how it calls for honest self-evaluation and criticism that acknowledge present community-college shortcomings in areas such as student success rates, employment preparation, and transferability. The report opens the door for thinking creatively to

make it possible to reclaim the American dream (Bailey, Jaggars & Jenkins 2015; Kahlenberg, 2013).

Vaughan (2006) and Cohen, Brawer, and Kisker (2013) acknowledge the merit of the community college mission and the how there is need for change. The present higher-education environment must respond to society's digital advancements to face a (digital) AT imperative (Cohen et al., 2013; Vaughan, 2006). Kuh and O'Donnell (2013) argue that the modern community college mission should have clear objectives to demonstrate a culture of proof and collaboration, gaining better focus on access and student success, clear and coherent educational paths, collective responsibility for student success, and funding tied but not limited to enrollment, institutional performance, and student learning objectives. Through prioritization and regular assessment at varied points along students' paths, quality implementation should be trackable (Kuh & O'Donnell, 2013). Glasper and de los Santos (2013) argue that American higher-education history demonstrates that community colleges are essential innovators. The innovation framework is not limited to the business model; process innovations occur as technology acts as an enabler, ranging from workflow productivity for incremental improvement and student ability to focusing on academic success (Glasper & de los Santos, 2013).

Reiterating Vaughan (2006), Cohen et al. (2008) and Cohen et al. (2013) allude to an organizational change that Diel-Amen and Rosenbaum (2014) explain is a case in which community colleges transform into institutions oriented toward college preparatory transfer programs or organizations that emphasize terminal vocational training (Cohen & Brawer, 2008; Cohen et al., 2013; Deil-Amen & Rosenbaum, 2014). Levin and Kater (2012), suggest that the difference is where the business-domination model was designed, with curricular offerings of those colleges reflecting the imprint of commercial and business interests. These programs

provide technically trained workers. Another variation of the community-college model creates vocational isolation because with the enterprise-domination model, emphasis is on the power of large corporations that shape the educational system to serve their interests, focusing on efficiency, business, and market/economic ends, and thus making educational programs commoditized and vocationalized. The impression is that the education curriculum is reduced to occupational training and marketable skills (Levin & Kater, 2012; Wagoner et al., 2010). In Wagoner et al. (2010) study argues that in the twenty first century and beyond, community colleges will have altered their identities and missions; educational endeavor will become primarily a capitalist enterprise (Wagoner et al., 2010).

Discussing community colleges, Vaughan (2006) and Cohen et al. (2013) argue that community colleges are unique in their ability to adapt to change, with close relationships with industry and commerce**.** Community colleges align much of their academic missions rationally with career and technical certifications. They incorporate advances in technology as it pertains to the industry, in comparison to other institutions of higher education
(Cohen et al., 2013; Silverman & Williams, 2014). However, Scott-Clayton (2011, 2012) and Bailey et al. (2015) highlight the reality that as the new wave of digital technologies is adopted, they are not necessarily accepted because of the demographics of students, faculty members, and, by extension, librarians. The added need for support in training and application of new digital formats is an issue, especially in rural areas because access to and comprehension of new digital technologies is limited (Scott-Clayton, 2011, 2012; Bailey et al., 2015). Zurkowski (1974) alluded to technology's prominence in people's professional lives. Whether people agree with Zurkowski, they have to accept that we live in a digital technology era.

Vaughan (2006) and Bertrand (2010) are among many scholars who express the realization that professionals and even the public must continue learning new technology programs to compete in an educational context, and in the larger picture of the global market. Both new policies from politicians and expectations handed down from institutional administrations suggest a need to incorporate increasingly more DL into learning and teaching. Both Bertrand (2010) and Bailey et al. (2015) identify the potential of new policies and political influence, expounding on how politicians and society's current sentiment affects community college redesign because the impression is that use of AT enables and improves data collection that is measurable. For that reason alone, the meta-analysis of data collected offers college administration the potential to predict how to amortize better their financial commitments to providing a balanced education environment (Bertrand, 2010, Bailey et al., 2015).

Access to support digital technology sustainability. Scott-Clayton (2011, 2012) and Bailey et al. (2015) argue that having secure Internet broadband access is a factorial issue that affects the success of (digital) AT. At the institution/faculty level, secure Internet access influences inclusion of such digital technology programs in curricula, from the viewpoint of faculty when assessing students' digital efficacy in relation to their demographics (Bailey et al., 2015; Scott-Clayton, 2011, 2012). The national telecommunications and information administration's (NTIA) broadband technology opportunities program (BTOP) publishes details and statistical information regarding broadband access and sustainability statewide. Smith (2010) alludes to Pew Research Center surveys, which ask the public about its attitudes and access to broadband, and reported that as of May 2010, 66 percent of Americans have high-speed connections. Some segments of the population are still not part of that group, where Scott-Clayton's (2011, 2012) corroborates earlier findings, and Bailey et al.'s (2015) most current

evidence. Similarly, Carmichael, McClure, Mandel, and Mardis (2012) continue research into broadband sustainability, metric assessment, and people's perceptions that rural libraries, schools, colleges, and training institutes became central technology hubs as community anchor institutes (CAI), providing sustained public broadband access. These CAI's provide a truer picture of the most reliable data on broadband penetration (Carmichael et al., 2012). In 2011 and at the national level, the University Corporation for Advanced Internet development (UCAID), known as Internet2, began the upgrade of advanced broadband technology access to extend across 50 states. The upgraded network will enable high-speed broadband connectivity for up to 121,000 additional CAIs. The project plan is to connect across all disciplines into virtual communities with shared goals and objectives, including colleges, universities, and libraries (http://www2.ntia.doc.gov/grantee/ university-corporation-for-advanced-internet-development). Consistent, high-speed broadband access is a component of digital technology, where the Internet supports the spectrum of digital programs.

In 2009, the American Recovery and Reinvestment Act (ARRA) provided a combination of broadband grants and loans, with priority given to underserved rural areas. The national telecommunications and information administration (NTIA) appropriated 4.7 billion in funding for the Broadband Data Improvement Act (*P. L. 110-385*) to overcome the digital divide among sectors of society. Kruger and Gilroy (2013) argue that the definition of the term *broadband access* characterizes a gap among people who have information access. The difference between these sectors is known as the haves and have-nots regarding digital broadband information technology, primarily because rural and low-income areas do not have access to high-speed Internet that is broadband technology (Kruger & Gilroy, 2013).

The Rural Telecommunications Congress with the NTIA (2012) web resources, in connection with the West Virginia Office of Telework Promotion and Broadband Access as a partner, the West Virginia statewide broadband infrastructure project intends to spur affordable broadband service by allowing local Internet service providers to connect to the project's open network. In 2013, 17 community colleges and 19 other higher institutions of education were connected to broadband access (http://www2.ntia.doc.gov/grantees/WestVA). A statement from the director of comprehensive community infrastructure for NTIA's broadband technology opportunities program (BTOP) commented that in southern West Virginia, McDowell County was able to use high-speed Internet connections for education services. The NTIA West Virginia broadband grant helps fund establishment of continuing BTOP connectivity (http://www.ntia.doc.gov/blog/2013/broadband-expanding-possibilities-students-west-virginia-and-nation).

Community college digital technology and information literacy inclusion. In the United States, community college programs are divided between student instructional preparation for further education and career/technical education through hands-on vocation. IL literature offers an outline of the vocational/technical IL programs found in community college libraries. Bird et al. (2012) recommend reassessing the importance assigned to career technical education (CTE) curricula and inclusion of tailored vocational IL programs. The study explores what is meant by informational need; recognizing when one's knowledge is insufficient to fulfill a particular activity is central to IL, described first in information practices in business by Zurkowski (1974). The study suggests that information behavior is the interaction between information need and the environment or context of a user (Bird et al., 2012). IL standards from ALA and ACRL emphasize critical thinking (Association of College and Research Libraries,

2000; Digital Literacy Task Force, 2013). Bird et al. (2012) reemphasize that the need for information technology skills have been identified in many types of professions, but little research exists regarding factors of vocational curricula, especially in a vocational workplace context since individually, traditional IL skills might appear inapplicable to those vocations. Understanding community college CTE programs, with unique student demographics, to develop new ways of thinking about IL and with relative value for vocational professions is challenging (Bird et al., 2012). The study also explains state-of-the-art practices for contemporary community college librarians (Bird et al., 2012, p. 24). A survey was employed with open-ended responses and questions designed to differentiate IL in vocational/technical programs and IL in college-preparatory/transfer programs. Responses illustrate that instructors must determine whether there is an IL need, and the tendency for IL program elements to be customized to instructor requirements and student needs. Vocational technology programs do not ask for library instruction, assuming students receive IL in general education classes. Bird et al. (2012) argues that IL is a set of skills that is learned, without consideration of context, suggesting a misinterpretation of IL and that vocational instructors from industry lack an IL concept. A further barrier to collaboration in IL instruction is instructors' adjunct or part-time statuses (Bird et al., 2012). The study also identifies that vocational faculty members do not necessarily consider information-seeking a part of learning outcomes. They might be unaware of the library's modern electronic services, and perceive that information skills should not be integrated into the curricula of individual disciplines.

Bird et al. (2012) advocate context-sensitive IL instruction relevant to the modern workplace, during which librarians are introduced to modern workplace technology IL needs, and useful redesign of IL and core curricula should be established. Bruce et al. (2006), Kuhlthau

(2008), Lloyd (2010), and Bird et al. (2012) indicate that more research is needed to understand best practices to facilitate future collaborations in the complex landscape of part-time and adjunct instructors at community colleges. It is also essential to study faculty and librarians to promote lifelong IL and recognize the bigger IL picture that Bruce et al. (2006), Lloyd (2010), Kuhlthau (2008) and other IL researchers describe. The present challenge is DIL that incorporates AT because as Wesch (2011, 2014) and Swanson (2010) demonstrate, digital literacy is becoming the new norm, and earlier, Bates (2000) cited that faculty must overcome their DL inertia and adopt new AT (Swanson, 2010; Wesch, 2011, 2014).

Integrating digital literacy with pedagogy into community college. Addressing DL adoption with AT integration at community colleges, Moser (2007) explains that there are critical phases involved during DL adoption —understanding the implications for faculty investment in curricula development using AT applications. Mosley (2010) argues that the institution provides an environment that fosters DL technology, and a faculty educational technology adoption cycle. There is consensus across scholarly literature regarding the transience of technology, which influences faculty DL adoption and the uses of AT as part of pedagogy, thus, institutions need to be cognizant of the implications, documented in the New Media Consortium 2015 Horizon Report (Johnson, Adams Becker, Estrada, & Freeman, 2015). Linder-vanBerschot and Summers (2015) explore implications of technology transience on instructional design. The study provides examples of programs, assuming a purposeful approach to creating DL quality levels with AT in online learning opportunities, and recognizing myriad issues that arise with the transience of technology. The study explains the influence on quality, currency, and effectiveness during design of learning experiences that need to be considered in a relationship with the ways technology changes the learning environment, especially when

making recommendations for practices and standards for instructional designers to work with faculty in the challenge of DL inclusion in pedagogy (Linder-vanBerschot & Summers, 2015). One issue is that institutions do not have easy access to instructional designers for AT support.

In the United States, typically community and technical college faculty are characterized as having full teaching loads, lacking teaching/clerical support, involved in community service, and having regular business and industry relationships (Cardwell-Hampton, 2008). In addition, the study examines faculty attitudes toward incorporation of technology generally, and with specific applications, including perceptions of the status of technology support and services, and perceived barriers to technology use. The study used an online survey to gather data, focused on predictor variables such as faculty gender, age, professional status, years of experience, tenure, and degree of technology use/confidence (Cardwell-Hampton, 2008). While Mosley (2010) acknowledges that community college faculty, much like in other institutions of higher education, are pressured to respond to students' expectations of technology incorporation, and adapt instruction methods accordingly.

Butler & Sellbom (2002) stated a main barrier to the adoption of AT is that certain faculty members believe technology is worthless (p.26), whereas Wallace (2004) argues that faculty and instructors overcome the misconceptions of DL and AT convenience, prestige, and satisfaction (p. 29). Hence, for faculty members to integrate technology, they should have proficiency and confidence with use, and find value in time invested developing greater technology inclusion in their teaching discipline methods (Bertrand, 2010; Cardwell-Hampton, 2008). Cardwell-Hampton (2008) argues that for institutions to overcome faculty barriers and make changes, implementation of new strategies requires broad, collaborative involvement of all stakeholders when there is absence of conclusive data. The benefits of new, best strategies have a

progressive influence, altering the way faculty teach and students learn (Cardwell-Hampton, 2008).

Hardcastle (2008) clarifies that for technology effectiveness and training, the priority should include electronic content, assessment, and communication tools, an efficient source of training includes self-taught/self-study methods since faculty do not believe they have adequate technical support to use technology during teaching; additional training for teaching and learning technology is necessary. Also, faculty primarily become aware of technology from fellow instructors as significant resources, that professional conferences and workshops are another avenue, and college IT departments, college librarians, and instructional designers, making them more technology aware. Accordingly, demonstrating that faculty attitudes toward the benefits of technology are positive in that use of technology increases student learning, and reports that only nine percent of faculty members believe technology diminishes their roles in a student's education—very different findings to prior studies that intimated that a majority of faculty perceptions were unfavorable toward AT Hardcastle (2008). However, faculty agree that technology inclusion in a curriculum and teaching model requires additional time and effort to expand use of technology. Student expectations motivate them to learn more about instructional technologies. Faculty focus-group comments clarify some survey comments, and identify underlying challenges such as opportunities for future use of teaching and learning technologies, including institutional pressures to use technology, lack of faculty input, advanced needs of early adopters, early adopters as trainers and mentors, effective tools and practices, assumptions students have regarding technology skills, technology skills assessment, and developmental technology courses (Hardcastle, 2008). These implications reveal how faculty learn about teaching technologies and tools, their training preferences, and personal perspectives.

Hardcastle (2008) reports that many educators, faculty, and instructors perceive that college classrooms are underequipped and lack proper hardware and software infrastructures necessary for technology use. Faculty commented on the critical value of peer-to-peer networks. Most instructors reported that they lacked sufficient training opportunities, and the need for more training and time to use technology. They also reported inadequate allowance of time or technical support for practice to apply new technologies in courses, and institutions should leverage the experiences of effective, technology-use faculty members to share and train across departments and the institution (Hardcastle, 2008).

While exploring community college faculty perceptions of student outcome contributions to the subject matter, to recognition of similarities or differences among various paradigms, which is paramount to gaining an understanding of the paradigmatic faculty perceptions (Fruge & Ropers-Huilman, 2008). Regarding diversity of faculty that credentials and majors offer, faculty tend to follow self-classifications along the paradigmatic continuum. The implication of student outcomes refers to both cognitive (i.e., intellectual growth) and non-cognitive (i.e., social, emotional, and cultural development) outcomes. Equally important is that findings highlight issues associated with cross-discipline curriculum policies since faculty perceptions are often reflected and relevant during institutional accreditation. Further research should be conducted on paradigmatic differences, and extended to four-year colleges and universities, as a tool to explore effects of classroom instruction, student experiences, and educational outcomes (Royal, Eli, & Bradley, 2010). During the last decade, studies from Babson Survey Research Group, ECAR, Lumina Foundation, and Gates Foundation of faculty perceptions of digital technology self-efficacy and inclusion reinforce Hardcastle (2008) and Royal et al.'s (2010) findings (Allen, Seaman, Lederman, & Jaschik, 2012, June; Allen, Seaman, Lederman, &

Jaschik, 2012, August; Dahlstrom, & Brooks, 2014; Jaschik, & Lederman, 2014; Moran, Seaman, & Tinti-Kane, 2012; Seaman, 2009; Seaman & Tinti-Kane, 2012).

An important aspect of contemporary teaching and learning is technological innovation, exploring faculty attitudes toward use of technology in the classroom at each university. Marzilli et al. (2014) assess technology in higher education and IL using a mixed-methods study of a faculty-developed, electronic survey, the purpose of which was to develop a community of practice to improve education built on a faculty-led initiatives. Those unfamiliar with this school of thought might be interested in learning from Marzilli et al.'s (2014) findings that faculties' primary barriers are summarized by perceiving digital technology as a distraction, lack of DL knowledge regarding technology for faculty and students, insufficient resources, and unreliable hardware or software platforms. Faculty also mentioned other challenges concerning administrator and student pressures to include DL, which compound problems when coupled with outdated, legacy platforms and tools. Marzilli et al. (2014) suggests that technology pervasiveness will increase, contrasting with faculty perceptions of the future of technology in higher education. Further developments of hybrid formats, online learning, and better use of technology to prepare students for the workplace will also occur. Faculty expressed concerns about losing full-time employment statuses under the new model of education. These findings both corroborate and contradict extant research. The future of technology is promising since mobile learning is an emerging theme, making education available anytime and anywhere. One concern for faculty is that technology diminishes the humanistic perspective in education (Marzilli et al., 2014). Morrison-Garcia (2011), Mitchell (2012), and Bucker and Kim (2014) expect IL integration in teaching since contemporary students have spent much of their lives surrounded by digital technologies, and thus these technologies, with portable online

connectivity, challenge educators to be on par with students. These topics were noted by Swanson (2010) and Wesch (2011, 2014), and reaffirmed by Hennefer (2013) and Meland's (2014) current cyberactivism research.

In reference to Kuzweil's (2011) prediction that the world is fast approaching a technology tipping point Poushter, Bell, and Oates's (2015) study by the Pew Research Center (PRC) reports that 60 percent of experts and stakeholders forecast that by 2020, there will be an innovative technology shift that will occur in higher education. PRC research into global, public perceptions suggests that the Internet is having a positive influence on education, but a negative influence on the morality of its users' society. The most common users of digital and virtual information, and the Internet, are young, well-educated English speakers (Poushter et al., 2015). Hargittai (2010) notes that there is a wide range in a person's computer proficiency, and online skills, among students. Dependent factors include students' socioeconomic backgrounds, personal technology self-efficacy, digital technology, access, and innovativeness (Hargittai, 2010).

When discussing twenty-first-century environments and ecosystems, one aspect most scholars agree on is that students require multiple skills for lifelong success, including access and completion of postsecondary credentials and critical thinking. Research demonstrates that students learn better when designing education by steering content and accessibility to their needs and goals, particularly when they receive real-time feedback. Another topic regarding DL inclusion is the controversial issue of how effective education technologies are when faculty personalize subject content learning, thereby tailoring and personalizing student learning, and thus enhancing student achievement (Badke, 2012; Kulthau, 2004; Swanson, 2010; Wesch, 2011, 2014).

A Lumina Foundation (2014) study used faculty focus groups (N=55), during which subjects discussed faculty use of online and blended/hybrid teaching tools and methodologies. Participants were largely early adopters of technology, and thus were not representative of all faculty. Nearly 87 percent of participants taught online courses, and nearly half taught using a blended or hybrid format. The majority of participants were non-tenured (slightly over 80 percent), and only 19 percent were on a tenure track, with a spread across disciplines (Luma Consulting, 2014). Primary attention was on student success, and knowing how to respond to the needs and constraints of the new, traditional student. The power of technology tools for instruction that enhance student learning, and the overall belief that current postsecondary systems need to change from traditional models, were common themes. Given guidance and assistance, faculty members, combined with institutional support, offer personalized learning to students, and the potential of open-access education (Luma Consulting, 2014).

The study's focus groups highlighted advantages and disadvantages of faculty adoption of online learning, identifying barriers such as time and commitment to keep up with changing technology. Faculty workload, lack of time, and inconsistent training were also reported. Development and support of online and hybrid courses, and academic administration's misconceptions of what is needed to establish an online class, were also part of the discussions. Also of concern were students' misconceptions of their self-efficacy and the commitment needed for online learning success. Faculty members are agentic as proactive change agents, and are champions when promoting use of online tools among faculty (Luma Consulting, 2014).

Bucker and Kim (2014) contend that studies on educational technology inclusion and reform should continue because more AT (i.e., software and hardware) in the classroom does not ensure bridging the digital divide. Their research suggests that incorporation of advanced ICT in

the classrooms is problematic. The Stanford mobile inquiry-based learning environment (SMILE) was developed to study AT inclusion, a framework of inquiry-based pedagogy and integration of ICT technology in the classroom, particularly in rural contexts. A review of findings from a series of SMILE and program effectiveness studies demonstrates that the challenge of inquiry-based pedagogy is how to engage students in questioning content and context of information. Questioning information while reading is core to inquiry-based learning since students learn meta-cognitive skills, and focusing on students' abilities to evaluate sources and monitoring their comprehension are paramount (Bucker & Kim, 2014). Findings suggest that the SMILE program is beneficial regarding promotion of student information questioning and enhancement of student-teacher dynamics. However, SMILE success is influenced by the school's/country's pedagogical context. Use of such constructivist teaching methods that introduce students to learning by discovery and participation involves a proactive approach on the part of both teacher and student. A programming framework designed in a technology-integrated and developed educational environment cannot necessarily be integrated to develop educational environments without contextualization. Thus, Bucker and Kim (2014) recommend further research with programming framework at all educational levels—primary, secondary, and postsecondary—and in urban and rural environments. Using samples from both the United States and abroad, assessing the effectiveness of long-term SMILE interventions would offer conclusive findings (Bucker & Kim, 2014).

In another study, *U.S. Post-secondary Faculty in 2015: Diversity in People, Goals, and Methods* (Gates Foundation, 2015), McGoldrick et al. (2015) survey two- and four-year institutional faculty members, suggesting innovation is creating a new wave of teaching. Findings suggest that of 3,971 faculty responses, at least 40 percent expressed interest in

innovative digital technology, but only 20 percent were using some form of digital technology. The most modern digital technology format was a flipped classroom, where 29 percent used the form and another 27 percent reported that they included free, open-course digital content, a model advocated by Eric Mazur at The Massachusetts Institute of Technology (MIT) since 1992 (McGoldrick et al., 2015). McGoldrick et al. (2015) highlight that an important aspect of the study was identifying hidden factors that encourage faculty to change. Postsecondary faculty pedagogy guided their beliefs and attitudes, influencing local pedagogical decisions that influence student learning outcomes. Adoption of digital technology is occurring erratically across the higher education community. When faculty decide to alter their course delivery format, they must believe that the change will benefit student learning goals and outcomes. Faculty from two-year institutions were particularly interested in the application of theory in real practice, mastering knowledge, and prerequisites needed for a discipline, and knowing how to synthesize, organize, and analyze information and ideas into new, more-complex relationships and interpretations (McGoldrick et al., 2015).

In many instances, peer-to-peer faculty support indicates whether they try the new digital technology. Therefore, a major determinant of faculty perspectives on digital teaching technology relates to opinions about colleague interactions, how they view their students and themselves, and interrelations among these factors. Hence, relationships among these factors are where barriers do occur, especially if time, training, and technology support are limited (McGoldrick et al., 2015). McGoldrick et al. (2015) address faculty beliefs about digital pedagogy, faculty/librarian methods of pedagogy concerning high-tech teaching, and why more study is needed. Johnson, Adams Becker, Estrada, and Freeman's (2015), Horizon report on higher-education edition, cited a statement from panel experts, who believe significant

challenges are impending regarding DL adoption in universities and colleges. No longer do traditional approaches support student learning outcomes. Similar to Bertrand (2010), New Media Consortia experts criticized traditional teaching approaches, citing that they stifle learning, and instead recommend a blended formal and informal DL learning environment. The report also indicates that institutions need to improve digital literacy and develop student personalized digital learning environments. An example includes virtual digital learning commons that incorporate Web 2.0, found in many large university libraries (Johnson et al., 2015).

The platform and format of much contemporary information production are presented and guided by a digital medium. McGoldrick et al. (2015) provide a broad picture of two- and four-year faculty opinions on types of digital teaching modalities and tools. The study suggests the prominence of digital technology inclusion in educational programs and processes, but does not explain the learning influence or DIL literacy benefits, nor does the study explore why two-year faculty members choose not to incorporate digital technology (McGoldrick et al., 2015).

Is IL, and by extension DIL, limited to a single subject or discipline? Bruce et al. (2006), Kulthau (2004), and Badke (2012) argue that the inception of IL to the new birth of DIL involves actions of working with information, and that the context of information relates to its inquiry. In turn is the ability to navigate AT with self-efficacy as part of the IR and ISP process (Kulthau, 1991, 2004), where ACRL (2000) standards explain that to be information literate, a person determines a need, find and access information, understand it, and evaluate it, and then synthesize and use it appropriately. Therefore, DIL can be applied universally to any subject or discipline because IL incorporates information comprehension and critical thinking. DIL is the digital bridge to finding and learning more about a topic. IL is commonly incorporated in general

education and English instruction, but has also expanded into humanities curricula; when a faculty member assigns a research assignment or project, DIL research is required and involved.

Digital information literacy and the humanities. Bruce et al. (2006), Kuhlthau (2007), and Head (2008) suggest that although IL is universal, DIL is ambiguous because IL is the primary concept term and DIL is the new, digital literacy subtopic. Head (2008) explains that faculty in the humanities and social sciences consider a research process involving knowledge of the discipline through acculturation, and that information research is nonlinear. Conversely, when students are new to a field, they have limited exposure, which derives from class texts and lectures. The students are unfamiliar with the ambiguity and nonlinear aspects of research, and are hampered by fixed cognitive development. Hence, DIL interjection and embedded support redirects and enhances student research. Through active learning assignments, students expand their cognitive abilities and overcome anxiety, gaining non-cognitive confidence with practical familiarity of digital tools. Thus, they engage in a hybrid approach to research, in which faculty and librarians collaborate to emphasize IL with a DIL module as part of the course (Head, 2008).

Head's (2008) study of humanities and social-science majors' information-seeking behaviors examines how students conceptualize and operationalize course-related research. Contrary to library literature of the time, which suggested a paucity of IL competencies, results suggest that students interact with library resources, primarily electronic resources, through library webpages. The assessment showed that students experience difficulties with determining the extent and nature of the information they needed for a research assignment. Through self-reported responses, the students commented that they became aware of their research issues, and learned how to achieve success by engaging in a hybrid research approach. The students leveraged librarians and digital technologies to overcome IL limitations and achieve DIL

competencies within course requirements (Head, 2008). Within the humanities, general education courses form the foundation of a common learning experience for all students. Rockman (2004) suggests that IL inclusion bridges gaps across discipline boundaries (Rockman, 2004). Ragains (2006) expands on the idea that IL should be taught beyond general education courses; incorporation of IL in disciplines provides students the ability to develop in-depth subject knowledge, think critically, and act creatively (Ragains, 2006).

Clement (2012a), Baran (2013), and Lea (2013) argue that contemporary AT, and the modern form of digital literacy, is now recognized as multimodality, which incorporates a combination of the traditional, standard, lecture-style format and material, digital resources from the Internet, LMS and online class programs, and other digital media. Clement (2012a) criticizes the multimodality theory, where educators and faculty use a combination of digital technology formats. Combined DL information instruction includes limitations, in part because of traditional, conservative ideologies related to student learning outcomes, which are demonstrated by either the institution or educator/faculty perceptions and forms of pedagogy. The traditional, standard, lecture-style format does not automatically or naturally transpose into a digital medium (Clement, 2012b).

Jumonville (2014) reiterates that using IL is a much better low-stakes introduction to the digital information format, where students learn and grasp the basics of database searches, avoiding plagiarism and thinking critically. Since the innovation of information, production is spurred by electronic information creation, search, and retrieval. There is a debate among faculty about the role of teaching and learning in the humanities (e.g., English, history, introductory sciences, psychology, sociology, etc.), not to be confused the digital humanities (Jumonville, 2014).

Why Digital Information Literacy is a Challenge in the Digital Literacy Environment?

Information literacy in literacy in higher education. Researchers argue that the definition of IL is complex given the ambiguous nature of IL inception and development that exists (Bruce et al., 2006; Gross & Latham, 2007; Huvila, 2011; Lloyd, 2010; Rockman, 2004; Seymour, 2012). Beetham and Sharpe (2013) and Sipple and Lightner (2013) recognize that IL draws a parallel interpretive meaning, synonymous with the ubiquitous terminology for e-learning and virtual technology. However, Covello (2010) considers IL as having a symbiotic relationship with digital literacy as an element of ICT.

From the beginning, recognition and establishment of IL were conceptualized as an information-learning concept, or a literacy process. IL was originally misinterpreted as an ICT program (Badke, 2012; Belshaw, 2013; Zurkowski, 1974). Such ambiguity is due in part to overlap between the traditional meaning of IL and the new counterpart DIL. The American Library Association (ALA) and the Association of Colleges and Research Libraries (ACRL) established standards for IL in 2000, and revised them in 2014 (Association of College and Research Libraries, 2000). Also, in the United Kingdom, the Chartered Institute of Librarians and Information Professionals (CILIP) developed standards. The Australian and New Zealand Information Literacy (ANZIL) provided direction and guidance for IL, and the International Federation of Library Associations and Institutions (IFLA) released statements on IL and lifelong learning, stressing the value and importance of IL (International Federation of Library Associations, 2005). The overarching organization that guides best practices with global, IL education policy comes from the central body of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) (IFLA, 2005). Many of these policies and standards are being

promulgated out of necessity to both innovate and update educational pedagogy and practice to align with technology influences on traditional paradigms.

Wiener and Jackman (2010) argue that a review of IL definitions and standards, established in America by ALA and ACRL (2000) and internationally by Bruce et al. (2006) and Kuhlthau (2004, 2007), suggests no consensus. IL's underlying core values include knowing the need for, being able to find, evaluating and synthesizing, assimilating, and understanding ethical issues surrounding information. However, Bruce et al. (2006), and Wiener and Jackman (2010) contend that through IL instruction, those issues and disadvantages are addressed. Ramaswami (2009), Bruce and Hughes (2010), and Belshaw (2012) state that IL incorporates both a person learning the skills that represent computer fluency and the ability to comprehend information in the form of DL. Constant increasing advances in digital technology mean a person continually needs to learn to know how to operate such technology. So much of information production and processing is now digitally based that DIL is the new norm (Belshaw, 2012; Bruce & Hughes, 2010; Ramaswami, 2009).

Research brings the relevance of IL to the foreground of education policy and pedagogy discussions in higher education. Head and Eisenberg's (2009) Project Information Literacy (PIL) program conducted a series of national studies. PIL is the first study to examine what causes students to continue to struggle with conducting course-study and supplementary, everyday-life research using academic and digital technology from a student's viewpoint. Eisenberg (2003, 2008) suggests that secondary students have not had IL instruction; students' search methods take on the form of a laundry-list approach. The student is shown the *how* of IL basic skills, but not the *when* and *why.* IL is necessary during the entire information search process (ISP), which Kuhlthau (1991, 2004) identifies as dual interaction elements of information retrieval IR and IL,

stressing that metacognition represents a student's understanding of thought processes. More important is that all college freshmen study IL and receive practical application instruction (Eisenberg, 2003, 2008). Head (2013) and Dubicki (2013) reiterate that PIL findings accord with an earlier study from Ethnographic Research in Illinois Academic Libraries (ERAIL), which suggests students experience difficulties with all aspects of the search process and electronic resources because they rely on Google for most of their searches. Survey data from students' personal IL perceptions of self-efficacy are useful tools for instruction librarians and faculty to find more efficient ways of teaching IL and critical literacy skills (Dubicki, 2013; Head, 2013). Dubicki (2013) examines community-college faculty and librarian (liaison) contexts. Recommendations include how faculty and librarians create informed and educated citizenry, and how to help faculty, librarians (liaisons), and students meet digital technological, economic, and social challenges (Head 2013).

A report from the Office for Information Technology Policy, ALA Digital Literacy Task Force (2013) is a review of IL updates, and expands IL standards and outcomes to include higher degrees of digital technology inclusion in higher education for more advanced instruction. In light of new knowledge about learning, two questions are asked: are librarians expected to teach digital research skills, and should librarians be adept at using all multimedia software and online applications (Digital Literacy Task Force, 2013)? Cordell (2013) discusses that these standards are attainable goals as benchmarks that IL programs are expected to reach. Thus, a revision of IL standards should facilitate conversations with institutional colleagues, not simply leave it to librarians to acquire new technological skills to support new demands of digital literacy learning (Cordell, 2013).

Defining information literacy as a phenomenon. From America (Badke, 2012; Swanson, 2010), Europe (Belshaw, 2012; Kerr, 2012), and Australia (Bruce, 2002; Hughes, Middleton, Edwards, Bruce & McAllister 2005), IL is a global concern. Zurkowski (1974) and IL researchers of the new millennium, Bruce (2000), Hughes, Middleton, Edwards, Bruce and McAllister (2005), Samuels (2007), Kuhlthau (2008), Swanson, 2010, Badke (2012), and Kerr (2012), explain IL in a broader domain, telegraphing IL history and evolution, and IL fundamentals. Where the characteristics of adoption of key IL concepts have been usurped by DL (Badke, 2012; Kerr, 2012; Kuhlthau, 2008; Rader, 2002; Samuels, 2007; Swanson, 2010; Zurkowski, 1974). Belshaw (2012) and Mitchell (2012) argue that IL evolved into DIL. Bucker and Kim (2014), Bird et al. (2012), Beetham and Sharpe (2013), and Cope and Sanabria (2014) argue that explanations for the development of relational approaches and framework tactics, and research focusing on emerging IL directions and digital literacy, inclusive of DIL, are needed. Hughes et al. (2005) offered a relational approach to understanding IL developed from the research methodology of phenomenography; the "outcome of phenomenagraphic research is the identification of the different ways people experience a phenomenon, the structural relationships between these alternative ways of experiencing and expressed as a finite set of categories, such as Seven Faces model for IL" (Hughes et al., 2005, p. 11). Bruce (2004) posits, "IL is an integral- part of learning where students learn to learn from available resources of this-information-rich 'digital' environment; IL should be totally inclusive of the learning experience" (p. 3).

Zurkowski (1974) made the initial comment that traditional demarcations among formal learning environments, workplace contexts, and community settings are increasingly blurring. Therefore, the relational approach, as a form of informed learning, expanded into a variety of

new disciplines, originating from educational research, in which researchers use categorical meta-tags to label and define people's experiences. Bruce et al. (2006) and Lupton (2008) use the seven faces of IL matrix, developed in 1997, which describes the experiential categories of the fundamental, relational approach. Providing better understanding of educators' various methods of IL education, the six frames model presents a research-based framework that suggests (IL) "learning occurs when variation in ways of understanding or experiencing are discerned" (Bruce et al., 2006, p. 6), identified as variation theory. Lupton and Bruce (2010) comment an alternative way of approaching IL from a literacy perspective is through three nested windows, reframing them as the generic, situated, and transformative learning (GeSt) windows model instrument developed by Lupton and Bruce (2010). These approaches play a role in informed learning, identifying three perspectives of IL as: (1) Sequential; gather information and retain information learning later, separating information and learning; (2) cyclical; gather information to learn from it, repeating the process as needed, and then maintain and organize separation between information and learning from it; and (3) simultaneous; learn from information as you interact with it during the gathering and experience process; as a subset of IL, the informed-learning phenomenon focuses on use of information and learning simultaneously (Lupton & Bruce, 2010).

Diehm and Lupton (2012) and Maybee, Bruce, Lupton, and Rebmann (2013) disclose that developments in the phenomenographic approach are matched with informed learning; the model considers informed learning in the university classroom by assessing the experiences of using the information to learn as part of an informed-learning agenda. Recommendations from Maybee et al. (2013) suggest that learning studies are a positive direction for phenomenographic research since learning studies explore what is effective when encouraging learning. The legacy

of traditional learning models, with skills and attributes developed by experts and shared with learners, is changing (Maybee et al., 2013). Gunton, Bruce, and Davis (2014) suggest that contrasting the relational approach with IL education suggests that the relationship is between learner and instructor, and at the same time, the teacher learns from the learner's experiences during instruction. Teaching represents a sharing of information and knowledge as a multidirectional experience. Learning is experienced as an iterative sharing of information and skills, and the experience occurs when educators and learners contribute to the mapping of what to learn and how to learn it (Gunton et al., 2015).

In conclusion. The primary challenge of DL adoption and inclusion is influenced by a combination of factors. Elements of the challenges vary considerably, depending on the environment of the institution; urban and rural institutions have their own particular issues pertaining to DL inclusion, from technology self-efficacy to broad arrays of degrees of AT access, training, and support provided by an institution. The extent of faculty, librarian, and personnel technology self-efficacy with AT instructional pedagogy determines the extent of DL adoption. Although best practices and standards guide institutions, issues that comprise the challenges are often unique to an institution due to diverse constituents and their particular needs. For example, another misconception surrounding the argument of DL capability and inclusion versus lack of DL adoption is the possibility that generation X, Y and Z might have innate academic technological ability. Research from rural institutions suggests that a person's environment, educational heritage, socio-demographics, and epistemology play a role in how acculturation and assimilation might occur with confidence into a digital ecology. Hence, more research is needed in rural community colleges to identify the challenges faculty and librarians face, from the perspectives of faculty and librarians, as educators with direct links to students,

and to understand student issues with DL that include possible barriers to AT. The significance of this study is to show that faculty are not opposed to using DL adoption to improve curriculum content, and that through collaboration with librarians, a way might be found to make faculty AT resources for DL inclusion easier to discover. Therefore, making students' digitally competent in using DIL to improve the learning outcomes is possible.

Research Questions:

1. How does epistemological perception bridge the connection between technology skills and technology self-efficacy?
    (a) What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)?
        i. What are faculties' perceptions of the DL?
        ii. When do faculty consider IL relevant to a course's topic?
    (b) What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?
        i. What are community college librarians' (library's) DL perspectives?
        ii. What are community college librarians' (library's) DIL instruction program?
    (c) What are Arts & Science faculties' concept of DIL?
        i. How do faculty consider DIL relevant to a course's topic?
        ii. How might faculty & librarian DIL collaboration enhance student learning outcomes?

CHAPTER III

Methods

Rationale for Qualitative Research

Regardless of the types of technologies faculty do or do not use, what is important is the faculty's epistemological concern for DL and DIL academic technologies developments to their subject matter. Epistemology is a person's perceived attitudes of learning understanding, and epistemological congruency (EC) refers to the sharing of beliefs (Fruge and Ropers-Huilman, 2008), in this case, the concept of the DIL paradigm, with its relevance to faculty disciplines and purpose in conjunction with student learning objectives and outcomes. Creswell (1998) argues that the essence of qualitative research "is an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting" (Creswell, 1998, p. 1). For the purpose of this study, a qualitative approach is applied because of the abstract human perceptions involved. The researcher seeks to understand the meaning of participants' (i.e., faculty and librarians) actions, or lack thereof, and the experiences of the individuals regarding a phenomenon (Creswell, 1998). The study is an exploratory, phenomenological examination that centers on concepts surrounding faculty DL affect (i.e., perceptions) and faculty understanding of inclusion of DIL in pedagogy.

Conducting studies on DIL, Bruce et al. (2006), Head & Eisenberg (2009), Abbitt (2011), and Shommer-Aikins and Easter (2015) agree that a socially constructed research method is appropriate. The research questions are based on people's beliefs and perceptions, not solely the self-efficacy of technology skills (Abbitt, 2011; Bruce et al., 2006; Head & Eisenberg, 2009; Shommer-Aikins and Easter, 2015). Denzin and Lincoln (2005, p. 40) discuss many

methodological practices of qualitative research, during which the researcher is a person who assembles multiple images, bringing the pieces together in a patchwork montage of a real life situation. Similarly, Carter and Little (2007) argue that the qualitative research method of gathering data uses descriptive textual data rather than pure empirical evidence. Analysis of data in the textual form views the natural occurrences of the phenomenon under investigation, instead of changing data into an empirical results format—the interconnected, direct relationships of a research design (i.e., methodology) among the epistemology, method, data, and analysis justifications. Data evaluations become the basis of new knowledge, shown in figure 12 (Carter & Little, 2007).

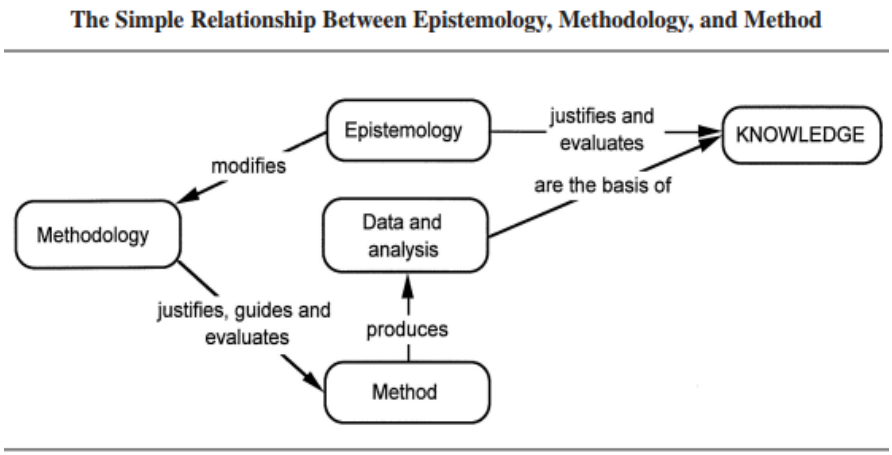


Figure 12. Carter and Little's (2007, p. 1317) epistemologies, methodologies, and methods.

Kuhn's (1970) theory suggests that learning proceeds according to a person's paradigm—the theoretical framework—and is useful because it elucidates a problem issue. Such progress occurs in scientific theories as they become more articulated so they are matched with the nature of the action and environment. From characteristic data observed and gathered, the puzzle of their interactive influences can be solved (Kuhn, 1970). Denzin and Lincoln (2005) argue that

the qualitative method of data collection incorporates human interactions. The data themselves have deep, personal, descriptive content; the research method is not what instrument to use, but which combination of tools might be used to gain sufficient depth of understanding to form provisional impressions of participants' epistemology (Denzin & Lincoln, 2005)

The Qualitative Tradition

The focus of phenomenology is the description of an experience. During discussions of phenomenological study, Moustakas (1994) and the Patton (2002) explain that the research focuses on the nature and meaning of a person's experiences, and phenomenology is the description of those experience. Descriptions reveal hidden meanings or patterns, and show what appears within the experience of the research phenomenon. To obtain the description of a phenomenon, questions are asked and the answers recorded (Moustakas, 1994; Patton, 2002). Both Creswell (2009) and Willis (2007) argue that the phenomenographic method enables the researcher to distinguish from analysis data collected and the description of the experience under review; "phenomenology (is) focused on the subjectivity of reality, continually pointing out the need to understand how humans view themselves and the world around them" (Willis, 2007, p. 53). Creswell's (2009) description of phenomenological research aligns with Bandura's (1989) triadic reciprocal determinism model. Patton (2002) suggests that phenomenological research is rooted in philosophy, anthropology, and sociology. Moustakas (1994) discusses that during phenomenographic investigations, researchers have personal interest and are likely to connect with the phenomenon. Hays and Singh (2012) suggest that each perception begins with the researcher's sense of what is an issue or experience, and the relevant meaning attributed to it.

My Research Paradigm

As a practitioner/researcher, my perceptions of life are viewed through the lens of a pragmatic constructivism concept (Lissack & Graber, 2014). I define my paradigm of pragmatic constructivism as going beyond the practitioners' basic epistemology. Each situation, the interactions therein and the environment, require in-depth analysis and synthesis to capture the essence and value of context or situation (Lissack & Graber, 2014). Including the researcher, the members of the study are a heuristic group. An (analytical) heuristic framework normally asks "who, what, when, where, and why." A heuristic investigation employs independent discovery, relying on common sense, creativity, and experiential learning (Merriam, 2009, p. 44). However, Merriam (2009) argues that the method does not guarantee a solution to the problem. Therefore, the study recognizes this heuristic concept while dealing with the complexities of individuality as part of each of the environmentally dependent contexts (Merriam, 2009). Lissack and Graber (2014) describe that going beyond the realist model, a pragmatic constructivist recognizes the need for questioning the "what, who, and how much." The baseline becomes modified, enabling new evaluation of constraints, boundaries, and other possibilities in many interactive patterns by autonomous and semi-autonomous agents. Applied modifications are grounded in the researcher/observers' understanding of the situation being studied that is influenced by the participants and interactions they are observing (Lissack & Graber, 2014).

Information is a vital component of learning, coupled with the dynamic metamorphosis of providing information from paper to digital technology; media are now at the core of institutional and library mission strategies and resources. I was a librarian, information specialist, and professional practitioner in the discipline of library science and knowledge management for over twenty years, culminating to a point at which I now specialize in the Internet and instruction

of IL and DIL. Librarian-information specialists are situated at the foreground of information management by digital technology in the contemporary library environment, serving incumbent demand of providing IL, which has since progressed into DIL to a diverse cross-section of users.

Thus, the experience of constant engagement with educators, students, and the public, nurturing their learning of IL and DIL comprehension, demonstrates my qualifications as a DIL practitioner-subject expert.

Design

The design of the research model draws from Bandura's (1989) triadic reciprocal determinism as an example of a framework. The model incorporates social cognitive theory, where a person's behaviors, cognitions, and environments are interacting determinants that mutually influence each other simultaneously (Figure 2, p. 13). Thus, an institution's DL and DIL practices and services naturally influence the faculty and librarians. What Bandura (1989) identifies as environmental factors, and faculty and librarians' personal and behavioral factors, might be applied to a particular research area. In this study, it concerns discovering epistemological beliefs and how they relate to DL and DIL of faculty, librarians, and institutional characteristics, and perceptions and interconnections for the types of issues that influence all three (Figure 13).

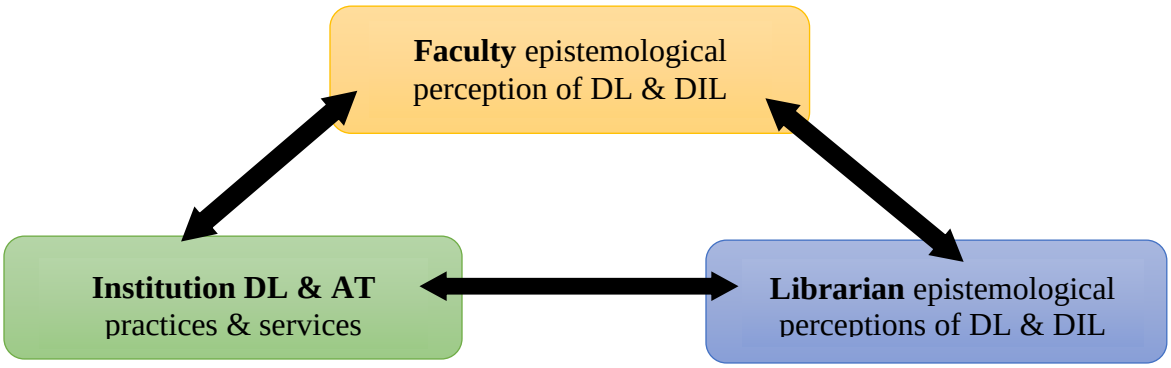


Figure 13. Participant Sample Framework

The purpose of this study explores faculty, librarian and administrators' attitudes of learning theory (i.e. epistemology) and digital literacy (DL) concepts of adoption with instruction, while teaching and understanding incorporation of information literacy (IL) and digital information literacy (DIL) at two-year community colleges. The logic model defines the scope of work, and identifies relevant indicators and who study participants will be. The logic model also provides a flow of information from data gathered, enabling the researcher to evaluate and assess the data to offer recommendations, and show how expected deliverables demonstrate intent, and the study's validity and rigor. The logic model of this study outlines the stages of discovery regarding how new ideologies and values are translated by faculty and librarians to incorporate DL and DIL into teaching to improve student learning outcomes or identify non-effective methodologies (Table 1).

Table .1.

The Study's Research Logic Model

Goals (measurable)	1. To identify barriers to: (a) users' digital literacy engagement (b) users' digital literacy understanding (c) users' digital literacy competency	2. To identify strategies and best practices that eliminate barriers to digital literacy for all constituents—faculty, librarians, and student users
Strategies to achieve each goal	1.1 Conduct a study of the issues that pose barriers to digital literacy learning for respective constituent groups—faculty, librarian liaisons, and institutional administrators	2.1 Review best practices in digital literacy; engagement, understanding and competency for all constituent—faculty, librarians, and student users
Activities to carry out each strategy	1.1 Perform data collection through survey questionnaire of respective constituent groups—faculty, librarians, IT personnel, and Institutional administrators 1.2 Focus groups of respective constituent groups—faculty, librarians,	2.1 Comparison of other digital literacy program successes, limitations, and guidelines relevant to rural community colleges and library locations

	IT personnel, and institutional administrators 1.3 Follow-up phone interviews; feedback from survey questionnaires and/or focus groups	
Performance indicators (deliverables-artifact).	1. Evaluation and assessment of the survey questionnaires and focus-group data provide indicators of areas needing improvement	2.1 Self- study of the report. 2.2 Comparison of self-study report to other program successes, limitations, and guidelines relevant to community colleges and library locations
Expected outcomes	1. Detailed understanding of issues that pose barriers to: (a) users' digital literacy engagement (b) users' digital literacy understanding (c) users' digital literacy competency	
Resources	1.1 Survey monkey digital survey 1.2 Survey questionnaire design for onsite implementation 1.3 Participant letter of agreement to complete e-mail survey and/or join a focus group 1.4 Follow-up phone interviews; feedback from survey questionnaires and on-site focus groups	
Responsible parties	Nancy Adam-Turner, MLS & interrater research faculty	Nancy Adam-Turner, MLS & Interrater research faculty

Correlation does not imply causation, but by recognizing issues that participants experience from identified indicators, the researcher explored those attributes for hidden effects and interactive influences. To understand current issues of DL and DIL adoption and inclusion into pedagogy, the table of specifications is a matrix that shows study participants' environments and attitudes (Table 2)—what develops from the start regarding incorporation of IL along the continuum of the present state of DL and DIL in the institution and its methods or praxis. The

table shows the content of the types of questions that will be posed to participants to discover their ideas, experiences and attitudes toward DL and DIL.

Table 2. Table of Specifications

	Cognitive		**Non-cognitive**	
Learning objectives—skills	Understanding—understanding of given information	Remembering—Recall or recognition of information	Thinking	Perceptions
Faculty and adjunct faculty instructors	What AT tools do you use as means for digital literacy (DL)?	Have you had training to learn DL incorporation?	How do you consider DL useful to your pedagogy/ discipline?	Did you know DIL understanding improves student learning outcomes?
	What are your concepts of digital literacy (DL)?	Do you have a DL program or tool preference?		
	Do you consider DL an integral component to your instruction?	How would you consider your level of DL self-efficacy?	How do you feel about students contacting you about DL matters?	What are the main issues/ barriers students face to DL & DIL?
Librarian & information technology Support	What is the librarian's role with DIL?	How do you provide IL & DIL content instruction and assistance to faculty for student learning?	What do you think are the reasons faculty do not incorporate DIL as part of the curriculum?	What are the types of support the librarian/ library can offers to foster collaboration for teaching DIL?
Institutional administrators	What is your understanding of the faculty's DL role compared to the librarian's role in DL-DIL?	What sort of training opportunities and content support assistance to faculty/ librarians for DL & DIL?	How would you envision broader faculty/ librarian's incorporation of DL & DIL?	What do you think are the main issues for a lack of DL-DIL inclusion in the curriculum?

Shommer's (1990) discussion of epistemology perceptions when discovering epistemological beliefs is presented in three levels: (1) "Knowledge is simple rather than complex" (i.e., simple knowledge), (2) "Knowledge is handed down by authority rather than derived from reason" (i.e., omniscient authority), (3) "Knowledge is certain rather than tentative"

(i.e., certain knowledge), (4) “The ability to learn is innate rather than acquired” (i.e., innate ability), and (5) “Learning is quick or not at all” (i.e., quick learning) (p. 499). Therefore, the study explores faculty and librarians’ concepts and self-efficacy of DL and DIL. What are community colleges’ AT standards and expectation of adoption? Are faculties’ DIL pedagogies and epistemological perceptions congruent? The study considers that the transfer or achievement of knowledge is both cognitive and non-cognitive (Table 2).

Cunha and Heckman (2008) define cognitive skills as the ability to understand, learn, and remember, making thinking a learning and processing information activity, where non-cognitive skills are defined as patterns of thoughts or behaviors that affect social interactions, equating to a person’s perceptions and attitude. Findings suggest that non-cognitive skills foster and support the formulation of cognitive skills, but the process does not operate in the reverse order. Cognitive skills do not foster or promote non-cognitive skills. Based on Cunha and Heckman’s (2008) arguments, a person’s DL concept comprehension does not mean they have DL self-efficacy with AT competency in pedagogy. Lea (2013) explains that learning technologies and academic literacies are a contested space. Whereas Beetham, McGill, and Littlejohn (2009) reports that technologists such as the Gates Foundation and Lumina Foundation advocate learning technology benefits. Abbitt (2011) and Kim, Kim, Lee, Spector, and Demeester (2013) find that teacher DL beliefs and technology integration differ individually; teachers’ and educators’ fundamental concerns and methods of pedagogy (i.e., epistemology) are paramount to student learning, regardless of technology use.

Design Instrument

The instruments of this study are a combination, with both directed and open-ended research questions posed to community college faculty, library-librarians, and institutional

personnel. The questions are taken from Schommer's epistemological belief index (EBI) (Schommer-Aikins & Easter, 2009, Schommer-Aikins, Unruh, & Morphew, 2015). The questions are framed to address directly faculty and librarians' perspectives of the complex nature of digital technology, and how it applied to DL and DIL pedagogy and the institution's DIL policies. Through investigation and learned understanding of the phenomenon, we examine underlying influences (Hays & Singh, 2012). The framework of the research is the PRS model shown in Figure 4, p.16, which is indicative of Bandura's (1989) triadic reciprocal determinism model because its strength is represented in social cognitive theory. The study is based on social cognitive and non-cognitive perceptions between faculty and librarians' DL adoption and perceptions of DIL use interconnectivity and collaboration between these parties and the community college as a continuum. The model suggests that a person's behaviors, the environment, and personal responses mutually influence each other. There is emphasis on the person's control of actions, also retains the authority to interact or not, so the individual defines the degree of importance and progression (Bandura, 2001).

Focus

A variety of studies survey faculty at four- and two-year postsecondary institutions about use of the newest digital tools, open educational resources (OER), and digital learning technologies (Beetham & Sharpe, 2007, 2013). The studies ask whether participants use these forms of new technology as part of their teaching tools. Although survey findings show some inclusion of more than one type of AT being used, the percentage is not significant (Gates Foundation, 2015; Lumina Foundation, 2014). Unclear is why faculty choose not to incorporate DL as part of their pedagogy. In all studies, the objective of the surveys was to discover whether faculty were using some form of AT to support their instruction, but did not specify whether that

use of AT was due to DL adoption. The frequency of the types of digital technology were being used, but not the faculties' epistemological concern for DL's influence on their subject matter, or the concept of DIL and its relevance to the discipline, in conjunction with student learning outcomes.

Purpose Statement

The purpose of the study is to investigate through the lens of community college faculty and librarians' epistemological perceptions and perspectives of DL and DIL inclusion in curricula.

Research questions:

1. How does epistemological perception bridge the connection between technology skills and technology self-efficacy?

(a) What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

i. What are faculties' perceptions of the DL?

ii. When do faculty consider IL relevant to a course's topic?

(b) What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

i. What are community college librarians' (library's) DL perspectives?

ii. What are community college librarians' (library's) DIL instruction program?

(c) What are Arts & Science faculties' concept of DIL?

i. How do faculty consider DIL relevant to a course's topic?

ii. How might faculty & librarian DIL collaboration enhance student learning outcomes?

The Research Objectives

1. Generate baseline data on the current degree of DL attitudes, adoption with self-efficacy, and DIL provision for faculty, librarians, and community college personnel as non-active faculty.
2. Develop recommendations for an exemplary organizational model and gap analysis, and encourage a management approach to embed DIL into all academic programs.

Participants

The participants are faculty, librarians, and an administrator from a pair of community colleges located in southwest Virginia and southern West Virginia, along the Central Appalachian Plateau and known as part of the "Horseshoe" Virginia region. The study identifies current degrees of DL adoption and individual self-efficacy used, what methods of DL with AT tools are used, and how DL's are incorporated into teaching DIL from the perspective of faculty and librarians. The study also examines community colleges' institutional DL policies, or at least DL standards and procedures, pertaining to expectations of faculty and librarian DL inclusion in teaching.

Sampling Logic

Leedy and Ormrod (2013) argue that purposive sampling is used because participants are appropriate to a phenomenon. The rationale for purposeful sampling is that participants are representative of diverse perspectives on the issue under investigation—EC (i.e., attitudes of learning) relevant to DL inclusion and DIL. A purposive sample was drawn from humanities faculty, librarian-library and administrative personnel. The pilot study sample size will be N= 25, also to assist in identifying the purposeful faculty participants the research will contact the Arts & Science Deans from the respective participant institutions to ask for examples of faculty who,

in the Dean's view, fall into Rogers (2003) 4 stages or functions individuals pass through in the innovation - decision process. The plan was to interview 5 to 6 participants from each purposeful sample selection of the Arts and Sciences full-time faculty and 3 to 5 adjunct faculty; (i.e. general studies, English, Psychology, Sociology, History and General Science disciplines), 1 to 3 librarian(s) and liaison personnel, 1 or 2 senior administrators. Therefore, the total sample was: 16 to 28 faculty, 2 to 6 for librarians, and 2 or 6 institutional personnel. This provides a minimum sample size N= 25 and a maximum size N = 40.

The study explored community colleges to discover what faculty consider appropriate inclusion of DIL, and how DIL is included in curricula. It also assessed to what extent library-librarians consider appropriate inclusion of DIL, and how faculty include DIL in their curricula. Data will be compared between the two community colleges.

The Protection of Human Subjects.

After receiving approval from the Old Dominion University Institutional Review Board, the researcher contacted all the sample colleges to gain permission to perform the study at their institutions and, in the process, recognize the importance of taking steps to protect the privacy of all participants involved in the study. Fontana and Frey (2005) stress the value in gaining access to the sample under investigation, and the willingness to share their experience and environment to the researcher. A letter of invitation to the study will be emailed to all participants clearly outlining the purpose and scope of the study, the ways that data will be used and stored, and underlining that participants may withdraw from the study at any time. This informed consent information will be reviewed with each participant at the start of the interview. Once participants agree that they are comfortable with the process, then the interview and recording will be started.

Following all the interviews, the recordings will be digitally transcribed and encrypted. Participants will be offered to review a copy of the transcript to ensure accuracy.

All participants will be asked to complete a letter of informed consent for participation in the research study (*see Appendix D*). This acts to inform all parties that the information collected will be anonymised, and personal identifiers replaced with a code. Only the researcher will maintain the information to connect participants with this code. The data will be stored in a separate password protected file and kept in a secure location accessible only to the researcher. At any time, participants may request transcript copies of any of the data collection instruments they completed. They will be informed that they are free to withdraw at any time with no repercussions. All participants will be given a clear explanation for the study and the reason for the value of their contribution. When the final research is complete and ready to be published data will be reported at the aggregate level.

Measures

A pilot test of the instrument was performed to assess content validity at a comparably sized, southern West Virginia, historically black college. Leedy and Ormrod (2013) argue that the "validity of the measurement instrument is the extent to which the instrument measures what it is intended to measure" (p. 89). A pilot test is used to assess the content validity of an instrument during data collection. A sample of faculty, librarian, and institutional administrator will be asked about their epistemological congruency regarding the DL adoption and DIL paradigm of pedagogy, using all three instruments—an online survey, interviews, and field notes from site visits. Charmaz (2000) espouses the importance of the assistance of an interrater research faculty member to test content accuracy of the questions for both the questionnaire and interviews, also providing evaluation of the relevance of the instruments.

Interview Protocols

This instrument has the broadest potential for reaching the greatest number of participants, in part because of the time and distance between the researcher and participant. A brief questionnaire (five to six minutes max) that uses a Likert scale and multiple choice answer design will be emailed to all participants. As a precursor, to introduce to the researcher the respondents level of DL adoption and technology self-efficacy. Thus, help to prevent question repetition for the participants' one-on-one interview (approximately 45 to 60 minutes) on participants' DL cognitive and non-cognitive attitudes. Then a follow-up onsite visits for focus-group discussion with the librarians- library personnel and institutional administrator Table 2.

1. The online questionnaire's main subject content includes: (i) demographics (ii) participants professional background (iii) DL comprehension, what types of AT program or process inclusion is incorporated into teaching, and possible knowledge of DIL.
2. An Interview: the primary method of phenomenological research since the instrument offers the unique potential of gaining insights and access to descriptions of everyday experiences. (Moustakas, 1994; Patton 2002, Rubin & Rubin, 2005). Depending on participant location, contact will be through wither Skype or telephone. The interviews follow similar content to the online survey, and will be conducted using open-ended questions to explore interviewees' epistemological attitudes. The subject content includes: (i) familiarity and self-efficacy with DL adoption and technology in teaching, (ii) familiarity with IL and DIL, and (iii) access and use of DIL, and training/instruction with DIL. This instrument is used to interview a purposive sample of on-campus faculty, librarians, and information technology personnel.
3. Field notes, in the form of a visit with focus-group meetings, provide insights and a picture of what might not be heard or expressed in a recording (Patton, 2002). A reflective journal

allows the researcher to audit how the research might influence him/her, and helps prevent bias when coding and analysis of data. Also, data collection might require adaptation to changes to the sample, research environment (i.e., face-to-face versus virtual), and instrument (*Appendices A, B, and C*).

Data Collection

Three instruments will be employed. First is a mixed method, brief online questionnaire so both on-and-off-campus faculty are reached. This acts as a precursor and preparatory introduction to the one-on-one face to face interviews with on-campus faculty, to collect cognitive and non-cognitive data on interviewees' DL adoption attitudes and AT self-efficacy. Then the on-site visit focus group with faculty, librarians and institutional administrators is to gather cognitive and non-cognitive data on interviewees' attitudes of self-efficacy with AT and epistemological perceptions (i.e., attitudes toward DIL) shown in table 2 & 3.

The face-to-face interviews will be recorded electronically (with the interviewee's permission) to ensure accuracy of the transcription of the conversations. All data collected electronically or in field notes will be stored in a separate, secure location, accessible only by the researcher. Participants will be asked for consent, and advised that they are free to withdraw from the study. They will also be informed that at any time, they can request a copy of their survey, interview, and focus-group transcripts. They may also request a copy of the research study.

A table of specifications (Table 2) represents a blueprint for the survey research tools, acting as a guide for the type of content questions posed in the open-ended survey and during focus groups. The themes for the questions are: (1) the concept of IL, (2) the idea of DIL, (3) DL with various AT programs and processes as a teaching tool, where dimensions are sequential,

cyclical, and simultaneous information interactions through faculty perceptions, librarian perceptions, and community college digital policies about the themes. As a subset of the learning-issue phenomenon, the researcher can focus on use of information, and learn simultaneously (Lupton, 2008).

Table 3. Data Collection Plan

Indicators	Data sources	Collection method
CC faculty's epistemological perceptions of DL & DIL Levels of DL adoption & technical self-efficacy	• Brief Survey • Interview • Focus group	• Online survey; demographics, DL adoption & Skills Likert scale questionnaire • Skype or telephone • Site visit; field notes
CC librarians'' epistemological perceptions of DL & DIL Levels of DL adoption & technical self-efficacy	• Brief Survey • Interview • Focus group	• Online survey; demographics, DL adoption & Skills Likert scale questionnaire • Skype or telephone • Site visit; field notes
CC institutions' DL & DIL policy and services Levels of DL adoption & technical self-efficacy	• Brief Survey • Interview • Focus group	• Online survey; demographics, DL adoption & Skills Likert scale questionnaire • Skype or telephone • Site visit; field notes

Data Analysis

Data will be analyzed once all data are gathered and transcribed to search for hidden meaning units through coding. Analysis will identify emerging trends that reflect various aspects of the experience. This meta-interpretive form of analysis demonstrates integration of the meaning of units into a seemingly typical experience (Miles & Huberman, 2013). Since coding often returns linear assumptions of qualitative analysis (Patton 2002), distorting the true meaning or value of data regarding their story, Creswell (2007, p. 152) suggests beginning with 25 to 30

categories, and then reassessing data and condensing to five or six specific categories to create a narrative. Guidelines concerning category development suggest the frequency of a word/phrase, and data context categories, eventually show patterns. Some data are unique and make it obvious to find connections to the path of a pattern. They also indicate inquiries unknown prior to collection, even showing specificity and leverage for an issue or phenomenon (Guba & Lincoln, 2005; Merriam, 2009). Marshall and Rossman (2006) demonstrate that this method of analysis reveals clusters that point to hidden patterns.

From a discussion of the classification of information as early as Ranganathan (1951) and Beghtol (1995), one controversial issue has been how a classification is relevant to the discovery of thought-content of a written or expressed unit of thought. Discussing information theory, Pierce (1980) argues that the same thought classification issue is also present when information is provided in a digital format. Use of classification schemes by human thought identification/keyword is applied in the ultimate stage of research, making the action connect with IL and thus affecting contact between the reader and the relevant unit of thought in a personal way (Beghtol, 1995; Ranganathan, 1951, p. 116). Ranganathan (1951) argues that when reading text, a researcher develops an interpretation of the contextual content of the interviewees' responses, attitudes, and perceptions of the object of discussion (Beghtol, 1995).

The faceted classification system methodology for the organization of information introduced by Ranganathan (1951) is similar to common, qualitative, social-science methods such as grounded theory. The researcher uses critical thinking to interpret meta-data through evaluation, assimilation, and synthesis, thus organizing data into classified categories (Glaser, 1978; Glaser & Strauss, 1967; Ranganathan, 1965; Strauss, 1987; Strauss & Corbin, 1990). All forms of faceted classification look for deep, semantic similarities, and much the same as

qualitative analysis, the researcher writes about the concepts and their interrelationships (Glaser, 1978; Glaser & Strauss, 1967; Ranganathan, 1965; Strauss, 1987; Strauss & Corbin, 1990).

Axiology, the study of values, has twofold relevance here: (1) the concept framework of the study is EC (i.e., sharing similar beliefs in attitudes of learning), and (2) the researcher's judgement of values reflects the choice of context. Using reflexivity, the researcher can recognize their epistemological influences on the research process, and question and review each step of the process to divine objectivity to be credible. If possible, the researcher collaborates with an external subject expert (e.g., pilot test interrater), avoiding bias and adding rigor (Denzin & Lincoln, 2005). Purposeful sampling allows collection of accurate data to meet the challenges of construct validity, internal validity, and reliability. Data collection methods include primary principles of using multiple sources of evidence, creating a secure project database, and maintaining a clear chain of proof. These principles are essential to all types of sources of evidence, forming a firm basis for evaluation and analysis of data content strength and weaknesses (Yin, 2013). A study must consider methodological congruence (i.e., rigorous appropriate procedures) for thoroughness if phenomenological research is to be judged valid. Validity and reliability concerns of the instruments include applying proper procedures in terms of plausibility and illumination about an issue or phenomenon (Christensen, Johnson, & Turner, 2010).

The framework of this study is drawn from a combination of Bandura's (1989) triadic reciprocal determinism model and Fruge and Ropers-Huilman's (2008) research model, combined with Saracevic's (2007) theory. I explore EC (i.e., attitudes of learning) among faculty and librarians regarding DIL and the effects of these perceptions on how to create a DIL paradigm. Little epistemological research focuses on teacher/faculty DL epistemological beliefs,

and how their views influence classroom practices. Astin (1993) suggests that student-faculty interactions correlate positively with self-reported personal and intellectual growth.

Tinto (1993) suggests that colleges and universities consist of both academic and social systems, where each contains its own macro/micro formal and informal structures of faculty and student groups. Where there is an issue of EC, students hold a perception of isolation or incongruence that they do not fit into the environment, affecting students' learning ability (Tinto, 1993, p. 50). There is need to establish a learning environment with openly outlined learning objectives and outcomes so faculty and students both understand the commitment to the class. Experience holds particular importance to community college students since they have minimal to no out-of-class activities (Tinto, 1993).

Triangulation

Corbin and Strauss (2008) argue that a significant methodological underpinning of research lies in data triangulation, which is vital for theory development. The triangulation approach is justified since it offers a three-dimensional description of construct validity (Corbin & Strauss, 2008). Merriam (2008) and Miles and Huberman (2013) expand the discussion, arguing that sources are reliable when they offer a multi-dimensional view of congruency between beliefs. Olafson and Schraw (2002) suggest that both faculty and librarians, as subject experts, are information gatekeepers who have the capacity to offer detailed accounts of DIL as it pertains to their forms of pedagogy. Therefore, triangulation will be used to ensure the trustworthiness of this study. Data will develop and influence the methodology. A combination of data collection methods such as questionnaire, interviews, focus group, and when available, participant member checks of data transcripts or respondent validations, adds many layers of cross reference (Merriam, 2009). Data collection, evaluation, and analysis will occur

consecutively (Hays & Singh, 2012). Thick descriptions from data will offer detailed accounts of the research process and outcomes. The epistemological viewpoint of this study can be modified in subsequent studies to obtain a complete view of the complexity of faculty and librarians' DIL inclusion in methods of pedagogy.

Limitations and Delimitations of the Study

A challenge of qualitative analysis is vacillation through data to filter/analyze what a phenomenon is demonstrating. The interpretations from the descriptive data oblique meanings and complexity might signify when data analysis reaches saturation. A good way for a researcher to determine that analysis is complete is to visualize how categories interact by drawing a model or diagram (Creswell, 2007; Merriam, 2009). Interpretations from descriptions and complexities of reality influence analysis. Use of an interrater reviewer adds credence to reliability and validity. Maxwell (2012) posits that validity is a goal, not a product, and credibility lies in findings (Creswell, 2007; Merriam, 2009).

Lankshear, Peters, and Knobel (2000) argue that although the standard concept of epistemology is individualistic, in the new digital era, established epistemological ideas or beliefs are disturbed. New trends, practices, and phenomena connected with the digital age and computer information technologies mean we need to ask ourselves about relationships among DL adoption and DIL inclusion into education (Lankshear & Knobel, 2008). Faculty and librarians' might be concerned that their DL and DIL epistemological beliefs and teaching methods are being evaluated. Therefore, it is imperative that there be a purpose, with clear guidelines, for all participants so they realize the benefits of the study. The recommendations will describe various approaches to engage in DL adoption and encourage DIL instruction in tandem with faculty course curriculum to benefit student self-efficacy at rural community

colleges. Another concern is whether it is possible to identify a relationship between a person's epistemological belief for DL and DIL teaching practice to identify variables that affect DL and DIL inclusion.

Significance

Regardless of how ambiguous the terminology, DL is synonymous with eco-learning, virtual learning, and ubiquitous learning, depending on the author (Gates Foundation, 2015; Lumina Foundation, 2014). One aspect is clear—all concerned faculty, librarians, institutions, and students must interact with digital information, AT and digital technology as part of DL. Contrary to critics such as Bertrand (2010), faculty and librarians regularly interact with AT, but may not be aware of the extended DL paradigm. Subject experts, faculty, and librarians need to collaborate not only with each other, but with the institution to find the most suitable AT that promotes DL for their constituents. In this case, participants are relatively small, rural, higher-education institutions, specifically community colleges and historically black colleges and universities (HBCU). The majority of studies so far have been at larger, urban universities and colleges, at which stakeholders and constituents have different learning environments and socio-economic characteristics, and sustained digital technology access, services, and possibly equipment (Gates Foundation, 2015; Bailey, Jaggars & Jenkins 2015; Lumina Foundation, 2014; Scott-Clayton, 2011).

This study provides insights into DL adoption experienced by institutions, faculty, and librarians, and more specifically, what faculty and librarians deal with when incorporating AT daily while interacting with students at small, rural, community colleges. The researcher will offer recommendations on faculty and librarian DL and DIL collaboration for future, longitudinal research to investigate performance measures of DIL curricula inclusion and

success, and student learning outcomes. The research might not offer generalizability, but the intrinsic value of faculty and librarian collaboration to include DL as part of their pedagogy is a move in the right direction. The value of this study is simple. Demand for DL with AT and DIL inclusion and use by faculty, librarian(s), and students is ongoing. Identification of why faculty are tentative to incorporate AT and DIL into their teaching, and how to find positive collaborative methods to overcome barriers, are explored. This study searches for recommendations, under participant ecologies and environments, that librarians can use to encourage faculty and institutions to incorporate more DIL. Recommendations are expected to increase motivation for DIL training that benefits community colleges' institutional DL policies and services.

Chapter 4 Findings

This chapter is organized into two sections, beginning with a summary of participant demographics and subject disciplines, and followed by a description of major themes that evolved. An analysis of findings that correspond to how community college administrators, faculty members, and librarians conceptualize and operationalize digital literacy with their instruction and curricula follows. The research method was divided into three stages. All participants, faculty, librarians and administrators completed a brief online questionnaire, a one-on-one survey interview with the researcher, and a focus group. Purposeful sampling was applied, and, faculty members, and administrators participated voluntarily. The digital component was useful because it offered accessibility to all parties, and interviews were conducted on the participants' own time. The stage-two survey and stage-three focus group involved logistics of scheduling coordinated attendance, limiting response participation from participants. The alternative peer institution that agreed to be a sample location provided some challenges to the researcher. The contact person at the institution retired unexpectedly, influencing timely distribution and connection with faculty members, and consequently, data collection did not resume until August 2016. A single researcher conducted all interviews. Participants' subject disciplines, years of teaching experience, and professional development demographics were collected.

A mixed method of quantitative and qualitative approaches was applied because of the abstract human perception variables involved; the researcher sought the meaning and experiences of individuals concerning a phenomenon (Creswell, 1998). Quantitative research allows a researcher to ascertain participants' individual perceptions of self-efficacy, and qualitative research allows a researcher to discover hidden meanings from participants' personal

expressions of their beliefs, aspirations, and expectations of digital literacy (DL), information literacy (IL), and digital information literacy (DIL) programs from rich data responses. This study explores faculty members' attitudes of learning theory (i.e., epistemology) and perceptions of DL adoption with academic technology inclusion in their modes of instruction. The new digital technology trend has influenced society by suggesting assumptions. The expectation is that DL has become a standard component in higher education culture, where literacy is redefined as a social practice for interactive learning with technology, instead of traditional, historical understanding of literacy as a cognitive and technical skill (Jones-Kavalier & Flannigan, 2006, Croxall, 2012).

A pilot study was conducted to test the research methods and provide the researcher with experience with conducting interviews. Findings from the pilot accord with views on disparities on DL adoption in higher education between scholarly literature and contemporary digital technology reports (Gates, 2015; Lumina, 2014). Deductive reasoning was used to assess the pilot study's brief questionnaire, confirming that the *a priori* codebook reflected themes identified as criteria for the study's research questions. From a reflective review, the researcher modified focus group questions, but made no changes to the survey interview instrument. Once the research proposal was approved, and IRB permission received, the sample locations were contacted in April 2016 to commence data collection.

All participants who completed the initial brief questionnaire provided years of service demographic data that included time spent working in higher education. (*See Appendix A*, p 253). Synthesis and review of the questionnaire responses data demographic variables, gender, years of teaching/service in higher education, discipline and professional development were considered for possible influencing factors with participants' self-reported assessment of individual DL self-

efficacy. These multiple variables were used as a proxy when calibrating the participants' overall self-efficacy scores for the three literacy categories under investigation, and that identified, which level of Rogers innovation of technology had been reached. Whereupon, the researcher factored these variable results into the survey and focus group respondents' qualitative data analysis to answer the research questions.

The table of specifications (table 2, p. 110) in chapter three acted as a blue print for the more specific questions then posed to the participants in the survey interview and focus group (*see Appendix B and C*) following the three literacy categories of digital literacy, information literacy and digital information literacy. A cross reference of the research questions with the survey interview protocol questions (Table 4) and focus group questions (Table 5) demonstrates how the open-ended interview questions relate to the study's research questions. Through the analysis of the participants' survey interview and focus group responses to the questions in the three literacy categories the researcher was able to answer the respective research questions.

Table 4. Research Questions Cross Reference with Survey Interview Protocol Questions

Main Research Questions	Cross Reference with Individual Survey Interview Questions (ISQ)
Research Sub Question – (a) What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)?	ISQ #1, 2a, 2b, 3, 4, 5.
Research Sub Question – (b) What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?	ISQ #1, 2a, 6.
Research Sub Question - (c) What are Arts & Science faculties' concept of DIL?	ISQ #7, 8.

The transcriptions were then given to participants for review to ensure validity. Participants received the interview protocol electronically before the interviews. The face-to-face interviews were recorded using a high-quality audio recorder, and the teleconference survey interviews were conducted using the researcher's toll-free account, which allowed the sessions to be recorded digitally. To ensure accuracy of participants' responses to contextual content, a professional transcription company transcribed digital audio recordings of the interviews. The account is password and pin-number protected, securing access to only the researcher.

Table 5. Focus Group Questions and Cross Reference to Research Questions

Main Research Questions	Cross Reference with Focus Group Questions (FGQ)
Research Sub Question – (a) What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)?	FGQ #1,2,3
Research Sub Question – (b) What is the librarians/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?	FGQ #5 & 6
Research Sub Question – (c) What are Arts & Science faculties' concept of DIL?	FGQ #4

Participant and Institutional Summaries

State Education Systems Represented

Mountain One Community College is location A, and is part of a statewide Community College System that adheres to the policies from the central governing body. Mountain Two Community and Technical College is location B, belongs to the Community and Technical College System that follows the policies under the Chancellor for the State Education Department. Both location samples participants work and teach at midsized (i.e., 2000 to 3000 fulltime enrollment), rural community colleges in southern Virginia and West Virginia.

Institutional profile, location A. The community college is a public, two-year, coeducational college, directed under policies established by the State Board of Community Colleges and a local college board. The college operates on a semester system, and is open year-round. It is accredited by the Commission on Colleges of the Southern Association of College and Schools to award Associate's degrees in arts & science (AA&S) and applied science (AAS), a career studies certificate (CSC), and other certificates and diplomas. Faculty members' qualifications range from Master's degrees to doctoral and other terminal degrees, and most have professional experiences that support their qualifications. There are approximately 40 fulltime and 129 part-time faculty members, with no tenure track, and 31 are humanities faculty. The student-faculty ratio is 17:1.

The library is automated, acts as a focal point for research and study found within the Learning Resource Center on campus, and provides digital resources, services, and IL that support and enhance the educational programs of the college. The institution's learning management system (LMS) is Blackboard (Blackboard, Inc., 1997). The Distance Learning and Instructional Technology (DLIT) department functions as a service for instructional design, development and support, instructional server management integration, and the Learning Assistance Center (LAC). It provides continual training and support of Blackboard for faculty members and students. The LAC offers supplemental, specialized instruction to assist individuals with meeting their educational goals. The DLIT also helps faculty members and administrators plan, develop, and produce audio-visual materials for college publications.

As part of the instructional framework, the institution established an administrative policy for a continuous learning program for employees. All fulltime and adjunct faculty members are eligible to take up to six credit or non-credit hours each semester. The 2014/15 College Report

notes accomplishments that include DLIT continued faculty technology institute training to expand faculty use of Blackboard, Instructional Technology, and Open Education Resources (OER). Continuous work with faculty members and instructors ensures uniformity of syllabi in the SWCC template (online) and review of class material, and an LAC faculty survey addresses specialized (technology) workshop offerings and additional areas of (digital) interest.

Institutional profile, location B. Unforeseen issues in the state in which Mountain Two Community College is located experienced significant budget shortfalls that threatened a state employee shutdown or furloughs that included all higher-education employees. The economic downturn in the area influenced Mountain Two personnel prompting them to withdraw from participation in this study in April 2016. Therefore, an alternative peer West Virginia community college was contacted in May 2016 and assumed the pseudonym Mountain Two Community College. This community and technical college is one of nine publicly supported, two-year institutions of higher education in the state. The institution's governance system underwent changes of legislatively directed expansions in academic, workforce, and community service offerings, and thus an expansion of its service region to include facilities located throughout the southern region of the state. The system operates under the direction of the Council for Community and Technical College Education, whose master plan is strategic and innovative planning and program delivery using cutting-edge technology. Delivering relevant, rigorous, and modularized curricula, while allowing each member institution to operate under a local board of governors, the council serves as a state-wide policy and coordinating body. It is accredited by The Higher Learning Commission, from which it obtained a 10-year reaccreditation in 2013, and it holds select programmatic accreditations. The institution represents one of nine community and technical college districts in West Virginia. The

institution's purposeful sample was taken from the primary campus of a formal service area in the core of coal country, encompassing approximately 1,900 square miles and five locations. Across these five locations are approximately 150 faculty members, including 65 fulltime faculty members and 75 adjunct instructors, where 15 are part of the humanities department. Faculty credentials vary, including holding Master's/doctoral degrees or other terminal degrees, and professional experience that supports their qualifications. The student-faculty ratio is 15:1. Faculty members participate in college governance, serving on institution-wide and division-based committees, and engaging in planning, program assessment, and curriculum development. Faculty members who have fulltime appointments (the college has no tenure track) design online instructional and other alternative delivery systems.

The college's 2010 to 2015 strategic goals shape and guide the college community, with focus on the future. The goals direct members of the institution to assess and adjust the college's direction in response to changes periodically. One priority is to build and maintain facilities, with a focus on improvements to facility infrastructures, including enhancing use of technology and prioritizing deferred maintenance projects. Technology and library services enable the institution to fulfill its mission and vision to enhance student learning success and improve the efficiency of education delivery, where digital literacy (DL) and information literacy (IL) are incorporated into the learning structure. The college integrates and supports innovative technologies. Institutional policies include technology guidelines and rules about e-mail as an official form of communication, and digital information technology acceptable use. These act as security measures to protect the college technology platform and information content.

Purposeful Sampling

The sample included community college administrators, faculty, and librarians. Data were obtained through a brief online questionnaire, personal interviews, and focus group sessions. Cumulative data were coded and analyzed. To mask institution and participant identities, pseudonyms for Mountain One (SPLA- 1 through SPLA-22) and Mountain Two (SPLB-1 through SPLB-16) are used to protect participants' anonymity. The brief questionnaire was a quantitative survey. The questions asked participants about their epistemological perception (*i.e*. attitudes of learning) with academic technology for instruction and beliefs regarding digital and information literacy (DL and IL) adoption in teaching. Where the overarching main question was how does epistemological perception bridge the connections between technology skills and technology self-efficacy is explored from the perspectives of the professional roles of the Arts and Science faculty, librarians and institutional administrators.

Gallardo-Echenique et al. (2015) suggest a preferred encompassing term of digitals learners since digital technology makes everyone a learner in varying degrees. Sample participants were identified from their professional position as a natural selection, thus, classified into faculty/adjunct, librarians and administrators' groups, and how the subject discipline also influenced the extent of individual DL comprehension and inclusion. This classification is relevant to the theory model of the study, and the research questions, which explored whether a person classified as either a faculty member, librarian or administrator predisposes him/her to avoid DL or IL technology adoption, making him/her less digitally information literate. Bertrand (2010) characterizes academia and higher education as being slow and behind the global market regarding adoption of DL, and thus a person's use of digital technology might correlate with

his/her DL, IL and digital information literacy (DIL) perceptions and self-efficacy, influencing the effort he/she expends on and persistence applied to the action (Bandura, 1989). The questionnaire indicated the participants' biographic information, including an individual's subject discipline and adoption/non-inclusion of DL. Moreover, teaching experience, gender and professional development were reviewed for possible inferences, although not specifically addressed in the research questions at this time. The questionnaire also provided individuals' perceived DL self-efficacy, indicating the form of perception, levels of inclusion, and type of adoption of DL, IL, and DIL. Deductive reasoning was used during the pilot study's questionnaire analysis, which confirmed that the *a priori* codebook reflected themes identified as criteria for the research questions. Appendix F contains a table of response scores for both locations.

The qualitative survey interviews and focus groups examined individual's particular perceptions of DL relative to technology skills and technology self-efficacy within the specific subject discipline and personal beliefs. The concept framework, a Point of Reference Spectrum (PRS) showed how an environment's effect on self and behavior variables is used to determine whether faculty DL and librarians' perceptions and activities in regards to the inclusion of DL and what might that level of inclusion involved DIL in instruction.

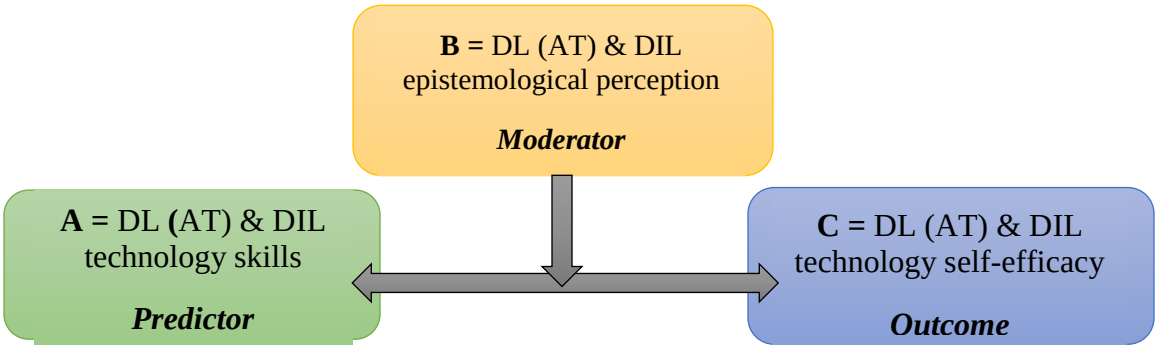
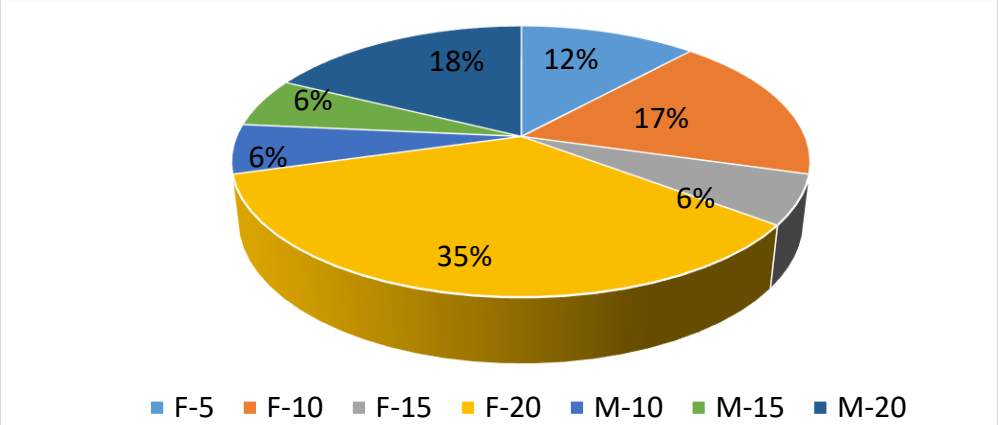


Figure 14. Research Framework - Point of Reference Spectrum (PRS) model.

The schema is A + B and B + C shown in figure 4; where A = technology skills (cognitive), B = participant epistemology (non-cognitive interpretation & learning), and C = technology self-efficacy (cognitive learning techniques). Thus, A is the predictor, B becomes the moderator, and C is the outcome. The PRS provides a basis of recognizing participants DL cognitive and non-cognitive issue levels, and possible occurrence of correlation in the areas where clusters appear from the data analysis. The result provides a starting point from which to offer constructive recommendations to build collaborative solutions.

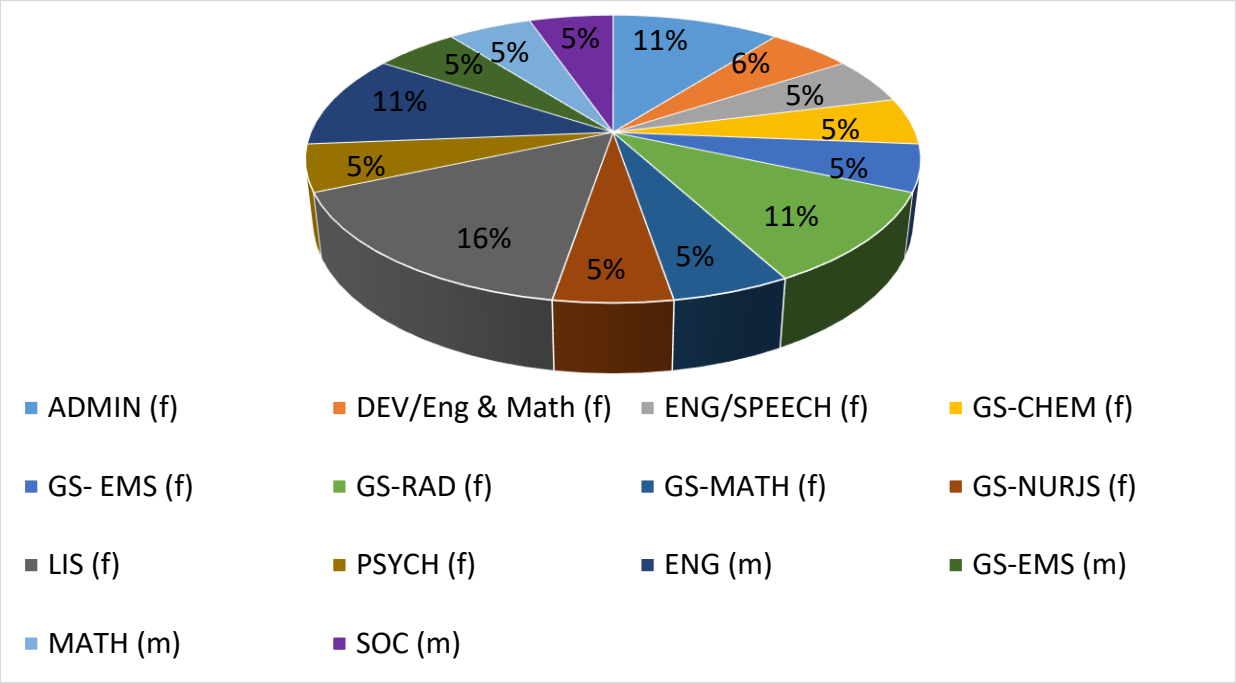
Stage One: Location A, Brief Questionnaire. At Mountain One the researcher met with the dean of the humanities department to identify participants for stage 1 of the study, during which 20 people were identified as candidates for the online questionnaire, which was distributed over e-mail to the candidates. Sixteen questionnaires were returned for an 80% response rate. The response group comprised two administrators/ instructors, an instruction librarian, and 13 faculty members from the humanities department, representing the English and speech, sociology and psychology, developmental English and math, math and general science, early childhood education, and library sciences disciplines. Location A, figure 15 shows Mountain One community college's participants' different gender with years of experience in teaching and

Figure 15. Mountain One Participants' Gender and Experience



working at a community college, and figure 16 shows the ratio of male to female in the different disciplines and participants' subject discipline percentages.

Figure 16. Mountain One Participants' Discipline with Gender



Stage One: Participant Profiles at Location A, Brief Questionnaire. Mountain One community college participants' individual credentials, experiences and questionnaire responses is provided in a summarized structure. For ease of reference the descriptions are shown in table 6 sample participants location A (SPLA) profiles summaries. Participants provided a self-efficacy rating between one and ten converted into percentile, for each of the following Digital Literacy (DL), Information Literacy (IL) and Digital Information Literacy (DIL). At Location B, the researcher corroborated with the Mountain Two new president's appointee to identify the relevant purposeful community and technical college sample participants for the survey interview and focus group.

Table 6. Mountain One Participant Profiles and Questionnaire Responses.

Pseudonym	*Working Teaching Years*	*Position Administrator or Faculty*	*Discipline*	*Professional Development & Conferences*	*DL scale*	*IL scale*	*DIL Scale*
SPLA-1 (F)	20 / 20	A - F	PhD in Education & Library Science	Virginia Community College System (VCCS) for Learning Peer Group Conference. New Horizons Office Professional Development State meeting, and the 2014/2015 VCCS Sociology and Global Studies Peer Group conference	50 %	95 %	25 %
SPLA-2 (M)	20 / 20	A	English	Conferences on assessment institutional effectiveness and student success for professional development	70 %	85 %	50 %
SPLA-3 (F)	20 /20	F	Psychology	Pre-semester faculty institute/ convocation			99 %
SPLA-4 (F)	20/ 20	F	English & Speech	Pre-semester faculty institute/ convocation		42.5 %	
SPLA-5 (F)	5 / 5	F	Chemistry/ Gen. science	Pre-semester faculty institute/ convocation	70 %	32.5 %	25 %
SPLA-6 (F)	10 / 10	F	General Studies/ Math	New Horizons Virginia Math Association of two-year colleges and the VCCS Math Pathways Project conference for professional development.	50 %		
SPLA-7 (M)	20 / 20	A - F	Sociology	New Horizons Conference, the Virginia International Educators twice yearly, and the National American Foreign Study Association (NAFSA) regional conference yearly for professional development	99.9 %	95.5 %	98 %
SPLA-8 (F)	20 / 20	F	Library Science	New Horizons Conference and Information Science & Technology (IST) Peer Group. Blue Ridge Community College Technology Summit. Info. Technology Essentials 119 Open Education Resources (OER) Team for the Chancellor's OER Adoption Grant, VA		99.9 %	

Pseudonym	*Working Teaching Years*	*Position Administrator or Faculty*	*Discipline*	*Professional Development & Conferences*	*DL scale*	*IL scale*	*DIL Scale*
SPLA-9 (F)	20 / 20	F	Develop-mental English & Math	Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), the Chancellor's Planning Retreat in Virginia, and New Horizons Conference for professional development.	80 %	90 %	75 %
SPLA-10 (M)	15 /15	F	English	New Horizons, New Faculty Seminar, and VCCS Peer Group for Developmental Education for professional development.	70 %	47.5 %	80 %
SPLA-11 (M)	20 / 20	F	Math	No Conferences listed.		25 %	25 %
SPLA-12 (F)	20 / 20	F	Nursing/ general science	New Horizons 2016 Virginia Council of Nurse Practitioners Conference; Info. Tech. Education ITE 198 Issues - Teaching Online Classes.	70 %	70 %	75 %
SPLA-13 (F)	5 / 5	F	General Science/ Radiology	Virginia Society of Radiologic Technologists and Joint Review Committee on Education in Radiologic Technology.	80 %	87.5 %	40 %
SPLA-14 (F)	10 / 5	F	Radiology	New Horizons and Virginia Society of Radiologic Technologist (VSRT) Educators Seminar for professional training.		37.5 %	30 %
SPLA-15/ F	10 / 10	F	General Science- EMS	Stroke and substance abuse seminars, and post-traumatic syndrome disorder (PTSD) and acetaminophen toxicity conferences.		70 %	60 %
SPLA-16 (M)	10 / 20	F	General Science- EMS	No Conferences listed		99 %	99 %

Stage One : Location B, Brief Questionnaire

At Mountain Two, the researcher renewed contact during the 2016 summer break with a community college administrator, who distributed the questionnaire to 28 members of the faculty body, librarians, and administrator. The majority were unavailable or unresponsive, and the researcher was informed that the best time to reconnect was at the start of the fall 2016 semester during preschool preparation (i.e., the community college's convocation event). A new round of questionnaires was distributed to humanities faculty members as per the president's new appointee directions. The researcher sent follow-up e-mails to maintain communication with participants. A request was made to the new provost for a site visit and meeting dates for collaboration to be reinstituted. Since the research method required purposeful sampling, and for the researcher to continue to stages two and three of the survey, discussions with the provost, or an appointee, was necessary.

For the brief questionnaire at location A, the questionnaire was distributed as a Microsoft Word attachment because the site B representative reported that there would be technical issues with the document over e-mail. The document was reformatted using Google forms to give participants greater accessibility to the questionnaire. The researcher communicated with the institution's presidential appointee to identify participants for stage one. Twenty-eight candidates were identified, to whom the questionnaire was distributed using e-mail. The 14 questionnaires returned represented a 50 % response rate. The response group included three administrators, two librarians, and nine humanities faculty members from English and psychology, applied science and information technology, math and general science, and library science. Location B figure 17 shows the different participants' gender with years of experience in teaching and

working at a community college, figure 18 shows the ratio of male to female in the different disciplines and participants' subject discipline percentages.

Figure 17. Mountain Two Participants' Gender and Experience - B

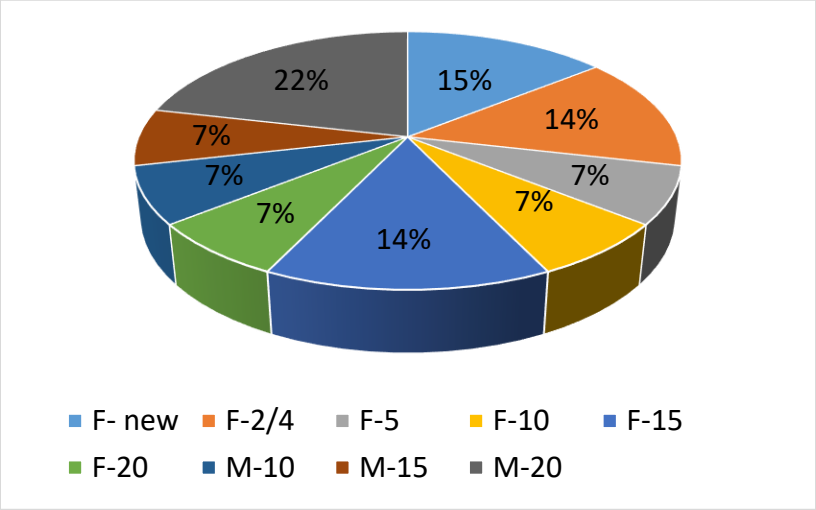
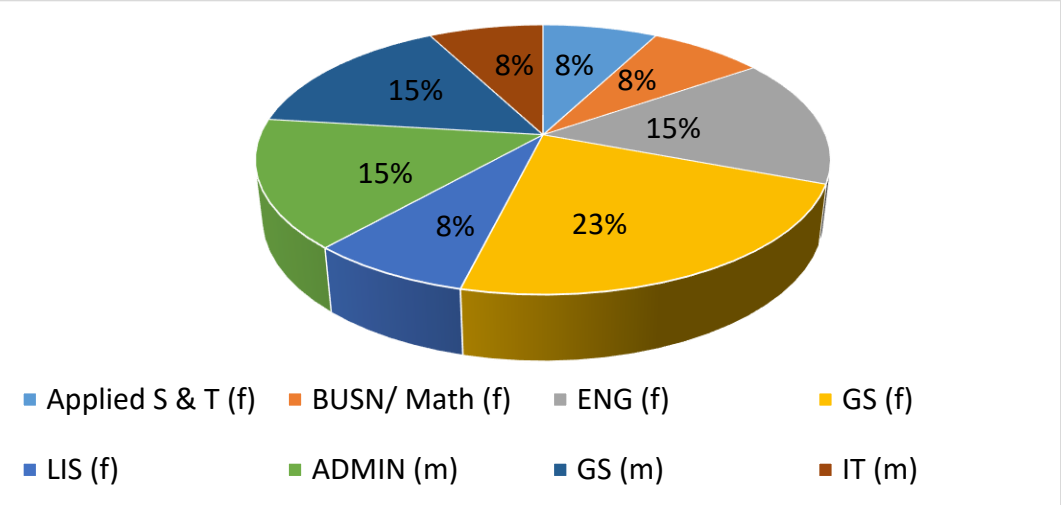


Figure 18. Mountain Two Participants' Discipline with Gender – B



Stage One: Participant Profiles at Location B, Brief Questionnaire. Mountain Two community college participants' individual, experiences and questionnaire responses is provided in a summarized structure. Participants provided a self-efficacy rating between one and ten for

each of the following Digital Literacy (DL), Information Literacy (IL) and Digital Information Literacy (DIL).

*Table 7***.** Mountain Two Participant Profiles and Questionnaire Responses.

Pseudonym	*Working Teaching Years*	*Position Administrator or Faculty*	*Discipline*	*Professional Development & Conferences*	*DL scale*	*IL scale*	*DIL Scale*
SPLB-1 (F)	20 / 20	A - F	Library Science	American Libraries Association (ALA) and Computers in Libraries (CIL) conferences.	90 %	77.5 %	99.9 %
SPLB-2 (F)	New / 6 mths.	F	English/ Development English		50 %	70-80%	60%
SPLB-3 (M)	20 / 20	F	General Science	Listed technology and instruction (T&I) conferences.	50 %	37. 5 %	50 %
SPLB-4 (F)	4	F	General Science	Student Engagement Workshop and Pedagogy Professional Development.	99.9 %		
SPLB-5 (F)	15	F	General Science	Higher Learning Commission (HLC), American Association for Learning in Higher Education (AALHE), and Quality Matters (QM) conferences.	25 %	47.5 %	
SPLB-6 (F)	10	F	Gen. Science	Online Learning Consortium as a conference.	25 %	20 %	
SPLB-7 (M)	10 / 10	A - F	Education Leadership in Higher Edu. Institutions		25 %	20 %	
SPLB-8 (F)	3 / 2	F	Business / Math	2015 & 2016 Student Success Summit & WV Community College Association and West Virginia Association for Developmental Education (WVCCA/WVADE) Joint Annual Conference.	50 %	32.5 %	
SPLB-9 (M)	-/ 15	F	IT	Stemtech 2015, National Science Foundation (NSF) 2015, and League for Innovation 2016.	90 %	67.5 %	80 %

Pseudonym	*Working Teaching Years*	*Position Administrator or Faculty*	*Discipline*	*Professional Development & Conferences*	*DL scale*	*IL scale*	*DIL Scale*
SPLB-10 (F)	5 / 5	F	Psychology	American Association of Christian Counselors and West Virginia (WV) Professional Psychologists.	80 %	85 %	50 %
SPLB-11 (M)	20 / 20	F	General Science	Quality Matters (QM).	10 %	10 %	10 %
SPLB-12 (F)	semester	F	English	A new teacher	50 %	70 %	60 %
SPLB-13 (M)	20 / 20	F	Human Resources	Institutional On-site Governance Day all four times For professional development as satellite director of campus operations, and committee member of quality integrated services.	10 %	n/a	10 %
SPLB-14 (F)	more than 15	A - F	Applied Science & Technology	2015 WVCCA/WVAD conference. Presented on student success; *Improving Course Design Using Gamification Concepts*. 2014 Applied & Industrial Tech. Advisory committee. And Dept. chair for a technology.	35 %	40 %	85 %

Stage Two: An Open-ended Survey Interview One-on–One

Stage two included a survey interview, a qualitative tool of open-ended questions that allows inductive reasoning and analysis. All participants who completed the initial brief questionnaire provided years of service demographic data that included time spent working in higher education. (*See Appendix A*, p 253). The researcher collaborated with the lead contacts at the two locations this verified the purposeful sampling candidates.

Location A, Mountain One. From the dean of arts and sciences, who had knowledge of which faculty members have or have not adopted DL, and whether faculty members have

familiarity with the latest DL concepts of DIL. From the suggested candidates, the researcher purposefully selected on a list of possible candidates. Ten Survey interviewees were contacted, two administrators/instructors, seven faculty members and an adjunct faculty who demonstrated both limited DL inclusion and adoption, and minimal or no IL, as part of their pedagogy were chosen, and seven responded.

Table 8. Mountain One Participant Profiles with Stage Two Survey Interview Highlights.

Participant	Classification	Responsibilities	Individual Comments
SPLA-9	Administrator and faculty	-31 fulltime humanities faculty members and many adjuncts. -Adopted academic technologies as instructional tools as soon as they became available in the classroom. -Digital technology self-efficacy for learning management systems (LMS), and integrates digital technology and digital information literacy into pedagogy.	Digital literacy is a general education outcomes standard in Virginia, digital literacy is actually a learning standard. From the aspect of the administrator the digital technology is very useful in helping to gather a lot of data together in a timely fashion, to be able to organize it creatively by demonstrating descriptive data graphically. The generation of assessment reports shows how the institution is meeting the state performance measures.
SPLA-1	Administrator and faculty	-Manages all library services and personnel, online and digital library services to support the many accredited degree programs. -Collaborates with faculty members on DIL adoption for pedagogy. -Continued development and enhancement of information science integration values on student learning outcomes.	Looking at the concept definitions provided within the committees that I am on we still consider information literacy as the leading concept. Since four years ago, our campus conducted an IL assessment for the CCS. This institution adheres to the CCS standards. The IL assessment was a concentrated effort by the library of information disbursement on (digital) IL literacy that follow ACRL standards.
SPLA- 7	Faculty	-Incorporated IL concepts into academic technology, and is involved to keep up with constant digital technology advances, since the Internet enables a person to stay current. -Collaborated to develop curricula with librarians incorporating IL in instruction because of the benefits IL provides as a critical thinking tool. -Recognizes the challenges of DL adoption as part of an instruction model, which is contingent on the institution's guidelines, where DIL incorporates DL through information research learning assignments.	When I first became aware of information literacy, at the institution where he was working at that time, the library director collaborated with him to develop a research project. Since completion of the class assignment involves IL research with critical thinking, where the students have to conduct research using the library's electronic databases. The IL concept was a natural fit where now DL with academic technology is the tool to achieve the critical thinking assignment.

Participant	Classification	Responsibilities	Individual Comments
SPLA-8	Librarian and faculty	-Provides collaboration and support to faculty members during development of subject-based assignments.. -Instructs students on DIL, in face-to-face and online, -Digital reference services on the institution's website. -DIL learning tools, for faculty through digital technology, as an embedded librarian on the institution's LMS Blackboard.	My point of view is DIL is just a given, since digital technology is how we manage information and how we put it (*information disbursement and distribution*) out there. So it (*digital technology*) is a way to get information dispersed to everybody. So when I of digital, because what you are learning is about how they (computers and technology) work and what you do with PCs to get to information and get you to become IL literate. So perhaps you might just call that digital literacy.
SPLA-17	faculty	-Both teaching at the community college, and as an adjunct professor at another regional liberal arts university. -Taught at the institution for over five years in the Career Studies Certificate in Early Childhood Education program, which was designed to meet qualification requirements of the Office of Head Start for teaching assistants. -DL is a large part of her instruction method because she teaches at two locations, and digital technology enables this opportunity.	The current educational environment even in the early childhood education instruction field has the expectation to include digital technology learning tools. In the instruction of students to be future teachers, therefore, it is necessary to incorporate the modern digital technology resources as part of pedagogy.
SPLA-18	Faculty and administrator	-Regional adviser for the Career Switcher Program, EducateVA, the community college system teacher preparatory program. - A leader in the college's efforts to develop a quality enhancement plan, an important part of the Southern Association of Colleges and Schools reaffirmation. -College liaison for ***Inquiry***, the Journal of the Virginia Community Colleges. -Editor of the hardcopy edition of the annual publication of and the Virginia community College Association. -Planning committee member for the Appalachian Heritage Writers Symposium, keen for Appalachian literature & culture.	Let me think about that for a second. I do think there's a difference between digital literacy and information literacy but…. Again, here everyone uses Blackboard for face-to-face and for online classes. I really think that for most of us, it's just become a very seamless part of the way we move toward meeting the student learning outcomes. I don't have any student learning outcomes that deal with mastering technology. I use technology to help students meet those student learning outcomes in literature, composition or technical writing.

Participant	Classification	Responsibilities	Individual Comments
SPLA-19	Adjunct faculty	-Had served as dean of arts and sciences at a historically black college in West Virginia. -Previously, was a fulltime professor at location A, and chose to continue as an adjunct professor of English because of a strong professional bond with the institution and student body. -At rural colleges, she understands the challenges that institutions and students face with achieving learning outcomes and digital technology accessibility. -An advocate of the benefits that DL offers in an instructional learning environment, especially as an interactive support tool for learning with developmental English and math instruction.	I really love Blackboard with the speech because I can use it as a distance teacher. And with my AP English I've enjoyed it with that as well because we use discussion boards and creative writing and I can upload PowerPoint and YouTube videos and students can constantly check their grades and their progress. So I love that but you know that I'm just a huge fan of library databases too and when my students are doing research, I definitely want them using those databases. For me teaching, my teaching tool I guess the best one is Blackboard.

Location B, Mountain Two. Stage two was the survey interview, a qualitative tool of open-ended questions that allows inductive reasoning and analysis. The researcher met with the institutional appointee, whose knowledge included which faculty members had fully adopted or integrated DL into their style of instruction, and whether the faculty members had familiarity with the latest DL concepts, especially DIL. The choice of survey interviewees reflected questionnaire responses, and those the appointee identified as Humanities faculty members/instructors. A list of candidates was purposefully selected, and 12 requests were e-mailed to participants. Two weeks later, the researcher followed up with an e-mail reminder. Three participants responded to the survey interview request—a faculty member/administrator and two librarians.

Table 9. Mountain Two Participant Profiles with Stage Two Survey Interview Highlights.

Participant	Classification	Responsibilities	Individual Comments
SPLB-14	Administrator and faculty	-Vice Chair and Faculty-at-Large of Applied and Industrial Technology, and Coordinator for Distance Education. -National Science Foundation grant director and Coordinator -Distance education coordinator, and holds memberships on the Strategic Planning and Financial Review Committee, and the Technology Committee member.	Digital technology facilitates digital literacy, and the new president intends for us, the faculty and professional instructors, to continue developing strong digital information literacy curricula relevant to our academic and career credential programs.
SPLB-1	Administrator librarian and faculty	-Manages two libraries, four locations bibliographic network that provides access to online catalogue to support faculty members' and instructors' informational needs. -Provides and support instruction and students' IL orientation, research, and class assignments,	The library provides digital electronic access and Web 2.0 services with 42 computers. She uses digital technology to access electronic information research services; and developed an online orientation to the library with all it's digital resources to welcome users, which is available on the college's homepage.
SPLB- 15	Librarian	-Provides library IL orientation and electronic research instruction for faculty members and instructors, including IL orientation classes for students each semester.	I guess you might say I am digitally literate because in the library we use all the different electronic resources such as the databases we use for the information literacy instruction. Also, a practitioner and instructor working with the students on how to use and navigate the Internet.

Stage Three: A Focus Group Meeting with Open-ended Questions

Stage three was a focus group meeting, a qualitative tool of open-ended questions that allows inductive reasoning and analysis. These structured interview questions continued to explore sample participants' perceptions of DL, expanding on the survey interview questions. This process examined how participants considered DL and DIL influences student learning outcomes, or not; and what was the institution's positon on DL adoption (*see Appendix C*). The meetings were conducted both face to face and via conference call. All the meeting interviews

were recorded and sent to a transcription service. The participants were asked to review the transcripts for agreement to the authenticity of content.

Location A, Mountain One. Continuing with the list of candidates from the humanities dean **s**ix focus-group participants were contacted, and four responded. Each participant was responsible for maintaining his/her department's website and keeping its content current.

Table 10. Mountain One, Focus Group Participant Details with Comment Highlights

Participant	Classification	Responsibilities	Individual Comments
SPLA-20	Administrator	-Administrative unit assessment coordinator, collects and aggregates data on the research college and regional demographics, also supporting the dean's office -Quality enhancement program (QEP) committee member. Information posted on the institution's website provides and maintains transparency. -Awards from the American Political Science Association and Academy of Political Science awards of excellence.	My perspective is doing academic assessment. DL and digital technology are a large part of his daily routine and work environment. Some faculty were very involved, really gone the whole nine yards. Others very little, but sometimes it's the nature of the program. Although, it's amazing some of even the trade area programs did develop a digital and distance presence, but varies from instructor to instructor and program to program. Certain programs are 100% via distance learning that need DL, maybe the very last class that would be the Capstone or the internship that incorporate digital IL/ library research
SPLA-21	Administrator and faculty	-Distance Learning dean, manages a cross-section of services, including admissions, advising, recruitment, retention, success and career coaching, student activities, disability services, Great Expectations, TRIO student support services, veteran's upward bound, and upward bound. -Responsible for distance learning and instructional technology, and a learning-assistance center for faculty and student digital information technology -Distance learning support on campus and through the institution's web portal	I've worked up through instructional technology and view my role in that regard very much as a service. I do not advocate using for technology sake. The culture of the environment that it's used in is very important. In Southwest Virginia, we have a unique culture, of course, everywhere thinks they have a unique culture and it has to be the right fit for the instructor, for the student, for the course content, or it's really not the best practice to use. Folks get pressure to use some of the technology and I love technology, and I think it's most wonderful, but it's not always the answer.

Participant	Classification	Responsibilities	Individual Comments
SPLA-22	Administrator and faculty	-Faculty senate president, representative to the chancellor's faculty advisory committee, co-advisor for the Phi Theta Kappa Greek society, and South-West Community College (SWCC) international tour coordinator. -Multiple professional interests and institutional involvement.	In agreement with my colleague's comments. Overall, the institution makes an effort to support faculty with the DL. Since CCS encourages creative and innovative use of electronic communication systems to enhance its teaching, research and public service mission, coupled with the institutions continues education policy. Particularly helpful with different digital technology resources are the library and our distance learning support folks. Another point, all faculty complete a digital technology training before posting classes online, and for content continuity all adjunct join in-service program at the beginning of each academic year.
SPLA-7	Faculty and administrator	-Director as global outreach director for -2015 faculty recognition award –A longstanding participation in curricular instruction, cultivating cultural diversity and understanding as a global perspective through both teaching attitudes and institutional administration. Digital technology and DL are necessary attributes for accessibility and communication in the global market.	Digital technology and DL are necessary attributes for accessibility and communication in the global market. While teaching two critical thinking, so the fourth week was in the library. An assignment with all digital kinds of things on how to manipulate, accessing information from the library. It required students to go through all of these steps on their own, plus if a student was very unsure of how to do that, we now have in place, little labs, a couple of staff members that are there, and my students told me they have gone. I think it's going to increase DL self-efficacy and it's all based on the idea of how you access information and then how you access appropriate information ... It boils down to, I think, showing is better than telling.

Location B, Mountain Two. Continuing with the list of candidates suggested by the Mountain Two president's appointee, five focus-group participants were contacted, and three responded. Every participant had senior administrative responsibilities and a couple actively teach online classes incorporating digital technology adoption. With the incorporation of the

LMS Blackboard online classes and administrative technology programs DL is prominent in much of their daily business and instruction content management.

Table 11. Mountain Two, Focus Group Participant Details with Comment Highlights

Participant	Classification	Responsibilities	Individual Comments
SPLB-16	Administrator	-Senor leadership administrator. -Directs and manages the whole institution.	"My personal philosophy to remain student-centered, faculty- and staff-focused, and community-minded with an already proven formula for institutional excellence". He considers digital technology an important part of the institution's administrative and academic programs. The focus that; one of the greatest things about community and technical colleges is that we realize each student is unique with different needs and goals. Whether your goal is to become part of an increasingly technologically savvy workforce, begin your pursuit of a four-year degree, or improve on interests and skills you already possess.
SPLB-17	Administrator	-Senior institutional administrator. -Directs and administers academic programs and faculty members.	Digital technology is part of our current world, thus digital literacy is an important proponent of educational learning to properly prepare students for future careers and/ or studies. Also important that the institution provides faculty and instructors with the tools and support they need to be able to use the digital technology to its best advantage to enhance their instruction models. By adopting digital literacy with academic technology in their pedagogy faculty need to feel confident students are achieving the right student learning outcomes.
SPLB-18	Administrator and faculty	-Division head for social science and non-traditional programs, Dean of humanities equivalent -Accreditation liaison officer for the institution.	Scheduled to join the focus group meeting, but was unable to attend.

Analysis of the Findings

At both sample locations, administration participants communicated that their respective state and local governing organizations considered development and establishment of DL and IL,

a priority due to contemporary professional career and global market digital trends. To stay current with their accreditation, IL and now DL became institutional academic assessment criteria. Location A has an initiative to get all faculty onboard with DL as a directive, and location B has the infrastructure to support DL across all disciplines for faculty adoption, but it is not yet policy. Faculty survey participants reported various reasons for why they chose not to incorporate DIL in their instruction based on individual choices because of their perceptions and concerns about DL. Faculty responses provided consensus of perceptions that DL was a recognized concept, though comprehension of the definition might not be understood fully, nor considered relevant to their disciplines, and DIL was an unfamiliar term or concept.

From the data collected the findings discovered participants' epistemological congruence (EC) (Fruge & Ropers-Huilman, 2008) and how this bridges the connection to DL and DIL between the different groups' technology skills and self-efficacy characteristics and perceptions that indicated the interconnections for the types of issues that might influence inclusion in instruction. (Figure 19).

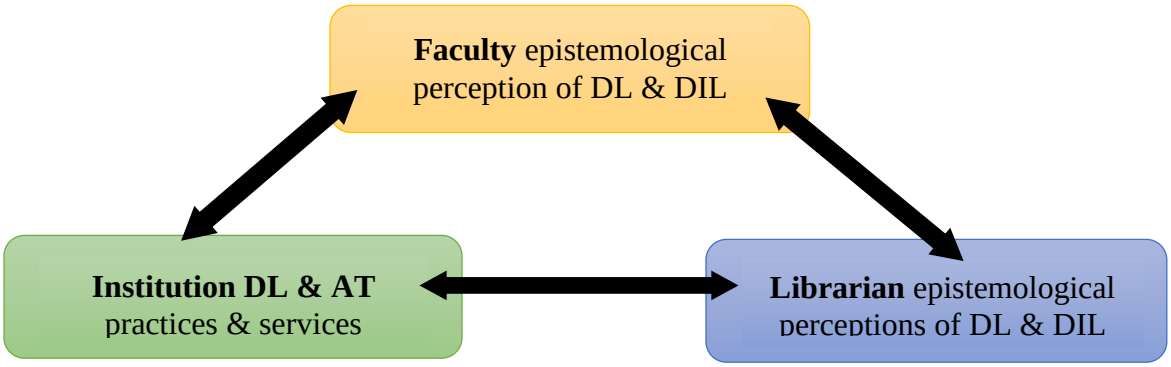


Figure 19. Participant Sample Framework

In answer to the main question how does epistemological perception bridge the connection between technology skills and technology explored further that frequency of digital

academic technology usage may not truly demonstrate a person's digital literacy self-efficacy.

Answers to the research questions 1a-1c.

What are Arts & Science faculty digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

Faculty at both locations consider themselves digitally literate. One reason for this is that at both locations all sample participants were actively involved in using the digital academic technology, whether for administrative purposes and/or online teaching via the LMS Blackboard online class instruction. Therefore, all participants considered themselves to have a basic level of DL self-efficacy.

What are faculty perceptions of DL? Among the faculty and librarian sample participants, there was a difference in opinion as to what exactly constituted the DL paradigm. Some considered DL as the skills and self-efficacy attributed to using digital AT programs such as the LMS Blackboard system. Whereas others believed, DL self-efficacy involved more than just digital technology skills but also included IL critical thinking skills. The variance in faculty DL perceptions seemed to depend upon the individuals own espoused theory of DL.

Mountain One community college, the state in which Mountain One is located requires all faculty to establish an online class presence as part of their continuous learning policy. So, the campus is proactively involved in the adoption of DL as part of pedagogy. Some faculty support this initiative as beneficial to student learning outcomes. For example; In General Science-Participant EMS SPLA-16 considers inclusion of DL literacy part of online teaching, and SPLA-15 includes electronic database use and research in lessons, using Web 2.0 YouTube. Since the library conducts in-class IL orientation with students that incorporates "digital" IL with academic technology while preparing class content. Compared to SPLA-13, who believes familiarity with

IL is important but assumes that students have exposure to IL concepts and practices before entering her classes. In comparison, English- Speech SPLA-4 indicated that DL with academic technology does not assist with classroom instruction. She also has the expectation that students go individually to the library for IL support concerning Internet. The librarian SPLA-8 commented that for face-to-face classes in the library's instructional lab, students can participate with hands-on searches, for "digital" IL activities. She incorporates the "digital" IL with academic technology instruction for "digital" IL on campus. The instruction modules are provided as written library guides shared with the faculty to post in their online classes as a form of embedded librarian resources. Moreover, SPLA-10 considers DL with academic technology does not necessarily fit his discipline. "…students can connect with DL but might be bombarded by "digital" information to access distracting entertainment" (SPLA-10). He was familiar with both IL and Web 2.0 database research for instruction. Students get library Internet and electronic database assistance.

At Mountain Two community college, administrators and library sample participants considered DL incorporating both digital technology self-efficacy skills and digital literacy critical thinking skills as necessary components of pedagogy. Here, the faculty members were more divided in their belief of DL classroom incorporation and instruction adoption. Certain faculty were under the assumption that teaching online constituted DL self-efficacy. SPLB-9 believes DL with academic technology incorporation might be non-beneficial because,

> "…if the technology is difficult to use, then the students spend more time figuring it out than they do learning the material being taught, and General Science SPLB-11 was unfamiliar with the term or concept of DL, also is unaware of an

institutional or departmental DIL expectation. Commenting such "terms not bandied about with faculty."(SPLB-9).

SPLB-8 adds that there is an institutional expectation that DL is included but the implementation of such appears to be far from perfect. And SPLA-10 considers that DL with academic technology does not necessarily fit his discipline. Students can connect with DL but might be bombarded by "digital" information to access distracting entertainment.

Conversely, there were faculty members who proactively included DL in their pedagogy. For example; English SPLB-12 considers that the LMS training on Blackboard covers DL specifics for incorporating digital literacy activities and assignments as part of instruction. DL applies to her discipline since Web 2.0 database use and research are an integral part of the class. Applied Science and technology SPLB-14 believes digital technology facilitates digital literacy, and the new president intends that the faculty and professional instructors, to continue developing strong digital information literacy curricula relevant to academic and career credential programs.

When do faculty consider IL relevant to a course's topic? There was no mention of a specific IL mandate at either location that faculty must include IL into their pedagogy. On the other hand, at both locations the libraries provide IL orientation for all new incoming freshman. Inclusion of IL library instruction as part of the class and/or student's individual IL mentoring and development through class assignments is up to the respective faculty. Traditionally IL has been mainly part of the English, Psychology and Sociology because of the research assignments involved in those subjects.

Mountain One, Virginia, Sociology SPLA-7 recounted a detailed description, how it was through the library that he first learned about, and introduced IL assignments that are a major part of his class student learning outcome.

What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

What are community college librarians' (library's) DL perspectives? Both samples of community college location library directors professed that their perspective on attitudes of learning theory for DL were that the concept of DL came from the innovative influence of digital technology to the IL paradigm. Each of the librarians agreed the traditional library bibliographic instruction (BI) was transformed by Zurkowski's (1974) introduction of IL, how much of library resources and services connected to and involve the skills, understanding and comprehension of an individual need for information. Searching for this information is rooted in the IL paradigm, and is now changed to a technology Web 2.0 environment (SPLA- 1 & 8, SPLB-1 & 15). Libraries adapted by incorporating digital technology resources, so as to be able to instruct and mentor students' information needs when using the library's electronic resources such as the online electronic catalog, electronic journal databases for the different subject disciplines class assignments (SPLA- 1 & 8, SPLB-1 & 15). The library continues its student support on the basic usage and knowledge of the different academic technology and Web 2.0 resources used in the current educational environment, where the advent of DL is just an extension of the IL paradigm (SPLA-1 & 8). The library promotes and believes in nurturing the development of students' digital self-efficacy in becoming digitally literate, thus, citizen centric (SPLB-1 & 15).

Mountain One community college, SPLA-1 explained that even with the arrival of digital resources there is still an expectation from the different subject bearing degree accreditation

associations that the library continues to maintain a balanced approach of hardcopy content apart from the digital technology resources. The number of classes/students that attend the library for DL instruction fluctuates depending on the faculty members. Although now that the library has more than one digital instructional lab that has been an uptick in faculty bringing the classes to the library for DL instruction (SPLA- 1 & 8).

Mountain Two, librarian SPLB-15 commented that her biggest concern was that students do not necessarily have adequate or appropriate digital technology at home. So, the library needs to be available to provide the resources and instruction. In addition, that it might further encourage students to attend the library sessions when faculty would set an example by accompanying their class.

What are community college librarians' (library's) DIL instruction program? Both sample location community colleges provide and promote the libraries' Web 2.0 digital resources. The development of their IL instruction program is a work in progress, but the method of delivery has been updated to the digital platform resources.

At Mountain one community college, to support the institutions continuous learning initiative and to remain proactively involved with the distance learning component, both the library director and instruction librarian regularly prepare the (digital) IL instruction materials. They are posted online into the faculty members online classes as a type of *embedded librarian*. In this way, more faculty have been introduced to the libraries' Web 2.0 digital resources, therefore, becoming more familiar with the broad range of library digital resources. For example; SPLA-1 stated that;

"…it is her impression that digital information literacy (DIL) is not yet recognized as a new paradigm, but is a subset of the DL and IL concepts as defined by the ACRL standards.

Among her peers in the library community, she believes IL is the defining paradigm that is being transposed with the advent of DL" (SPLA-1).

At Mountain Two community college, West Virginia, SPLB-1 coordinates library instruction for both the main campus and satellite locations. Library digital IL instruction, mentoring and support is provided mainly at the main campus, and library personnel at the satellite locations offer digital reference support. This includes an introduction to the basic usage and knowledge of the different academic technology and Web 2.0 resources used in the current educational environment, where the advent of DL is just an extension of the IL paradigm.

What are Arts & Science faculties' concept of DIL?

How do faculty consider DIL relevant to a course's topic? In general, most faculty sample participants stated limited knowledge, training or exposure to a DIL paradigm. Certain faculty members voiced a concern that DIL is a paradigmatic paradox, in their opinion the paradigm is that IL uses and incorporates the modern digital Web 2.0 digital resources, an echo of what Mountain One library director had stated (SPLA- 1, 2, 3, 4, 5, 6, 7, 10 & 22; SPLB-2, 7, 10, 11 & 14). The faculty have the choice to include (digital) IL into their class subject instruction (SPLA-2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 15, 16 & 22; SLPB-2, 4, 7, 9, 10 & 12). On the other hand, at both locations different senior administrators are strong advocates for the more current DIL concept, since DIL self-efficacy is a needed ability for all students entering the main stream 21st century society career fields and/or continuing education programs (SPLA- 1, 10, 20 & 21; SPLB- 4, 9, 15 & 16).

Mountain One community college, Humanities faculty members consistently follow the traditional subject disciplines, i.e., English, Sociology, Psychology and maybe general studies-history that typically incorporate and use the library's digital resources. One addition is that the

Nursing/ Rad tech school added Blackboard's Flipped classroom module into their online instruction program. They have incorporated student DL preparation where critical thinking is an integral part and big component in the learning module. Hence, the library/ librarian is being asked to do more embedded librarian materials. For example; SPLA-9 explained how faculty such as SPLA-13 & 14 who expressed these DL inclusion initiatives.

> "In the nursing Rad Tech program clickers are used extensively and the institution also incorporates the use of the interactive remote access clicker program for professional development with faculty and personnel. The program used in nursing Rad-tech is called the flipped classroom-this is a concept-based instruction method- with lecture capture through Bb. Students must read the text and view to study the online lecture video before class. To then have studied and learned the subject content material before attending the face-to-face class. This environment means students are being prepared to answer questions or complete activities that are grounded in problem-based learning to gain subject knowledge and understanding. This of course relies on digital technology of Bb and Pod-cast to establish the environment for intensive critical thinking" (SPLA-9).

At Mountain Two community college, the response was much the same as Mountain One. Humanities faculty members are consistently following the traditional subject disciplines, and typically incorporate and use the library's digital resources. There are a few exceptions, such as SPLB-14 where the faculty in the Applied Science and technology field are requesting DIL developed instruction.

How might faculty & librarian DIL collaboration enhance student learning outcomes?

As the sample participants' response data showed, there remains an ambiguity in the perception and comprehension of the DIL concept. While participants are just now adjusting, and becoming

familiar with DL incorporation and adoption into pedagogy, a discrete DIL difference with a clear definition is not a consideration presently at these two sample locations. For example;

> "…certainly for the students who are in the developmental classes in my analysis of the student outcomes has shown these students need face-to-face lab time was faculty direction to feel confident in using and understanding the technology to be able to complete their class work" (SPLA-9).
>
> " …I Believe digital literacy with academic technology incorporation might be non-beneficial because-if the technology is difficult to use, then the students spend more time figuring out the program than they do learning the material being taught" (SPLB-9).

For both Mountain One and Mountain Two locations faculty and librarian responses voiced a consensus on the adoption of the DL concept into instruction is a work in progress. Faculty members and librarians are on the frontline with students' means being actively involved in instruction that incorporates varying levels of DL using Web 2.0 and the LMS online classes. Consequently, their practical knowledge real-time experience provides valuable insight into the challenges and issues the students' encounter with DL incorporation. The integration of DL adoption needs institutional support and infrastructure assessment for a fit with the subject disciplines and to best suit the student constituents' needs. Currently collaboration tends to fall among the faculty limited to regular library users. In their opinion because students' work and learning outcomes showed an improvement and academic success correlated to library DL instruction. Therefore, collaboration with faculty members and librarians will help to find

solutions and promote transparency. As a valid information resource for leadership and departmental directors DL decision making, institutional policy and training.

However, Mountain One librarians mentioned they are exploring avenues of greater involvement with other subject discipline faculty beyond the traditional faculty members, for example in the Rad-Tech nursing flipped classroom (SPLA-1 & 8). In addition, Mountain Two president (SPLB-15) relayed that the strategic plan incorporates Web 2.0 professional in-house development, and expands the library's digital information presence. Now with the library's new virtual introduction demonstration to incorporate library Web 2.0 workshops at the institutions governance day training events. Perhaps a response to general science SPLB-4 reaction when asked about DIL and the library, SPLB-4 stated how she was unaware of whether the institution has a DIL policy, or whether faculty members and librarians collaborate for DIL training.

Consequently, participants' responses across all the subpart questions for their respective subject disciplines and fields represented the individual assimilation of varied beliefs for what might be considered basic AT knowledge and skills, and how that amounted to the bridge that connected DL, IL and DIL self-efficacy EC.

Relationship of Research Questions, Data Collection and Data Collected

The literature review outlined the complexity and ambiguity connected with the comprehension of DL, IL, and DIL concepts. For this phenomenological inquiry, the design of the research instruments was guided by the research questions All three research instruments, the brief questionnaire, the survey interview, and the focus group survey, guided the interviews; and, ultimately, the collection of data.

Participants in each of the two venues in which data was gathered, were asked to consider their individual perceptions of learning connected to DL, IL and DIL. The interview protocol

was semi structured, designed to keep participants and me focused on the topic, and permitted the flexibility to enable the exploration of other topics introduced by the participants.

Table 12. Research Questions and Cross-reference to Overarching Themes

Central Research Questions with Sub-questions	Cross-reference with Overarching Parent Themes
(a). What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)? i. What are faculties' perceptions of the DL? ii. When do faculty consider IL relevant to a course's topic?	Understanding and Adoption
(b). What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)? i. What are community college librarians' (library's) DL perspectives? ii. What are community college librarians' (library's) DIL instruction program?	Understanding and Adoption
(c). What are Arts & Science faculties' concept of DIL? i. How do faculty consider DIL relevant to a course's topic? ii. How might faculty & librarian DIL collaboration enhance student learning outcomes?	Adoption and Incorporation

Table 12 shows the relationship between the research questions and the overarching parent themes that provide the researcher with a guide to build the coding framework for the identification of the subsequent detailed themes found in the participants' questionnaire, survey and focus group responses.

Tables 4 and 5 (p. 129-130) identified the relationship between research questions and structured interview questions and between research questions and survey interview questions. Synthesis of the response meta-data led to the development of the overarching parent themes shown in table 12. Table 13 presents the parent themes, which then evolved into the major theme subcategories.

Research Question Subpart (a) with subsections

Research question (a) asks: What is Arts and Science faculty's digital literacy epistemology (i.e. attitudes of learning)? This question considers what the individual participants understood as DL attitudes of learning. Responses introduced and explored participants' individual attitudes of learning philosophy perspective for their subject discipline attributed to their personal learning and teaching paradigms. This clarified a participant's mindset respective to their professional role(s) within the sample location's institution for how they understood the concept of DL. It also helped identify when and where the inclusion of DL appeared in the learning/teaching environment.

The administrator participants often had the dual role of management and teaching. They could provide rich commentary from practical experience that was related to both perspectives that recognized the institution's DL justifications, and faculty and librarians' similarities and differences for DL adoption in instruction. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 1, 2a, 2b, 3, 4, 5 and FGQ 1, 2, 3 responses provided the data to answer the first research question.

Research question (a) (i) asks: What are faculty perceptions of DL? This directly questions how individual participants understood the concept of DL. Faculty members' replies steered the researcher to ascertain, through a description of the type of instructional environment (i.e. class curriculum or online class environment) that explained the faculty interpretation for what being digitally literate means, and whether in their opinion they had adopted DL, in some form, as part of the teaching process. Consequently, participants' perceptions defined the self-assessed recognition of DL self-efficacy and personal competence. The respective DL content value related to student learning outcomes tied into the perception of DL incorporation and

adoption. The analysis of survey (ISQ) and focus group (FGQ) interview questions ISQ 1, 2a, 2b, 3, 4, 5 and FGQ 1, 2, 3 responses provided the data to answer to research question 1 (a).

Research question (b) (ii) asks: When do faculty consider IL relevant to a course's topic? This question explored the participant's possible knowledge and recognition of the IL concept. I examined the participant's interpretation of the IL concept, through a description of the type of instructional actions (i.e. class curriculum and syllabi) that explained their personal meaning of digital literacy, and whether in their opinion they had adopted DL in some form as part of their teaching practice. Participants' perceptions defined the self-assessed recognition of IL self-efficacy and personal competence. The IL instruction content value towards the subject discipline student learning outcomes tied into the perception of IL adoption. I interpreted the faculties' responses that found positive incorporation, objective reasons for IL limitations and reactions why it might not be not included. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 1, 2a, 2b, 3, 4, 5 and FGQ 1, 2, 3 responses provided the data to answer to research question 1 (b).

Research Question Subpart (b) with subsections

Research question (b) asks: What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)? Similarly, the question asks what the librarian participants 'individual understanding and knowledge for the definition and application of DL. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 1, 2a, 6 and FGQ 5, 6 responses provided the data to answer to the research question.

Participant librarian DL perspectives were broader than those described by faculty. All of the librarians explained that they have to know about IL concepts as part of the national ACRL

standards to be in compliance with ALA simply because the majority of library services and resources are now managed and provided digitally (SPLA-1 & 8; SPLB- 1 & 15). For example;

> "…librarians through training and all conference attendance have to stay up-to-date with IL concepts and the incorporation of DIL. To be able to instruct face-to-face digital IL activities in the use of the libraries Web 2.0 electronic resources. Also with the library/institutions online classes providing the embedded librarian digital services and the institutions Internet live chat student support system" (SPLA-1)
>
> "… As the library director it is important to be able to understand and provide instruction for faculty and students in the use of all the libraries and electronic resources that include the web 20 online materials" (SPLB-1).

Perhaps this is because librarians support all the subject disciplines. Some of the participant librarians had the dual role of administrator and instructor. This meant that these dual-hatted individuals were aware of both the institution's standards, faculty requirements and students expectations to achieve DL. The task of keeping library services and personnel current with rapidly changing DL resources was expressed as a challenge but a responsibility needed to survive in today's competitive education environment. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 1, 2a, 6 and FGQ 5, 6 responses provided the data to answer research question 2.

Subpart (b) (ii) asks: What is community college librarians' (library's) DIL instruction program? Here again the response data provided a more in-depth perception of the possible advantages and challenges DL presented at an institution related to faculty members' DL

expectations compared to student learning outcomes. All the librarians' commentary identified a belief that DIL is an extension of the IL concept, just in a different mode; that learning and teaching is carried out via the digital platform. The librarian participants reported that understanding and adoption of the IL to DL is a concept that libraries and librarians have been involved with since Zurkowski (1974) initiated the concept. Also, many library information research and instruction services have been electronically based for a long time. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 1, 2a, 6 and FGQ 5, 6 responses provided the data to answer to the research question.

Research Question Subpart (c) with subsections

Research question (1c) asks: What are Arts & Science faculty' concept of DIL? Digital information literacy (DIL) is a new concept. So, the expectation was that participants might not have a clear understanding of DIL. Hence, I wanted to hear from the administrators, faculty and librarians alike what level of DIL was recognized, and how DIL might currently be incorporated in a course to enhance student learning outcomes. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 7, 8 and FGQ 4 responses provided the data to answer to the research question.

Few participants had heard of DIL. Applied Science and IT instructors had some idea, but the English faculty members' educated opinion expressed DIL as, "educationese" or trendy jargon and reported that from their perspective digital was the platform or tool. The belief seemed to be that DIL is a combination of interconnected digital services. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 7, 8 and FGQ 4 responses provided the data to answer to the research question.

Subpart (c) (ii) asked: How might faculty & librarian DIL collaboration enhance student learning outcomes? Faculty, administrators and librarians associated DIL more with a DL paradigm of incorporation and instruction. The discussion among participants focused on how the library engaged in more outreach, as collaborative online presentations and training webinars within the institution. When participants were asked this question directly they felt this was the chance to voice their ideas and explain the institutions different professional development training opportunities. Administrators expressed the wish to gain faculty support and continued commitment to developing further the online class instruction inclusive of more DL programs. Faculty reiterated the feeling that the institution should take time to be sure the digital technology infrastructure was properly operationalized before providing it to students. Librarians want faculty to use the Web 2.0 DL resources and hope students continue to request/ attend the library either in person or virtually. All participants responded that the digital teaching environment is interconnected across disciplines and job positions; that everyone needs to support each other and strive for successful adoption and incorporation for enhanced student learning benefits. The analysis of associated survey (ISQ) and focus group (FGQ) interview questions ISQ 7, 8 and FGQ 4 responses provided the data to answer to the research question.

Data Analysis

How does epistemological perception bridge the connection between technology skills and technology self-efficacy? In table 13, it shows the development of inductive reasoning from the participants' qualitative responses, and identification of the development of evolving major themes from all the participants' open-ended questions in the survey interviews and focus group responses. Synthesis of context from the responses content identified key points to the main

overarching question. Data descriptive statistics and probability of variance are shown in Appendix G and H.

Table 13. Key Coding Strategy Data Analysis

Parent Overarching Theme	Parent Theme Description	Evolving Major Theme Identified
A. Understanding	the definition and application of digital literacy, information literacy, and digital information literacy	1. Concept and meanings 2. Cognitive actions and learning 3. Professional development and training
B. Incorporation	the possible levels of digital literacy, information literacy, and digital information literacy inclusion and digital technology self-efficacy	1. Practical skills 2. Self-efficacy and personal competence 3. Benefits or limitations
C. Adoption	the perception about digital literacy, information literacy, and digital information literacy	1. Self- efficacy and personal competence 2. Non-cognitive value and content 3. Motivation and policy

Table 13. Lists the parent themes as the overarching themes that are a starting point for coding.

Parent Overarching Theme. Understanding: understanding is an overarching theme where participants are familiar with the concept definition of DL, IL and possibly DIL. Also, that they comprehend what type of actions are involved for DL, IL and possibly DIL to take place with instruction and teaching methods. Certain attributes such as student/ class assignments that incorporate Web 2.0 recourse, library instruction, and embedded librarians for online class resources are recognized that show when DL and IL might occur.

Major Theme Identified. (1) *concept and meanings*; how the different faculty, librarians, and administrators interpreted understanding the concept of DL as it applies to teaching and learning was a common theme with the most varied perceptions and comprehension. In the analysis from both sample locations, the two qualitative instruments, the

survey interview and focus group responses showed the correlation between understanding IL concept and meanings for most of the participants. Faculty subject discipline influenced how confident faculty felt about their DL level of self-efficacy. As such, faculty members from the more science based subjects, *i.e.,* Math and IT measured DL as being digitally literate on par to digital fluency with the LMS online Blackboard class program. Therefore, how the faculty perceive DL self-efficacy is the core factor, whether they interpreted DL as competence with the LMS online or DL adoption in the form of research and critical thinking as applicable for teaching their subject matter to achieve the necessary student learning outcomes.

> **SPLA-1:** The thing is it's not necessarily digital literacy, but information literacy is definitely an academic standard that is assessed. Digital literacy and digital information literacy are still so new. To be clear of the term and concept description is why one asks questions. That is, is it digital literacy instead of information literacy or by having digital technology the new concept is digital information literacy (administrator/librarian).
>
> **SPLA-9:** One comment I would make; digital technology has definitely changed the way I do my job as Dean. The work as an institutional administrator, student administration has changed into being managed, provided and supported through the digital technology platform (administrator/faculty).

Major Theme Identified. (2) *Cognitive actions and learning;* all faculty believed they were digitally literate to an extent because both institutions use digital technology as part of the teaching administration and learning platforms in the Blackboard LMS. The English, History, Sociology, and Psychology faculty were more concerned with subject specific critical thinking as part of the student learning outcomes. This group expressed a familiarity and preference with the more traditional IL concept, and is mirrored in the librarians' responses. In the area of DL and IL

cognitive action, there was a degree of separation. The administrators believed that faculty would follow institution policy whereby using the LMS Blackboard system meant the faculty had a level of DL. The faculty would decide the scope of how much DL was incorporated included into instruction, depending on the faculty member's interpretation that might be simply using the LMS online class program. On the other hand, the faculty may perceive DL according to the Digital Literacy Task (2013) force definition to include critical thinking activities and programs, for example, Web 2.0 research, podcasts and blogs. However, faculty members reported approximately only a 60% to 40% comprehension of DL beyond the basic LMS online digital fluency usage that is explained by their perception and lack of DL cognitive activities in instruction.

> **SPLA-1:** Faculty do cross collaborate with each other, most definitely it's very much a team spirit, team effort. The faculty is the lead person, but yes there are still faculty who don't necessarily fully appreciate the concept of digital technology and digital information literacy, that is their belief that digital literacy is not necessarily applicable to their subject discipline (administrator/ librarian).
>
> **SPLA-8**: Obviously we are using more and more electronic resources stop i.e. digital technology. We also provide research guide in the form of "Lib Guides". Those are perfect for embedding us into a class online as the information links to particular subject area for the class-not only what we (the library) do for orientation and research, also provides information for what professors do as subject content instruction and learning (instruction librarian).
>
> **SPLB-1**: I do stress to them when I go to their Faculty members that are ...at meetings, that they need to let them know when they've given them an assignment, they give them

the syllabi that lists all their assignments usually. That they know this is where you can come for information (administrator/ librarian).

SPLB-16: I'll tell you the ones we have are mostly English, psychology, speech, theater. Those are mostly the classes we get. Science, Math don't ... No, not really. Mostly those subjects I mentioned, most of them come in and see what we have and set up orientations. Yeah, they do (instruction librarian).

Major Theme Identified. (3) *Professional development and training*; Both institutions encourage faculty to attend conferences for professional development both to stay current in their subject disciplines, but also to gain an understanding of new possible digital technology that would better support DL. Senior administration at both institutions appreciate all personnel needs to be onboard and understands the implications of properly understanding the concept of DL in the academic environment. Also 95% of all participants agreed on the need for professional development training to support faculty, librarians, and personnel to improve their DL comprehension.

SPLA-1: Also the institution promotes faculty engagement in professional development. There is regular Blackboard (Bb) training, most faculty do this on an annual basis. In fact, all faculty has to complete an online training program to learn the system and how to best develop a class, before they actually then post their class. This is an institutional policy, because you cannot let someone go and develop a class in an LMS when they don't know how to best use or understand the functions of the program. The central office has their own training programs "TOP or IDDLE" we use our own training which work well for us and that also have been very successful for adjunct faculty too (administrator/librarian).

SPLA-21: To be able to have an online presence all faculty and instruction instructors have to go through the course and must pass the course to be able to develop and deliver online instruction. By doing this we have seen a difference in the class structure, there is consistency in the way classes are developed overall. Therefore, it is a requirement of all full-time faculty new or otherwise to complete the training course. Regardless of whether they have taught online elsewhere since we may have different procedures. Faculty have to show that they are capable of navigating and making proper use of Bb functions to the fullest advantage of the class content (administrator)

SPLA-9: My job as the Dean is to make sure the faculty have all the tools they need to make students successful in achieving the learning outcomes. And of course I have to make sure that the faculty know how to make the best use of these different academic technology tools we have available for them. So that part of my job is a very, very good thing, anything that I can provide my faculty with that makes them more effective teachers with students. The institution provides training and also incorporates the use of the quality matters (QM) program to show faculty-instructors how to develop well structured, properly developed online classes that meet the specific learning outcome criteria for the different subject discipline areas. QM professional training is expensive. This is provided through the Distance Learning department, who also maintains and supports the Bb platform for all faculty/adjunct have to successfully complete an online training component in order to establish their online instruction class environment. This makes the consistency of structure and content organization as well as training faculty how to use and interact with all the different Bb functionalities (administrator/faculty).

SPLA-19: You know the first couple times, I've done a few things with Quality Matters and I'm going to be honest about it, I walked in there thinking, "My stuff is good. I've worked with great instructional designers. My stuff is good", then I sat through the instructional sessions and I said, "Oh my gosh. I need to do so much alignment." My stuff is not so great. I do need to work on my stuff, you know, so it was eye opening to me and I do know I need to work on it. Audrey and I are talking even this year about it and I said, "If we ever want to get to the point that we are truly quality, we are going to have to get faculty stipends like we used to when they originally designed it', this goes for both higher Ed institutions where I work (adjunct faculty)

SPLB-1: I think, as we both know, faculty could do with some more Professional Development. Where the faculty meets. It's 4 times a year. Well, everybody meets. They have committee meetings at that time. I know that they do, do different training's, and I have been encouraged ... I know when I tried it before, it didn't work. Out of the 15 people who signed up, 4 showed up. But, they have encouraged me to set up, on one of their All College Days, a time where the Professors can come in, and be shown these data bases. But, the one's that come to their Library Orientations, already know how to use the data bases. I can assure you, that when we were meeting, Face Timing, in our last Consortium Meeting, they were asking, "Who got responses?" And I had gotten 6 or 7 responses out of my faculty. And the others had not. They were very interested in knowing how my faculty felt about different data bases that we were using, and considering. I think that I'm doing a pretty good job, about showing them how to use library electronic resources such as databases. Unfortunately, I do believe it's not that

> the faculty don't mean to. They have the best of intentions. They just somehow, just don't seem to have time (administrator/ librarian).
>
> **SPLB-16**: If I wanted to? I think they would help us out, especially Angel, being that she's the director, they would be really good about making sure, because she would just impart it to us. Do you see what I'm saying? They would make sure Angel got what she needed. They allow in our budget for things like that, so yeah. Again, mostly just Angel. She went to the West Virginia Library Association meeting, but that's about ... We don't, she doesn't really get too much of an opportunity to do that. It's not that she can't, it's mostly budget restrictions (instruction librarian).

Parent Overarching Theme. Incorporation: incorporation is an overarching theme wherein participants go beyond just the understanding of DL, IL and possibly DIL to actually incorporate the concept and application of DL and IL activities into their instruction and teaching methods. The attributes identified show the levels of DL and IL that might occur:

Major Theme Identified. (1) *Practical skills*; all senior administrators at Mountain One and Mountain Two stated the importance of having appropriate digital learning lab/distance learning centers, librarian instructors and labs, and library/technical support and mentoring available for students. Here administrators, faculty members and librarians' responses arrived at a consensus to the extent that they all believe they incorporate some form of DL into their instruction because the digital technology is how they facilitate both teaching and learning services. Also, most teaching and learning resources are provided for information distribution digitally. The institutions offer a range of support and in-house training to help keep faculty and librarians abreast of new digital technology for both the administrative aspect as well as the

teaching end. This happens to be beneficial and a great support resource to faculty that includes adjunct members.

SPLA-18: Again, everyone here uses Blackboard for face-to-face classes and for online classes. I really think that for most of us, it's just become a very seamless part of the way that we move toward meeting the student learning outcomes. I don't have any student learning outcomes that deal with mastering technology. I use the technology to help students meet those student learning outcomes in literature, composition or technical writing.

It is true that in the first, say, 30 years ago when composition classes were just beginning to use Word processing software, some of our student learning outcomes dealt specifically with the technology. I don't have any of those anymore and I don't believe that anyone else has those. We just assumed that students are going to be ready to go when they arrive in a freshman comp. That's not quite true, of course, but it's an assumption that's shared (faculty/senate committee chair).

SPLB-16: Well, probably the ... This probably seems very small and insignificant, but it matters to me. When the class comes down and has an orientation and the teacher stays and hears what they hear, I think it helps more. Compared to when the teachers just send them down and then they don't know what we've told the students I think it holds it back. They're not using what we've told the kids to help them when they assign the papers or whatever kind of research they're doing. I know that's being kind of small, but I think that's important that the teachers know as much as the students are learning, because ... That's another thing. Some big technology wiz, because I am not, but I try to learn as much as I can so I help the students, but we have some faculty who are very intelligent,

> very good teachers. Nothing against that part, but technology-wise, they can't ...well don't think about how electronic information resources could be used to the students' advantage. It's a small thing but for example rather than students having to come and make copies of an articles or chapter on reserve we could scan it and distribute it via email. That would also save the students the copying fees (instruction librarian).

Major Theme Identified. (2) *Self-efficacy and personal confidence*; Faculty and students access their materials digitally using the learning management system (LMS). When the library provides access to the electronic resources and supports IL instruction for learning information research they utilize the digital platforms, *i.e.,* digital electronic databases, digital library online catalog, institution's and student support services website and the LMS system. Each participant's reported perception of digital literacy self-efficacy from the brief questionnaires charted along the scale of self-efficacy and personal competence ranged from 5% to 99% with the incorporation of DL into methods of instruction.

The questionnaire asked participants to self-assess their DL, IL and DIL technology self-efficacy, reporting the rating as a Likert scale value from one to ten (one is low and ten is high). A detailed full listing of location A, Mountain One participants sample mean Likert scale self-efficacy responses and location B, Mountain Two participants sample mean Likert scale self-efficacy responses are found in Table 14 and 15 in Appendix F. Participant responses indicate a variance amongst faculty members', librarians, and administrators DL, IL and DIL self-efficacy score values shown in figures 20 and 21.The participants' DL, IL and DIL self-efficacy self-assessments was investigated in the survey and focus groups.

Figure 20. Location A- Participants Discipline DL, IL and DIL Self-Efficacy Response Values

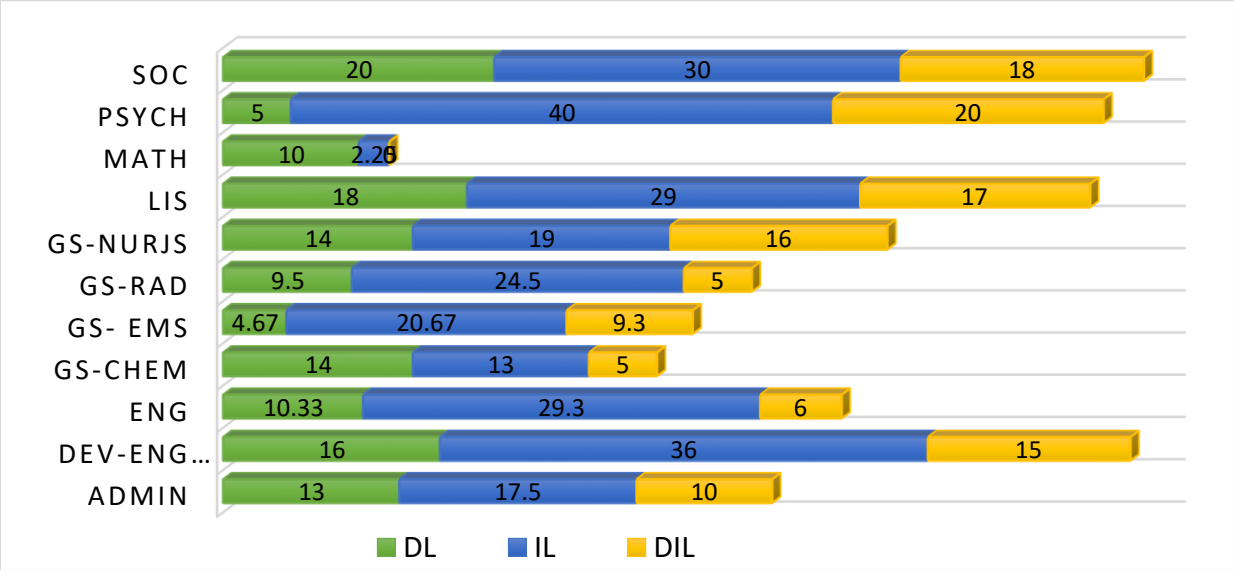
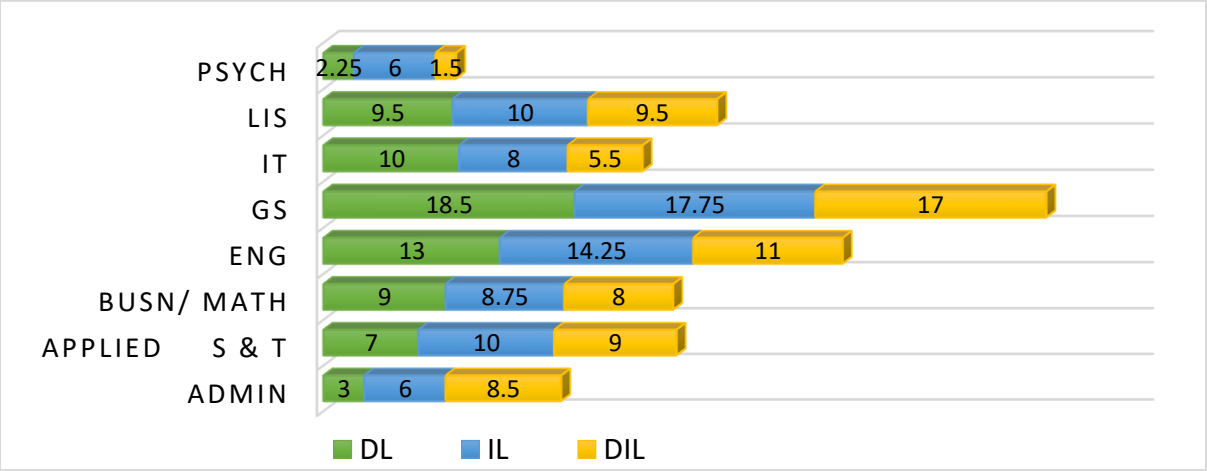


*Figure 21***.** Location B- Participants Discipline DL, IL and DIL Self-Efficacy Response Values



At Mountain Two, the librarian group had the highest overall DL, IL and DIL cumulative self-efficacy scores. Comments from the open-ended survey and from focus groups sheds light on the reasons for the variances. For example;

> **SPLA-18:** I like the phrase appropriate technology. As a student or a faculty member or as a citizen, don't give me technology for the sake of technology. Give me technology

that allows me to do something efficiently. With computers, we've had very, very few changes since about the late '90s. Before that, the rate of change was just incredible. We've gotten to the point, at least with desktops, laptops and tablets, where it's going to be pretty hard to substantially improve on what we have.

I did see a book in my e-mail just a few minutes, Open and Integrative: Designing Liberal Education for the New Digital Ecosystem. It's from AACU. I did read part of their excerpt but it does make the argument that technology should be supportive of what your overall student learning outcomes are instead of vice versa. They used the phrase digital revolution quite a bit (faculty/senate committee chair).

SPLA-19: So included in the continuation of business plan is that faculty have a class shell that they do consistently and remain current with posting class materials regardless of whether school is open or not. The faculty must post materials on snow days or if any reason the institution i.e. community college site is closed because class-learning must continue regardless. A problem with this is location-many students still have only basic technology connection off-campus using "dial-up". But the class material is posted and available and accessible online so students who do not have consistent stable online access from home they are expected to go to the local library or vocational tech centers. Students are made aware of their different possibilities i.e. where they can find reliable local Internet access as they are expected to continue their studies on schedule (administrator/ faculty).

SPLB- 1: We do recommend when they (students) registering for classes, come in here and get their Student Id's created. We show them some little things about how to log on to Blackboard, and other such things. Of course, they ask, "What is this?" Its like, "Well,

I saw that you had an online course." And then some of them are like, "What?" They didn't even know they had registered for it. We end up showing them how to go into it. But ... and we recommend ... that they go in and use it, every day. Until they feel comfortable with the information literacy resources and digital literacy programs. Because again, you've got some students that are very comfortable with it, and then you've got these other students that are not quite ready for that dive in ... that deep of a pool. The ones that are ready, and are excited, seem to do extremely well (administrator/librarian/instructor.)

SPLB-15: Well let me say it's a mixed bag. We have a lot of faculty who really use it and some who don't use it at all. A lot would really like to learn more about using technology and doing some literacy and research. We have a whole IT class that's devoted to nothing but internet researching.

I think a big part is the amount of time and the load that faculty have, that they don't really have enough time to get that comfortable with all that, to go through everything. I think as level of support increases, they become more comfortable. It's all a factor of time and support to increase usage. That relates to funding. The ones (instructors) who use it are pretty comfortable, but there are some who still do not use it at all. They getting more comfortable at using more technology but there still a learning curve there.

Major Theme Identified. (3) *Benefits:* both location participants who were institutional administrators all agreed there were numerous benefits to have the digital technology, which they also agreed had taken some time to learn but would not be without those digital programs now. The digital programs provided better communication with speed and accuracy. Also, adding efficiency to their administrative tasks. Faculty and librarians on the whole would agree with the

administrators that the digital technology potentially provided better communication and access to information. On the other hand, not so much for DL with academic technology because of the learning curve and all of the different programs in use.

> **SPLA-9**: One comment I would make; digital technology has definitely changed the way I do my job as Dean. The work as an institutional administrator, student administration has changed into being managed, provided and supported through the digital technology platform. We have a particular tool called “Quinn” where I can set up and run queries (information search questions) across the metadata in the databases. And it will provide information for me, for example I can see how successful my developmental English students are as they progress through their other English classes. I’m able to see their grades, their attendance etc… Which enables me to make informed decisions.
>
> **SPLB-16**: I do like that a lot of times you can find answers quickly because then that gives you time to move on to other things and you can even learn more. It's wonderful. Being one that grew up with a typewriter and now they can change ... They can print out a paper and it be perfect the first time, where how many times did we have to rip a sheet out and start totally over, you get halfway through a page and you think, "This looks terrible, or I didn't indent right." I love all that and I live that they don't have to take all that time like we did with the Reader's Guide and they can go to the databases and choose the databases that fit their subject and type in their subject that they want full text, peer-reviewed, whatever, and it's there. They have a list. They can just go down through the list and pick and choose what they want. I like that, so yeah, it's great. It's great! (Instruction librarian).

Major Theme Identified. (3) *Limitations*: All participants from both locations, whether administrators, faculty or librarians commented that the DL training that was made available was not always enough, and expressed the need for more practice time to gain the practical skills involved with incorporation of DL and IL into methods of instruction. Similarly, all participants agreed that the possible impact of DL limitations was concerned with student digital technology self-efficacy as it related to the students' technology skills and sustainable technology access off campus. Another potential limitation stems from the local culture, which is a rural low-income environment. Students may not own or have access to the appropriate technology equipment, which might be a barrier to student learning and success. Although, a Mountain Two senior administrator noted; "this has changed somewhat now that the incoming high school students tend to be more digitally savvy." While a Mountain One faculty senate member said: with digital technology learning is and will always be a continuous activity, since digital technology is going to keep on changing. So we must change with it."

> **SPLA-1**: Our students are a great mixture of the very modern and the not so modern. Then in that many of them like to print off the class information/materials/reports. They still like the effect of having hard copy to put into a binder and study from these paper materials (administrator/ librarian).
>
> **SPLA-8**: Other classes such as STV 108 and including English 111 and 112 most of the instructors are supportive of the library. What happens with our students is the library is included in these classes so by the time students get to English 112 they might be sick of the library. We are hitting them pretty constantly and they/the students' sort of shutdown. They feel they've had enough library instruction as this particular group of students get hit hard.

SPLA-18: Two points. Number one, with schools in the Southern Association accreditation area, we have to verify that for most of those assignments online or in class, for that matter, that the person completing the assignment is actually the person enrolled in the class. In a society where, and at Mountain One community college, it's not unusual for parents to want to sit in the class with their 17 or 18-year-old children.

A faculty comment on students' attitude with digital technology and learning. I was talking to a faculty member on Wednesday. She was saying it's they don't want to think. They're just happy. "Oh, well. It's all out there in electronic la-la land. They don't need to worry about it," and trying to get them to understand that they would actually be better and stronger if they didn't rely on the technology alone (faculty/senate committee chair).

SPLA-19: Okay, so a limitation where DL is non beneficial and students might find it a barrier. Well, the only way I can imagine that it would be non-beneficial for a student is if that student just had zero experience with technology and became overwhelmed in trying to use it. But that rarely, rarely happens. It's usually just adult learners who struggle a little.

Because they have to do a test or whatever and they get timed out because they don't have a very good connection. I think that that's just a little bit the type of students and the area that we live in. That can be an issue as well, them saying they don't have access but you know, I've just learned to respond to mine and say, "I expect you to go to where you'll have reliable connection." Then that becomes a new issue when I say, you know, "You can usually drive 30 minutes down the road and find good connection."

SPLA-21: Even though the tutorials are out there and all the face-to-face instructors' kind of go over that with their students, I think it's still kind of, a learn as you need to

kind of thing. We probably don't do as much of that as I would like for us to do, I'll be honest. That's just from a lack of hands, lack of resources, from a staffing perspective, but with regard to if they don't have the technology at home, most of our, if not all, of our courses that utilize video lectures, we actually burn to DVDs and the students can check those out free of cost. So that if they don't have reliable internet or they don't have high-speed internet or they don't have a computer, then they can check out the DVDs, and keep up with the syllabus, and watch them at home (administrator/ instruction/ technical support).

SPLB-1: I think that we need to come to terms with ... there is a level of comfort that students sometimes will not go beyond. They will go so far, and then stop. It's almost as if, the younger generation still wants to Google, but will only go through, like the first 2 or 3 pages of the Google searches. The older generation, prefers to use the data bases. What I'm doing is spending a whole lot of time getting everybody on to the data bases. Well, I've found that what I was constantly telling the students is, "Okay, I know that you're going to Google. I know that you're going to Dog Pile, or whatever it might be that you use. But, when you use the data bases, it pin-points. It gets rid of all the advertisements, and it gets rid of all the things that are not peer reviewed (administrator/ librarian).

SPLB-15: Sometimes it (digital technology) makes it too easy to access information. They (students) tend to find versus think. That ease of find (digital technology) makes them (students) in acquiring and retaining knowledge. I (student) don't have to know it. I just have to be able to find it. I think that is an issue with technology that has handicapped in some way the current population of kids.

> Then of course in Appalachia, we do have that barrier and keeping current with it. A perfect example is a student right now that is taking an online class. Calls and says, "I don't have internet service at home." That was the second example was going to be. She's taking a Microsoft Office 2013 class or 2016 class. She has Windows XP and can't load Office on her machine (administrator/ instruction/ technical support).
>
> **SPLB-16:** I feel like sometimes they don't have to do as much research. It's all at their fingertips and so I don't know how much they really are taking in other than just copy and paste and just reword it a couple of ... You know what I mean?
>
> Hmm. It kind of goes with what I said earlier. It almost makes it too easy for them. A lot of times I feel like they're not finding the information themselves, it's just handed to them. Just like me, if I want to know something I just Google it, instead of like I used to have to do, look it up, and study it out or ask people, or ... You know, it's so much easier now, which is a good thing, but sometimes I think it limits you because it doesn't make you exercise your brain or your critical thinking or anything like that (instruction librarian).

Parent Overarching Theme. Adoption: participants have a well-perceived understanding of DL, IL and possibly DIL and include the concept and application of DL and IL activities into their instruction and teaching methods. The attributes identified demonstrate the sort of influence DL and IL adoption might bring, plus its perceived impact.

Major Theme Identified. (1) *Self-efficacy and personal competence;* at both locations, the respective librarians, and all faculty/ instructors participants identified the challenges of DL adoption in the institution environment. All the administrators, faculty and librarians and support personnel agreed that for positive DL adoption, the infrastructure for support and maintenance

must be available, participants also agreed that institutional leaders should also take a unified approach when the teaching members recognize barriers to DL and IL comprehension.

> **SPLA-19**: They also have worked with faculty to use the Quality Matters as a professional development to support faculty in developing well-structured online classes. Although Dr. PQR was saying he doesn't like or dislike what... His personal choice is he doesn't think Quality Matters is quite as wonderful as some people say that it is. Were you given an opportunity to do that with them?
>
> You know we haven't talked about using Quality Matters and I would be interested in doing that but the problem for me is as a faculty member when I'm asked to update my courses using something as amazing as Quality Matters, I'm just not going to do it unless they compensate me to develop the course (adjunct faculty).

Major Theme Identified. (2) *Non-cognitive value and content*; Much of the faculty by reason of their subject discipline already have adopted DL as part of their instruction. Most other subject discipline areas are updating their curriculum with a caveat that all students also need to understand DL and have DL self-efficacy in order to succeed, and achieve the necessary student learning outcomes. Faculty members had concerns about digital technology suport for DL, and if DL provides value for student learning outcomes, and students' digital literacy self-efficacy. When recognizing students personal level of DL self-efficacy as a possible barrier for learning the subject matter to achieve the respective student learning outcomes.

> **SPLA-21**: We've recently kind of transitioned our previous orientation model, which was an actual 1-credit course, an SDV 100, and we used to kind of do that and work in some of the student services side and kind of go that direction. We recently have transitioned it as part of our QEP to incorporate critical thinking, and that's kind of our focus for the

next five years, at least, to kind of integrate that and move that up through some additional courses as well, but that's the introduction to it. I think as we look at the results and we look at the interaction from those things, I think we'll see that a lot of those students that don't have those digital literacy skills, it's going to pop up a lot earlier because of the increased demands in that SDV class. Academic and more content based with regard to an academic topic as opposed to college skill topics, so I think those digital literacy needs are going to become a whole lot more front and center because it's going to pop up earlier. I think a natural thing to do with that is to incorporate some digital literacy into the SDV. I don't know that we have room in a 1-credit course packed full with critical thinking (administrator/ instruction/ technical support).

SPLA-1: Another one of the digital technology programs that is very useful is an early alert program called “Starfish” that alerts faculty and myself as Dean when a student for whatever the reason seems to be struggling with their class work. That way reach out to the student to find out what seems to be causing the challenge they are experiencing with class work, missed attendance et cetera. This program has made a great difference and it allows for direct contact between faculty and student to give kudos, also making the student aware that we are concerned about you as a person. Letting the student know that individually each one of them matters, using email as the communication connection beyond what is considered regular class communication. Leading the student know you is the faculty are there for them, faculty can reach out and invite students to come and see them in person to offer that support (administrator/faculty).

Major Theme Identified. (3) *Motivation and policy*; both sample locations encourage faculty/ instructors to attend professional development, provide in-house training and support

dedicated days for all personnel to attend training workshops to improve the DL adoption levels and standards. For example at Location A there is a requirement, even for instructors of the face to face classes, for all faculty and adjuncts must complete a Blackboard online course shell. In comparison location B faculty are still in the growth stage of establishing the adoption of DL across all the different academic and instructional technical programs.

Motivation

> **SPLA-9**: Digital literacy is a general education outcomes standard in [the state in which Mountain One is located] there are actually learning standards, digital literacy being one of them. From the aspect of the administrator the digital technology is very useful in helping to gather a lot of data together in a timely fashion, to be able to organize it creatively by demonstrating descriptive data graphically. Since with the generation of assessment reports will show how the institution is meeting the [system] as well as state performance measures.
>
> So that is why I'm gonna be putting my money, into the types of digital programs and training that will fulfill this mission. After all it's because of the students that we are here. If we can't take care of the students then we might as well go home, students are why it says college on the sign (administrator/faculty).
>
> **SPLA-21**: I think it absolutely impacts the learning outcomes because if that digital literacy level is low, and that includes environmental barriers that we have a tremendous amount of in our area, which is the lack of high-speed internet or any internet at all, or a computer, or dependable device. They absolutely, we often see that students that come from parts of our service region that don't have those advantages as a standard, they have to come to campus more, and they have to put forth more effort to

develop those skills and to utilize those technologies. It's a delicate balance and I think it's kind of hat's off to our faculty because they have to balance both sides of that spectrum and keep it as equal as they can (administrator/ instruction/ technical support).

SPLB-17: The speed of education has tremendously increased because of the technology environment we are in right now. It is a very demanding situation and apparent that the faculty because of students' digital literacy ability and expectancy means faculty/instructors must be digitally literate themselves and incorporate as much as possible into their instruction process. Also tying it into the specific learning outcomes they have written into their syllabus. The more of this they (the faculty) can do I think the more higher learning will take place. Keeping the student engaged in the classroom regardless if online or face-to-face is an imperative (senior administrator).

SPLB-18: There are a combination of ways we encourage our faculty, instructors and all personnel to stay current with the new digital technology. From in-house on-site training workshops to different institution wide programs. For example, Governance day and Convocation day. Since it is apparent that to be able to compete with other colleges for student enrollment the institution, programs and faculty are going to have to develop more programs and services using the digital platform. Therefore, all of us are going to have to be more DL adept (senior administrator).

Policy:

SPLA-18: I think, and the VCCS is partly responsible for this, they keep pushing students, faculty and staff toward "mobile apps." They really want students to be able to take the entire gamut of online classes with their phones. It's just not possible to do a

composition class that way.

SPLB-1: We, in this State, our Chancellor of Community Colleges, in this past year, has asked the Academic Librarians of the Community Colleges to meet and to create a consortium. We have all agreed that we would study these data bases and these sites, and that we would go with what the majority liked. Last year, and definitely this year. They (faculty) still want to see that the resources are provided, but obviously, they're looking for ... if I may use the phrase, "their best bang for the buck."

SPLA-21: We have an online teaching policy for our instructors, so every instructor that teaches at Mountain One community college, be it adjunct or full time, is required or supposed to have a presence in our LMS, or learning management system, which is Blackboard, at least one course each semester. Now, we don't have a mandate that requires instructor to use Blackboard in all the courses or anything like that, but we instituted the online teaching policy so that everyone can keep up their skills to a minimum degree of posting. It actually says to posting grades, a syllabus, and announcements is the minimum required for that utilization, for at least one course each term. Then, they also have to take an ITE 198 class, which is taught out of the distance learning and instructional technology area, which is a 1-credit, basic, kind of introduction to Blackboard and online teaching class (administrator/ instruction/ technical support).

SPLA-18: We are each other's strongest supporters and allies. Our Southern Association Quality Enhancement Plan for 2016 through at least 2021 deals with critical thinking. They were an integral part of planning and implementing that Quality Enhancement Plan. We came up with our own definition of critical thinking. The first part of it was collecting data. We had a big fight over this term which the librarians say is used by

> librarians nationwide. The term is relevant. We were making the point that the library's role in this critical thinking initiative would be "more relevant." A lot of people didn't like that. I think that most humanities and social science faculty members have their students in the library for an orientation and they're using current refereed sources in their sociology and psychology classes and history classes. The librarians collaborate willingly. Sometimes, they push us to be more academic (faculty/senate committee chair).

Summary

The chapter aimed at documenting the results of rigorous and detailed analysis of the three data collection instruments utilized in this research project. A constant comparison approach was used to identify concepts and themes (Strauss & Corbin, 1998). I also reviewed institutional reports, state and governing documents for comparison. Analysis of participants' responses to the research questions developed themes that emerged and allowed for framing of relationships between the participants' perception of digital literacy (DL) and the focus of DL adoption in teaching. The hermeneutic cycle of examination of the study's data showed to what extent the influences of digital ecology had on all participants (Laverty, 2003). What became clear is that the action of digital literacy adoption and incorporation impacts institutional administrators, faculty and librarians uniformly. The research meta-data shows how faculty members and librarians DL/IL attitudes of learning are the moderators working in unison for the students' best interests towards achieving learning goals. Faculty who collaborated with librarians were more conversant with the concept of DL and IL, since they were already actively incorporating it into their curriculum. An underlying factor that did show up is that DL self-efficacy gets confused with digital fluency, *i.e.*, computer fluency skills.

Amid the rhetoric of participants' responses, the core thread weaving throughout is the importance of student learning outcomes success. This finding makes sense since colleges "raison d'être" is the student. The response data indicated that to some extent faculty and students' opinion of the library and its resources are trapped in the old reputation, which overshadows the transformation of libraries and electronic resource services to the new Web 2.0 digital technology. The inference drawn is that faculty and students' interpretation of DL is often limited to the LMS blackboard digital technology. Many have not used the libraries Web 2.0 resources, and have no idea of all of the benefits. This behooves the library to reach out to the administration for collaboration with faculty through forums such as the faculty Senate and institutional workshops to demonstrate the learning outcome value tied to the library Web 2.0 engagement. Chapter 5 describes the findings from the meta-analysis of the survey interviews and focus group responses aimed at providing a holistic picture of faculty DL adoption in education via answers to the three research questions and sub-questions.

Chapter 5

Discussion

Summary: This chapter connects a summary of the study, which highlights pertinent conclusions drawn from data presented in Chapter 4, with the literature review. The overview of the problem is the scant amount of research that addresses the issue of how the phenomenon of digital literacy (DL), with academic technology (AT), influences faculty members' and community college librarians' inclusion or non-inclusion in instruction, and whether DL adoption improves student learning outcomes for community college students.

Purpose. This study addresses faculty members' attitudes of learning (i.e., epistemology) and DL adoption, with AT inclusion, while teaching and understanding incorporation of DIL in higher learning. It examined two community colleges in Virginia and West Virginia, located in rural areas in which digital technology and digital literacy present challenges to implement in educational contexts. A mixed method of quantitative and qualitative approaches was applied because of the abstract human-perception variables under study; the researcher sought the meaning and experiences of individuals concerning a phenomenon (Patton, 2002). Purposeful sampling was used to identify participants, and included completion and analysis of three instruments—a brief questionnaire online, an open-ended survey interview, and focus groups—during which triangulation was used with all three instruments meta-data.

Research Questions:

1. How does epistemological perception bridge the connection between technology skills and technology self-efficacy?
   (a) What are Arts & Science faculties' digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

i. What are faculties' perceptions of the DL?

ii. When do faculty consider IL relevant to a course's topic?

(b) What is the librarian's/ library digital literacy (DL) epistemology (i.e. attitudes of learning theory)?

i. What are community college librarians' (library's) DL perspectives?

ii. What are community college librarians' (library's) DIL instruction program?

(c) What are Arts & Science faculties' concept of DIL?

i. How do faculty consider DIL relevant to a course's topic?

ii. How might faculty & librarian DIL collaboration enhance student learning outcomes?

Summary and Discussion of Findings

The big picture findings are that all sample participants surpassed Rogers (2003) chasm measurement using Gladwell's (2000) espoused tipping point eligible standard, indicated by the quantitative data. The effect of participants' digital literacy (DL) perspectives and self-efficacy are demonstrated by espoused theories. The individual's espoused theories affected to what measure participants incorporate DL into their subject discipline and instruction. As the data showed a basic level of DL was expected since both sample institutions required all faculty and librarians to incorporate the digital literacy technology, namely the LMS blackboard online class and subject content instruction materials. Therefore, participants explained their DL perception measurement of self-efficacy depended on individual DL paradigm interpretation. Also, the relative value of adopting DL concept incorporation into pedagogy was aligned to the subject

discipline. The difference is the difference in opinion where English, sociology, psychology faculty had already adopted DL as an extension of the IL paradigm. Whereas Math, IT and general science faculty did not believe DL defined as DIL to be relevant to the discipline and student learning outcomes. The library is in the position to allay any possible tension from these differences providing the subject specific DL instruction, general access, instruction and mentoring for DL. Since much of the library's information and services are digitally based via Web 2.0. One surprising factor was that the sample librarians' perception of the DL/DIL concept and definition considered the ACRL standards of IL as the learning paradigm, and that the IL epistemology had just been transferred onto the digital platform environment. When asked why both location librarians answered that in response to the student constituents level of DL, self-efficacy knowledge and adoption is in a constant state of flux. Students are easily influenced by transience of technology trends, thus, responding to the sudden and intense technology innovation is a constant work in progress for the institution, faculty, librarians and student body.

On the positive side, from the point of view of both the institution, faculty and librarians where DL with academic technology promote student learning outcomes at the fundamental level. Students have greater accessibility through digital technology also supporting program services sustainability of the continuous learning institutional policies. On the negative side faculty and librarians are among the primary contacts with the students' work to achieve student learning successes. In a balance of the pros with the cons value of DL the inference is the benefits of DL demonstrated through digital information literacy is thought outweigh any particular drawbacks.

The institutions continue to work on providing consistent infrastructure support in training, IT helpdesk and digital technology online class development. The faculty members and

librarians are encouraged to use these resource avenues. When challenges arise there are mechanisms in place to help resolve the issues will stop however, transience of technology and DL adoption area is attributed to faculty feeling pressured to having to develop online class materials. When in the faculty members' judgment either that subject content or their students' academic DL self-efficacy is not up to par for achieving the necessary student learning outcomes.

A parting thought from the librarians at location A, is that in the long term the digital technology influence would subsume the physical presence of the library, personnel and possibly hardcopy. Ultimately, the library would go to a virtual information clearinghouse. I disagree with this prediction because in the learning environment students all have varying abilities to understand and use DL successfully. From more than 20 years of experience in the education field, and in library instruction and digital development, my observation is that technology remains the program tool and a platform by which learning and teaching is made more accessible, while students better understand by showing and learn by practice.

A hallmark of American community colleges is to assert their prevalence and status of preeminence for diffusion of digital innovation in global higher education. Bertand (2010) refers to what Bates (2000) calls barriers of inertia as "techno-sclerosis of higher education" (p. 1), challenging American academia to become more technologically applied and international by conducting a meta-analysis and redesigning digital, technology-delivered higher education. Scholarly groups such as the Babson Research Center (BRC), Educause, Lumina, and the Community College Research Center (CCRC) identify many institutional and faculty digital literacy (DL) barriers with academic technology as legitimate issues that can be overcome (Lumina Foundation, 2014; McGoldrick et al., 2015;), though they do not agree with Bertrand's

(2010) negative critical assessment of faculty and the higher education system. In contrast to Bertrand's criticism, the current study's findings demonstrate transformation, expressed by an institution's administration, faculty members', and librarians' perceptions of DL, as positive change to an accepted congruent level of understanding and self-efficacy. The development is improvement to Bertrand's implied lack of faculty member and librarian DL inclusion, which occurs through a combination of daily academic administration and more DL incorporation in online instruction—namely Blackboard online classes used across most discipline curricula. Faculty members and librarians, particularly librarians SPLA-1, SPLA-7, SPLB-1, SPLB-15, and administrators SPLA-21 and SPLB-17, commented that they still have concerns about DL adoption relative to students' demographics, similar to the BRC, Educause, and Gates Foundation studies, not so much regarding faculty barriers, but of limited time to practice new applications and learn new DL programs before they get implemented into the institutional infrastructure, and concerning student accessibility to reliable digital technology and Internet (Scott-Clayton, 2011; Johnson et al., 2015). Participants' individual years of service, gender and professional development demographic was not a specific element of the research questions. On the other hand, empirical analysis of participant's individual disciplines questionnaires data sets assessed perceptions of DL, IL, and DIL, providing self-efficacy scores based on a Likert-type scale (1 through 10; 10 is highest) the detailed tables 18 and 19 is found on Appendix F. The research data provided new evidence of how the previously unknown administrator, faculty members and librarians DL, IL and DIL self-efficacy reported vales on the normal distribution curve when compared to Rogers and Gladwell Tipping point standard exceed the standard eligibility value.

Figure 22. Location A- Participants Disciplines' Individual DL Self-Efficacy Ratings

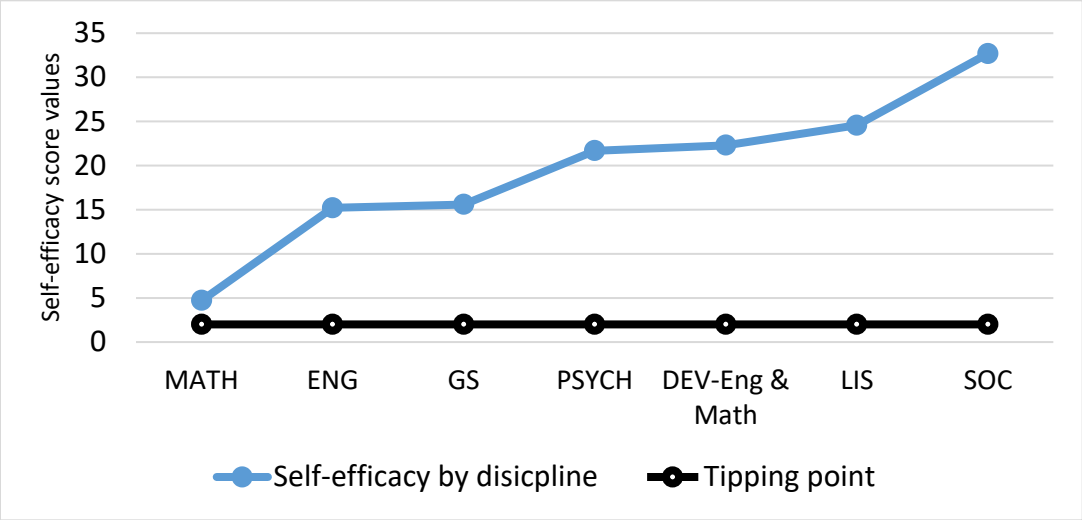
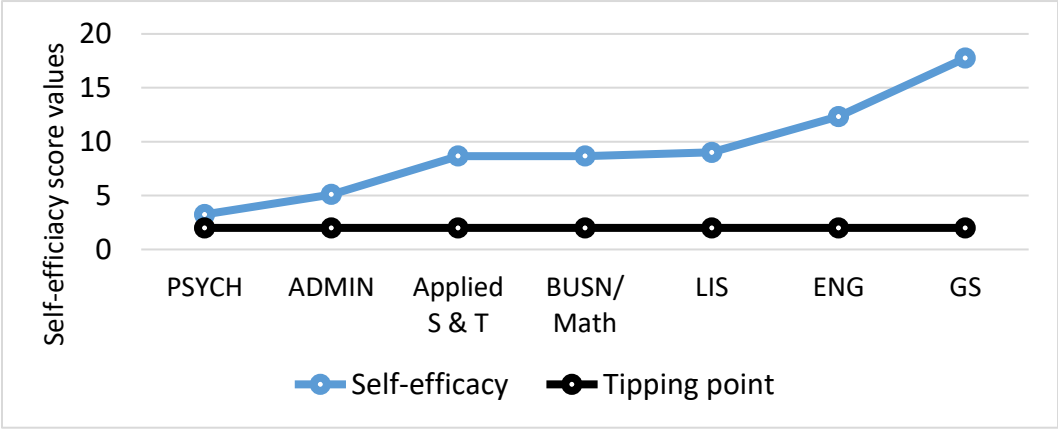


Figure 23. Location B- Participants Disciplines' Individual DL Self-Efficacy Ratings



Figures 22 and 23 demonstrates that both Mountain One and Mountain Two sample locations discipline values distribution with Rogers and Gladwell Tipping point standard.

Considering Rogers' (2003) diffusion of innovation bell curve, Gladwell's (2002) study suggests that when a phenomenon under investigation surpasses what Rogers calls the "chasm" (i.e., passing 18% to 20%), a tipping point is achieved (p. 24, Figure 3). In the current study, the number of participants who reported DL perceptions and self-efficacy ratings above the median surpassed that tipping point. The inference is that both locations achieved an overall institutional

tipping point for DL adoption. By tipping point, I mean that at the two locations, most administrators, faculty and librarian participants considered themselves digitally literate by incorporating both DL and IL into their instruction, thus meeting a recognizable, basic degree of digital information literacy (DIL) adoption. These basic DL actions include a library's digital electronic resources, Web 2.0 online catalogs plus databases, and use of the LMS-Blackboard for online classes. This finding accords with Kurzweil's (2011) prediction, which has since been corroborated with a recent Pew Research Center study, that 60% of experts forecast that by 2020, the Internet and digital technology will have a positive influence on education (Poushter, Bell, & Oates, 2015).

Allen et al. (2012) and the Gates Foundation (2015) imply that inclusion of DL with AT as a component of curricula and faculty syllabi in higher education continues to be sporadic. However, the studies used limited two-year community college data, and the basis for results was faculty types of AT frequency, not DL self-rated efficacy and adoption (Allen et al., 2012, June; Gates foundation, 2015). DL development is a core factor in AT that leads to DL competency and individual self-efficacy for faculty, educators, and librarian professionals (Covello, 2010, Head, 2013). As the questionnaire, interviews, and focus groups demonstrated, administrators, faculty members, and librarians in both groups reported overall strong personal confidence with IL, and self- rated efficacy for DL in the broader sense. Considering the structure of the groups, everyone was involved in a socio-technology environment that contains both human and digital technology resources, and thus personal self-efficacy influences the individuals' perceptions. Each person draws support from one another to support both DL initiatives and self-efficacy (Bandura, 1989), but the current focus is on differences and links between these groups within the major groups of faculty members and librarians, and thus synthetic, *ad-hoc* groups might

occur whereby internal group members support, coach, and develop the degrees and types of DL deemed useful to a discipline, curriculum, and learning outcome. For example, SPLA faculty members group were more inclined to incorporate DL, and explained that IL had been adopted into their instruction.

Table 19. Participants Reported Frequency for perception of understanding, incorporation and adoption of DL, IL, and DIL

Group classification-	**Administration sample participants**	**Faculty sample participants**	**Adjunct faculty sample participants**	**Librarians sample participants**
Literacy Category				
DL concept Understanding	A= ✓✓✓✓ B= ✓✓✓	A= ✓✓✓✓✓✓✓✓ B= ✓✓✓✓✓✓	A= ✓✓ B= ✓	A= ✓ B= ✓✓
DL skills Incorporation	A= ✓✓✓✓ B= ✓✓✓	A= ✓✓✓✓✓✓ B= ✓✓✓✓✓✓✓	A= ✓✓ B= ✓	A= ✓ B=✓✓
DL active instruction Adoption	A= ✓✓ B= ✓✓✓	A= ✓✓✓✓ B= ✓✓✓✓✓✓	A= ✓✓ B= ✓	A= ✓ B= ✓
IL concept Understanding	A= ✓✓✓✓ B= ✓✓✓	A= ✓✓✓✓✓✓✓✓✓✓ B= ✓✓✓✓✓✓✓	A=✓✓ B= ✓✓	A= ✓✓ B= ✓✓
IL skills Incorporation	A= ✓✓ B= ✓✓	A=✓✓✓✓✓✓✓✓ B= ✓✓✓✓✓✓	A= ✓✓ B= ✓	A= ✓✓ B=✓✓
IL active instruction Adoption	A= ✓✓✓ B= ✓✓	A= ✓✓✓✓✓✓ B= ✓✓✓✓✓	A= ✓✓ B=✓	A= ✓✓ B= ✓✓
DIL concept Understanding	A= ✓✓✓✓✓ B= ✓✓✓	A= ✓✓✓✓✓✓ B= ✓✓✓✓✓✓	A=✓✓ B= ✓	A= ✓✓ B= ✓
DIL active instruction Adoption	A= ✓✓✓✓ B= ✓✓	A= ✓✓✓✓✓✓✓✓ B= ✓✓✓✓✓✓	A=✓✓ B= ✓	A= ✓✓ B= ✓

Since the inception of IL 40 years ago (Zurkowski, 1974), humanities faculty members, particularly those involved with English, speech, and sociology, have included IL and

interactions/collaborations with librarians as an active component of curricula because the critical-thinking component enhances student learning outcomes. Now that the institution has adopted more digital technology through Blackboard, general studies and nursing programs have adopted DL with critical thinking, making them DIL.

Among the group members, a small contingent identified subject discipline as the primary reason for lack of inclusion of IL or DIL with library electronic resources and services, but that they were digital literate since they used the LMS Blackboard online class program and some Web 2.0 resources relevant to their subjects such as Khan Academy and YouTube videos. SPLB faculty members expressed subject discipline as the primary reason for lack of inclusion of IL or DIL with the library electronic resources and services, but that they were digitally literate since they used the LMS Blackboard online class program and some Web 2.0 resources relevant to their subjects such as Khan Academy and YouTube videos. Humanities faculty members from both locations expressed being digitally literate, at Mountain Two the range of DL and IL self-efficacy was a higher score than at Mountain One. Table 19 show the participants reported identified perception of DL, IL and DIL understanding, incorporation and adoption self-efficacy in the different categories into instruction and relates to the major themes identified in chapter 4. What did come to light during the data analysis is that at both locations certain participants' classifications made them fit simultaneously into two of the groups, i.e., administration and faculty, or faculty and librarian. The mediating factor between an administrator/faculty participants was the moderating attribute of institutional policy, and the mediating factor for faculty and librarians was the same moderating factor that basic DL and IL inclusion occurred because of using the LMS. Hence, the overall effect remains the same that the findings demonstrate both locations met the DL adoption tipping point standard (Gladwell, 2000).

Discussion of Major Themes

A review of the literature revealed that although extensive research has been conducted related to the practice and inclusion of IL with instruction and class assignments the situation is not similar for DL. Significant gaps exist regarding understanding of relationships among foundational concepts, individual beliefs, and practical theories-in-use for DL. Questions remain concerning how faculty members and librarians perceive DL and its practical theories-in-use since they might shape instruction initiatives. This study examined these relationships, adding to the literature by providing an explanation for some of the complexities that faculty members and librarians face during DL inclusion and/or adoption while teaching. The previous chapter describes research findings in relation to the major research questions and sub-questions, and the data analysis builds toward understanding diverse DL perceptions and practical theories-in-use relationships that faculty members, librarians, and administrators attribute to DL, IL, and DIL. Varied definitions of DL are reflective of its contradictory nature and the incongruence found in its current definition.

Understanding concepts and meaning of DL, IL, and DIL. The definition of DL is inclusive of IL since IL applies to the digital technology format. Therefore, a digitally literate person can perform tasks effectively in a digital environment. Literacy includes the ability to read and interpret media, reproduce data and images through digital manipulation, and evaluate and apply new knowledge gained from digital environments (Jones-Kavalier & Flannigan, 2006). IL is a set of abilities that requires individuals to recognize when information is needed, have the ability to locate, evaluate, and use the needed information effectively (American Library Association, 2000, p. 2). For example, SPLA-7, an instruction librarian, reported that

she believed that DL is synonymous with digital information fluency and DIL since they are all a subset of each other, requiring the same types of skills in use in digital technology programs.

Cognitive actions and learning. Gunton, Bruce, and Davis (2015) suggest differences contrast in the relational approach of IL instruction and more recent incorporation of DL relationships between learners and faculty members/instructors. Learning is experienced as iterative sharing of information and skills since teaching represents a sharing of knowledge as both multimodal and multidirectional. Simultaneously, instructors learn from student experiences during instruction (Gunton et al., 2015). IL and DL are not competitors; they are complementary, whose concepts interconnect closely for higher education faculty and students. DL concepts and skills provide the fundamentals of managing digital environments that students need to succeed with IL and other areas of study. DIL is the application of IL standards and skills with digital technologies (Cordell, 2013). For example, SPLB-16, an instruction librarian, concurred, adding that many students still do not understand or grasp how to use the library's electronic Web 2.0 resources, though they are millennials and generation X, Y and Z group and are tech savvy, but are still digital learners. SPLA-1, a library director, stated that IL is the parent term of DIL, where DL is the congruent concept and skill for both IL and DL.

Professional development and training. When discussing the possibilities of professional development, participants at both locations explained that they offer a variety of avenues that faculty and adjunct faculty can take advantage of, including off-site state and discipline-appropriate conferences, in-house training workshops, and professional all-day events. Location B annually conducts all-day training events called governance day, during which all institutional personnel must attend in person. The event offers a forum for discourse, training, and collaborative DL troubleshooting, and demonstration and instruction of new DL programs.

Collins (2014) suggests that when institutional leaders provide infrastructure for collaborative training such as faculty training centers or workshop events, they produce positive results, establishing valuable connections among faculty members, librarians, and personnel who support each other's online and DL endeavors. Both locations' participants confirmed this argument. One aspect that emerged that was not obvious from empirical data was faculty members' experiences with institutional initiatives to incorporate quality matters (QM) as a class online training tool to achieve consistently high standards for online classes. Faculty members reported mixed reviews regarding discipline content assessment benefits of QM evaluations. Conversely, they also reported that students who completed QM-reviewed LMS classes completed the classes more often, a positive reaction that led deans and directors to consider tracking such results longitudinally. One dean explained that QM programs are expensive, and faculty members reported that QM training is time-consuming, and continued budget cuts prevent renewal of QM programs. However, in-house faculty members and personnel who completed the training could advise and collaborate with colleagues concerning online class content and structure. Using the QM program had a positive effect on production and continuity of structure across disciplines, and offered consistently high standards of class content presentation.

Incorporation

Practical skills of incorporating DL, IL, and DIL. Kurzweil (2011) posits that by the 1990s, computer and Internet technology revolutions occurred faster than Moore's (1965) law of exponential development, and by 2005, the world approached a technology tipping point. Considering the positive influences of new technology, digital advances improve communication—the ability to connect over great distances with accuracy and speed— thus enabling global community members to communicate (Kurzweil, 2011). Incorporation of new

DL concepts of AT applications in existing institutional cultures influences an organization's information transfer cycle, which begins with basic assumptions and moves to espoused values and artifacts that include information systems incorporation (Schein, 1985, p. 57, Figure 9). For example, SPLA-7, a professor of sociology and director of international outreach, agreed with this statement since he had studied and taught abroad, and uses the Internet and digital technology to maintain international connections. By using technology and incorporating DL, students benefit from diverse learning and are introduced to the global community.

Self-efficacy and personal competence. Bruce and Hughes (2010) and Belshaw (2012) argue that incorporation of IL influences a person's learning of computer fluency, and the ability to comprehend information in the form of DL self-efficacy. So much information is produced and processed digitally that DIL is becoming the new norm (Belshaw, 2012; Bruce & Hughes, 2010). Participants reported demographics that included teaching experience, and years of work in higher education, age, and subject disciplines used to assist with the DL, IL and DIL literacy categories self-efficacy interpretation among the administrator, faculty member and librarians' group classification, since this was relevant to the theory model of the study and research questions (p. 15, Figure 4). Both Bandura (1989) and Bourantas (2008) posit that a person's use of digital technology correlates with his/her DL, DIL, and DIL perceptions and self-efficacy, influencing effort expended on and persistence with an action. Current results suggest that both locations expect faculty members and librarians to maintain and support online instruction through the LMS Blackboard system. Therefore, it is unsurprising that all participants reported reasonable DL self-efficacy and personal competence. At both locations, gender distributions were similar, but experience with teaching ranged from new faculty members to more than 20 years in higher education. DL inclusion in instruction was a personal choice relative to

discipline, self-efficacy, and DL competence reported in Chapter 4 findings (Figures 14 through 19).

Benefits and limitations. Cunha and Heckman (2008) argue that being digitally literate does not automatically mean that a person has DL self-efficacy in an academic environment. Lea (2013) explains that learning technologies and academic literacies occupy contested space. DL, IL, and DIL interconnect if only because they are all action processes conducted on a digital platform. Except for basic skills, all three are interchangeable, but self-efficacy and learning concerning knowledge comprehension are not. Although using an LMS (e.g. Blackboard) affords a person reasonable DL capabilities due to being part of an online classroom environment, areas of self-efficacy still require support and instruction. Therefore, when face-to-face classes are partnered with LMS online classes, they require greater DL support. Using IL is a much better, low-stakes introduction to digital information formats, in which students learn to grasp the basics of Web 2.0 resources such as database searches and critical thinking (Jumonville, 2014). SPLA-15 from Mountain One pointed this out regarding developmental math and English. When the college generated a report to review student success, it became apparent that students needed added face-to-face time in digital labs while completing DL assignments, with faculty members and help-desk mentors present. Once the college combined these two resources, students showed much improvement.

Adoption

Perceptions of adoption of DL, IL, and DIL. Rogers (2003) argues that people adopt new technology at varying rates. The speed of adoption follows a bell curve, during which the primary difference is an individual's psychological disposition to innovation. An individual passes through four stages during decision-making, from knowledge of an innovation, to

persuasion (i.e., attitude formation and change), the decision to adopt or reject, and confirmation. Rogers (2003) suggests that diffusion of technology transformation has measurable areas such as relative advantages, compatibility, complexity, trialability, and observability, and thus application of DL adoption relates to individual acceptance. Therefore, people unofficially self-select into internal groups such as innovators, users, technologically savvy, and DL technology support. These groups are interdependent, and characteristics that define to which group a person belongs remain constant, but a person can, by professional development training or personal interest, move or change to another group. There is fluidity that is in this case dictated by DL adoption and/or innovations since the defining trait is self-efficacy and confidence in DL adoption and use during instruction. For example, both SPLA-7 and SPLA-16 reported that when working with students on assigned projects, they required DL skills and collaboration with faculty members by providing step-by-step DIL library information guides that could be embedded into online classes for student reference. They thus made discovery of Web 2.0 resources both more accessible to faculty members and easier for students. SPLB-17 said that much the same occurred with students when instructing them on IL for assignments that used DL actions.

Non-cognitive value and content. Since general education courses form the foundation of education in the humanities, IL inclusion of DL might bridge the gap across discipline boundaries (Rockman, 2004; Ragains 2006). The newest forms of DL are recognized as multimodality that incorporate a combination of lecture-style formats and material, digital Web 2.0 resources for the Internet, and LMS online class programs (Baran, 2013; Clement, 2012a, & Lea, 2013). Expanding on the idea of DL inclusion beyond general education courses provides students with the ability and opportunity to gain in-depth subject knowledge, think critically, and

act creatively in a modern digital environment (Wesch, 2011). All participants were agreeable to the benefits of online LMS classes offering students accessibility to subject matter, and that faculty can use this modality to maintain a continuous learning environment, though there were concerns regarding DL self-efficacy of students in rural environments due to low incomes and underserved demographics (Scott-Clayton, 2011, 2012).

Motivation and policy. At the institutional level, motivation for DL adoption has dual relevance and potential. An institution must develop and maintain a DL infrastructure in accordance with state and accreditation agency standards. Participants from Mountain One explained that their state's policies include a DL standard, and therefore the institution chose to develop and initiate a DL policy as part of the state's directive on continuous learning. Mountain Two does not have a specific policy since it is reviewing and developing a strategic plan that considers the future vision of the institution. The senior administrator expressed the importance of digital technology platforms as a means of providing higher education, and the hope that through greater DL training, high-quality DL instruction programs will be made available to the student body. One motivational force is that DL training for faculty members and personnel will enhance individual DL self-efficacy to produce polished educational materials comparable to contemporary business community standards, improving the institution's reputation and providing digitally enhanced information that will attract and improve student enrollment.

Another aspect of DL program inclusion and adoption is the positive effect software programs offer when engaging in information administrative actions. Senior administrators, deans, and library directors stated that digital programs enhance the efficacy of information collection and assessment, and make creating and running information query reports and tracking any type of data much easier. All institutional personnel need to be trained and know that DL

support is available, but digital technology also gives administrators, faculty members, and librarians' instant access to student and class instructional data. Senior administrators at both institutions appreciated, regardless of whether people are classified as faculty members, librarians, and adjunct instructors that all personnel need to be on board and understand the implications of DL in academic environments. The expectation is for faculty members and librarians to maintain subject-relevant DL self-efficacy. Mountain One expects faculty members to attend an in-house DL online training program to demonstrate DL self-efficacy regarding their ability to prepare online class shells, an institutional policy that confirms that faculty members can navigate the LMS Blackboard system, and ensures a reasonable standard of class content preparation and structure. There is also an implication of ensuring that students who attend classes online receive quality instruction and reliable faculty interactions to achieve learning outcomes and complete online classes. Mountain One's dean reiterated tracking this policy during the past three years, reporting that most faculty members had completed the online training course, but a few outliers had not managed to prepare an online shell that coordinated their face-to-face syllabi with instruction materials. She mentioned that it is no longer an option, and faculty members are told to become compliant with the institution's policy. Anyone developing a class shell or posting information to the institution's website must have passed online training before being allowed to upload information and this also operates as internal quality control. On campus, DL, IT, and Blackboard support is available to assist with development of online classes.

Research Objectives

I. Generate baseline data on the current degree of DL attitudes, adoption with self-

efficacy, and DIL provision for faculty members, librarians, and community college personnel as non-active faculty.

II. Develop recommendations for an exemplary organizational model and gap analysis, and encourage a management approach to embed DIL into all academic programs.

Implications for Practice

Literacy is a condition, not a threshold, and therefore the plurality of DL concepts and skills suggests that understanding DL as "one literacy to rule them all" is loaded with ambiguities (Belshaw, 2010, p. 223). The legacy of sage-on-the-stage, traditional learning models, during which an expert shares skills and knowledge with learners, is changing rapidly (Maybee, Bruce, Lupton & Rebmann, 2013). Faculty members, instructors, librarians, and institutional administrators interpret DL variously, defining DL as either an overarching parent concept or as the practical application and skill of using digital technology programs. Context is essential to how disparate groups consider DL as a valuable component that enhances modes of instruction and student learning outcomes. The researcher realizes that participants' responses added richness to the findings, and that their commentary suggests that DL theories-in-use must be inferred from their behaviors or representations of action and practice (Saracevic, 2007). The implication is that people unintentionally espouse theories when they intend to discuss them, hence the importance of cross-referencing participants' responses to institutional- and state-level guides, policies, and other documentation (Kuhlthau, 2004, Wesch, 2011).

One explanation for incongruences observed during DL practice or inclusion relates to IL research from Bruce (2005), which suggests that theoretical positions determine strategies employed in practice. DL definitions offer multiple interpretations of use, including practical implementation in classrooms, face-to-face or online, by faculty members and librarians. Bruce

(2005) and Badke (2012) argue that IL use is not limited to skills needed to operate information technology, and the same is true for DL; digital technology skills do not equate to DL use and comprehension in an academic environment. Consensus found in the literature recognizes the effects that transience of digital technology has on DL. Institutions are responsible for providing an infrastructure that fosters DL technology and faculty members' DL adoption cycle (Mosley, 2010). The Annual New Horizon report documents that institutions must be conscious of the influences that DL adoption has on faculty members, librarians, students, and the community (Johnson et al., 2015). The current study recognizes the dilemma, where faculty are the main moderating force to what extent of DL adoption and inclusion beyond the basic usage where the online class inclusion is the mediating attribute. Also, identifying the different participants' issues with DL adoption considering such mediating attribute as relevance to subject discipline, student DL capability and faculty/ instructor or librarian self-efficacy, thus, offers recommendations to deal with the challenges.

The state board, policy-makers, and accreditation agencies believe that colleges should provide and maintain digital technology equipment (i.e., hardware) and services (i.e., software) infrastructures, keeping with current higher education standards. Technology pervasiveness will increase in contrast to educators' perceptions of the future of DL in higher education, particularly regarding new mobile-learning resources. Faculty members expressed concerns that such technology diminishes students' success and has a major influence on the humanistic perspective in education (Marzilli et al., 2014). The new provost at Mountain Two, a self-described IT activist and supporter, endorsed this statement in that there are many instances in which digital communication does not always project or express clear contextual interpretations for receivers. For example, in his experience, when writing investigative e-mails, instead of receiving direct

replies, the other party's response is either delayed or the party asks questions rather than providing an answer, where it is far more productive to address the party face-to-face. He commented that there are times when a message can get confused or lost in translation, but he remarked that this is changing rapidly, especially with video calls and conferencing available.

A high priority that senior administrators, deans, and directors of libraries expressed concerned dwindling budgets, and that digital technology equipment and services required for higher-education programs account for a high percentage of budget expenses. Common knowledge suggests that digital technology offers administrative efficiency, and state and accreditation agencies have similar expectations that digital technology will enhance student learning outcomes (Bailey et al., 2015). Therefore, the college's senior administrators, deans, directors, faculty members, and librarians must have sufficient DL knowledge and self-efficacy. Professional development funds are often used to support training personnel (Mountain One, 2001). Lea (2013) suggests that learning technologies and academic literacies occupy contested space, and Beetham, McGill, and Littlejohn (2009) contend that technologists such as the Gates Foundation and Lumina Foundation advocate learning technology benefits. Abbitt (2011) and Kim, Kim, Lee, Spector, and Demeester (2013) argue that teachers' DL beliefs and technology integration differ individually, and teachers' and educators' fundamental concerns and methods of pedagogy (i.e., epistemology) are paramount to student learning, regardless of technology use.

Regarding remaining current with digital technology, all participants reiterated that there is never sufficient time to complete all training and keep up with constant technology changes. On campus, there are the advantages of IT help desks, distance learning personnel who support everyone, and in-house training and workshops. There is no option to fall behind technologically due to competition with other education institutions, and for students, it is imperative to offer the

right modern digital amenities. One-way training is provided is through online webinars, a cost saving option, but they are unpopular among traditional faculty and library staff members. Adjunct faculty members especially experience stress when having to learn new digital technologies for their classes.

State education departments and policy-makers advocate more adoption of digital technology programs in learning environment in the form of OERs since these digital software tools are counted as low-cost additions with high learning value. What has not been considered fully is the logistics of how to support faculty members' and librarians' decisions of which OERs to adopt because so many resources are available, and there is also the question of compatibility with an institution's legacy digital technology platform and LMS programs that are already in place. As senior administrators reported, they are constantly reviewing their institutions' strategic models to find ways to adapt current digital technology policies and improve DL adoption with faculty members' instructional models, but it is a work in progress.

Among faculty responses, some individuals believed that DL is digital fluency, and as a skill was important for students, but it was unnecessary as a research assignment to be included in their disciplines (e.g., math, general science, and applied science). The subtle nuance is the paradox of the two varied DL interpretations. At its most basic DL is digital technology fluency/skills with computer technology but in its fullest sense DL is the self-efficacy of both the fluency and the comprehension of digital information for critical thinking. Consequently, all faculty members and librarians remarked that over the last few years, students entering their classes had changed, with more than 50% demonstrating basic DL self-efficacy. Among the remaining 50%, it was uncommon to find students unfamiliar with digital technology. If a student has difficulties with DL self-efficacy, the institution has the student use support programs

and resources such as TRIO, the distance information learning technology center, and the library to acclimate them to learning how to use digital technology (e.g., LMS) and integrating DL skills into learning.

At rural institutions, the topographies do make it difficult to sustain and support consistent accessibility to the Internet, particularly true for adjunct faculty members making teaching complicated when it comes to students taking online classes. Both institutions provide access to free downloadable digital programs (i.e., Microsoft Office and anti-virus software) to help students reduce technology costs since local demographics include low-income areas. Such access occurs over the Internet, which is problematic in areas with poor cellular tower transmissions, and even weather events that disrupt satellite transmissions make online studies challenging (Scott-Clayton 2011; Bailey et al., 2015).

Recommendations

Each college, where participants worked, offers training and professional development events on the schools' calendars. From an outline of these methods and the literature review, it is possible to offer recommendations regarding how to continue to incorporate DL that supports faculty curricula and student learning outcomes at similar, midsized community colleges. Collaboration of shared DL experiences and knowledge is essential to supporting the suggestions that follow.

One recommendation is to establish a forum among faculty members, librarians, and IT or student support services to collaborate on identifying unexplored DL adoption initiatives with in-house DL experts. Feasibility of this recommendation requires support from department heads, deans, and directors for the group to be recognized and consists voluntarily of faculty members, librarians, and IT personnel. An indirect issue not fully addressed in the study was that

the group would have to overcome any faculty and personnel who are either unaware or unsure of DL definition from the Digital Literacy Task (2013) force, and the value of adding more programs. If people invest in developing or adding more DL curriculum online, to ensure that there are definite guidelines and policy to support the individual faculty or librarian's intellectual property rights. Also, faculty need to know their intellectual freedom is respected and recognized as the creator of the subject content instruction, even with LMS online classes. The group should develop a plan, including:

1. Opportunities to coordinate with similar peer institutions to open a dialogue and compare current DL issues, and to discuss how to troubleshoot and find solutions to challenges that might be unique;
2. How the group will identify faculty members who have adopted DL, and set up cross-training with faculty members/ librarians at the DL work-in-progress stage and new faculty members regarding DL programs and resources that enhance student learning outcomes. An example is making a list of resources to be distributed among departments.
3. Since IL is an integral part of DL, request library directors and/or instructional librarians and designers (if available) to prepare digital IL guides of all library electronic digital resources, which should be posted in online classes as an embedded librarian service for both faculty members and students. An example is library DL information reference guides that are pertinent to faculty members' disciplines, especially syllabi assignments;
4. Outreach presentations by a library director or an appointee should be scheduled that demonstrate all of a library's DL Web 2.0 resources available to faculty members and

students at in-house workshops and institutional training events since some faculty members are unaware of such electronic resources and services;

5. Connections should be made with faculty members who write grants to explore grant opportunities for training and research for faculty members and librarians in support of current discussions from policy-makers' suggestions made to an institution's administrators regarding more open education resources (OER) inclusion to reduce budgets.

Conclusion and Future Research

Complexity in literacy Interpretation. Badke (2012) provides an explanation of how multiple types of literacies include an interconnectedness through the intermediality that is the relationship of the person with the cognitive process of information production (i.e., self-efficacy skills) and the non-cognitive process of information comprehension and creation. When considering the six foundational types of literacy, digital literacy and information literacy are depicted within the hierarchy (Mackey & Jackson, 2011). Each term might be considered independently or understood as the main central (parent) term and the other terms evolve as subsections dependent upon the perspective that the person chooses as the defining concept. In fact, the different types of literacies are interconnected (Jones-Kavalier & Flannigan, 2006). A person therefore decides what the dependent factor is that makes one term the key, i.e., main central term. Generally, the dependent factor that makes either DL, IL or DIL the main key term is relative to the context of the person's environment. (Belshaw, 2012). Unintentionally, the instruction librarian at both locations frustration with the paradox of DL self-efficacy perception caused the rationalization to sound convoluted, but was seen clearly in this study's participant's responses. Certain faculty consider DL the understanding and application of self-efficacy skills

more so than the need or relevance of IL or digital information literacy (DIL) as applicable to their subject discipline.

Data Analysis Outcomes

Respondents Concerns to DL Adoption. Unexpected was that at both locations combined participants' DL inclusion and self-efficacy responses surpassed Rogers' (2003) chasm between early digital technology adopters of mainstream digital technology and achieving what Gladwell (2000) calls the tipping point of DL adoption. Although promising, this finding is not generalizable, but faculty members, librarians, and administrators cautioned that DL in the form of LMS online classes should not replace face-to face classroom instruction. Another concern was that only some students entering post-secondary education are ready for full emersion in a digital technology environment as a learning system (Hargittai & Hinnant, 2008). Education institutions should not assume that new students arrive with IL self-efficacy awareness, or that they are digitally literate that includes DIL self-efficacy. Katz (2007) recommends indirect incorporation of IL and DL as part of Educational Testing Service (ETS) questions regarding college readiness, which would at least confirm recognition of IL and DL. Faculty members and librarians, having direct contact with students, are sensitive to students' needs and capabilities, and know to what extent DL inclusion would benefit learning outcomes.

In 2009, President Obama announced a plan to reform the nation's student college completion rates, and among the administration's strategies was to improve DL (American Association of Community Colleges, 2011). Schweitzer, Ancis, and Brown (2001) argue that digital technology altered organizational structures, changing traditional processes and instructional models for academic departments and administrators on two levels. On one level, incorporation of digital and online education blurs boundaries that impose disruptions among

established cultural dynamics of curriculum pathways. The second relates to an institution's teaching philosophies, and faculty members', librarians', and students' expectations regarding academic achievement (Kezar & Eckel, 2002, Garza-Mitchell, 2010). Cohen et al. (2013) suggest that community colleges possess unique institutional cultures that help them determine which strategies should take prominence during change. Community Colleges align much of their academic visions with career and technical certifications, incorporating digital technology as it pertains to keeping current with the industry (Cohen et al., 2013; Silverman & Williams, 2014). With adoption of new digital technologies, there might be challenges that prompt additional training and continued support for faculty members, librarians, administrators, and students, particularly in rural areas in which sustainable, high-speed access to and comprehension of new digital technologies are limited (Scott-Clayton, 2011; Bailey et al., 2015).

What might be learned from this study is that at both community college locations all the sample participants viewed DL as a standard form of practice because digital technology is part of basic education administration. Then in the areas where DL is included in instruction, the participants believed the benefits seem to outweigh possible issues. What became clear from the varied group of participants' responses to the open-ended survey interviews and focus groups is that when challenging factors arose, they would be addressed and solutions found to solve the issues. Such an attitude implies a pivotal development beyond the basic DL inclusion towards a trend of more DL adoption. Faculty, librarians and administrators in this study, regardless of their subject discipline differences perceive DL as a fluid combination of DL, DIL and digital IL (DIL) as the newest and unconfirmed category. Where the belief is that DL is the understanding and adoption of computer technology skills, digital technology programs (software), and that everyone knows how to use the necessary software, i.e., College website, LMS e.g. Blackboard

and Internet resources. Beyond this, where subject content is concerned, the level of adoption and inclusion of DL is up to the individual faculty member. Certain faculty stated using DL in their teaching model is a natural development from IL since the subject, e.g. English, psychology and sociology require information research for critical thinking. These faculty members are major users and supporters of library electronic Web 2.0 resources and services. The other faculty/instructors do not discount the library Web 2.0 resources DL value, only that they believe there is no specific relevance for their subject content and student learning outcomes.

The point of view of the administration participants' perception intimated how increased DL adoption would have a continued influence on educational programs. Therefore, greater collaboration between the institution inviting the faculty, librarians, and IT support personnel to join these committees to invest their tacit knowledge of the DL concept in programs and/or services. The administration will need to show support of an infrastructure that recognizes and understands the possible levels of adjustment and inferred value of incorporation more DL adoption into pedagogy brings with it.

At both locations, there was definite commitment from administrators to encourage DL self-efficacy among all campus personnel, whether part of the educational administrative process or teaching. Cross training on various digital technologies that were incorporated in administration and teaching was encouraged. At one location, administrators demonstrated commitment to be more digitally literate, whereby the institution mandated that all faculty members had to create an LMS class shell to accompany all face-to-face curricula so students could complete coursework online, which was partly in response to the state's continuous learning policy (Mountain One, 2015).

All participants showed genuine interest in DL since it affects so many areas of a college's environment. Participants were candid with their responses when explaining their positons regarding DL adoption in instruction. Consensus was observed that DL is an integral part of academic learning, but concerning the extent of DL inclusion in instruction, there were varied responses from faculty members based on espoused theories of DL relevance to disciplines. When discussing the library's digital electronic resources, Web 2.0 and DIL integration in instruction received mixed consideration. Faculty members believed that the library's digital electronic resources, Web 2.0, and DIL integration offered value to a subject's content. One factor common throughout the interviews was that the advent of digital technology means that nearly everyone will be continuously learning DL.

Future Research Considerations

The transformation that digital technology has made to education, and new federal policies to improve DL, indicates a need for more research. Chapter two mentioned a brief discussion on faculty members' academic freedom involved with the development of the DL instructional classes and subject materials in the LMS online program software. AAUP has set out certain guidelines to assist faculty in their contractual responsibilities and intellectual property rights, an area that needs closer examination and research. The question of who owns the digitally developed online class syllabi, curriculum and content must have clarity for institutional leaders. Also, since the uncertainty influences some faculty and librarians in avoiding embracing the DL trend for online class development.

Whereas this study examined faculty members', librarians', and administrators' perceptions of adoption of DL in instruction. Findings suggest general adoption to varying degrees, depending on the discipline. General education courses form a foundation in the

humanities, beyond IL inclusion of DL that might bridge gaps across discipline boundaries (Rockman, 2004; Ragains 2006). Expanding on DL development inclusion beyond general education courses is paramount since incorporating DL in other disciplines provides students with the ability and opportunity to gain in-depth subject knowledge, think critically, and act creativily in a modern, digital environment (Wesch, 2011). The next step is to identify faculty members who have incorporated DL in their instruction beyond basic LMS shells, and study the benefits of DL and embedded library 2.0 with a class that does not use these tools during instruction and class assignments. A mixed-methods study is needed that uses a qualitative approach that observes students' library Web 2.0 use and resources that also includes a quantitative review of their success with completing class assignments and what effect DL had on the outcomes. The research model should be based on Mishra and Kohler's (2006) TPACK theory, assessing the benefits that DL offers to learning outcomes.

Maybee et al. (2013) argue that developments in phenomenology pair with informed learning since the model considers informed learning in college classrooms by assessing experiences with using information to learn as part of an informed-learning agenda. Coinciding with assignments and student learning outcomes, assessing whether learning studies are a positive direction for phenomenographic research is necessary since learning studies explore what is effective when teaching (Maybee et al., 2013). Such research might reveal how community colleges can stabilize retention and improve student completion rates since the American Association of Community Colleges (2011) suggests that DL represents a cogent strategy to facilitate such improvements.

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APPENDIX A

Questionnaire and interview questions are a combination of an online survey and open-ended questions. Also, the focus group is comprised of open-ended questions designed to elicit participants' individual in-put on topics and introduce their own subject matter perceptions (unhindered).

Online Survey questionnaire: please mark an X where applicable, approx. 10 mins to complete. This is a valuable indicator of DL inclusion with academic technology and DIL comprehension and usage. THANK YOU

==========

Demographics: Gender – Male [ ] Female [ ]

Discipline - General Studies [ ]

English [ ]

Psychology [ ]

Sociology [ ]

General Science [ ]

Library Science [ ]

Institutional Administrator [ ]

Professional experience:

No. of years teaching in higher education: 5 years [ ] 10 years [ ]

15 years [ ] more than 20 years [ ]

Professional development:

1- Have you attended a professional education conference during the past two years?
Yes [ ] – please list……

2- No [ ]

3- Are you familiar with Digital Literacy (DL) concepts? Yes [ ] No [ ]

4- Have you had DL technology training specific to your subject discipline? Yes [ ]
No [ ]

If you answer NO to either ques # 2 or # 3 please jump to ques # 6

Digital literacy:

5- Do you include digital literacy as part of face-2-face and hybrid class instruction?

Yes:☐……Please explain how confident you feel - on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

IF - NO: ☐ Please explain why not……

6- Do you include digital literacy as part of online class instruction?

Yes:☐……Please explain how confident you feel - on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

IF - NO: ☐ Please explain why not……

Information literacy:

7- Are you familiar with the definition of Information Literacy?

Yes:☐……Please explain how confident you feel - on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

NO: ☐…… Please explain why not……

8- Do you incorporate or teach Information Literacy as part of your class content?

Yes:☐……Please explain how confident you feel - on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

NO: ☐…… Please explain why not……

9- Do you include Electronic database usage and research in your lessons?

: ……Please explain how confident you feel - on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

…… Please explain why not……

10- Do you request Internet & electronic database research assistance from the library?

Yes: . Please explain how confident you feel - on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

NO: .. Please explain why not……

Digital Information literacy:

11- Is there an expectation at your institution that you include DL using academic technology applications in your class as part of your teaching style?

Yes: …… Please explain briefly……..……

Not sure: ..

NO: ..…… Please explain briefly why not……

12- Do you incorporate digital literacy with academic technology when preparing your class content?

Yes: …… Please explain how confident on a range of 1 to 10 where 1 is low, 5 is medium and 10 is high [ ] *insert the number here*

NO: .. Please explain briefly why not……

13- From the list below which academic technology applications do you use on a daily basis

- Email
- Learning Management System (LMS) e.g. Blackboard, Moodle, etc.
- Internet/Google searches
- Electronic databases (a.k.a. Web 2.0)
- YouTube
- Social Media
- Pinterest
- Picktogram
- Blogging
- Glogster

Please list any other academic technology application you are aware of that are of interest to you, and might consider including as part of Digital Literacy inclusion into pedagogy

……
……
……
……

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SHORT SURVEY.

==========

Appendix B

Survey Interview – questions, conducted either face to face or via Skype. Participants are told the interview will be recorded electronically, and then transcribed into a secure digital file, password accessible only to the researcher.

Interview Introduction: The approach of the interview questions is to collect information that will identify the faculty member's and librarian's perceptions and attitudes of digital literacy (DL) using academic technology (AT).

These may be conducted either face to face or via Skype. Participants are told the interview will be recorded electronically, and then transcribed into a secure digital file, password accessible only to the researcher.

Would you agree with these definitions; glossary of terms:

Information literacy. Information literacy is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively." *Information Literacy Competency Standards for Higher Education.* (American Library Association, 2000, p.2). Information literacy and digital literacy are not competing concepts; they are complementary areas for students in higher education. Digital literacy concepts and skills provide fundamentals of managing digital environments that students need to succeed in IL and their other areas of study (Cordell, 2013).

Digital literacy. Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (Digital Literacy Taskforce, 2013).

The definition of digital literacy is inclusive of information literacy (IL) since IL applies to the digital technology format. Therefore, a digitally literate person has the ability to perform tasks in a digital environment. Literacy includes the ability to read and interpret media, reproduce data and images through digital manipulation, and evaluate and apply

knowledge gained from digital environments (Jones-Kavalier & Flannigan, 2006). Digital literacy is synonymous with digital information literacy and digital information fluency.

Digital information literacy (DIL). DIL is the application of information literacy standards and skills with digital technologies. It is not only application of information research, but also involves incorporation of spheres of philosophy of information (i.e., epistemology) (Badke, 2012, p. 102). Another term used in this context is fluency; d**igital information** fluency (DIF) is the ability to find, evaluate, and use **digital information** effectively, efficiently, and ethically. 21st Century Digital Information Fluency (DIF) project and model (2009, Oct).

---

1 (a) What is your subject discipline and does the Internet help to develop your lesson content?.....

Yes:……Please explain how confident.....

1 (b) Do your lesson plans incorporate Microsoft office products- E.G.: PowerPoint, Excel and Access?

Yes:……Which is your preference?.....

No: …… Please explain why not.....

2 (a) Do you create and utilize online LMS classes –E.G.: Blackboard or Moodle?

Yes:……Explain how this helps with student learning outcomes.....

No: …….Please explain why not…….

2 (b) Do you demonstrate searches of the Internet to students' for class assignments?

Yes:……Explain how this helps with student learning outcomes.....

NO: Please explain why not.....

(3) Do you have a particular digital technology program you find most useful for teaching your discipline?
Yes:…… Please list and explain why .....
If No:…… (move to next question) .....

(4) Why might academic technology be non-beneficial to student learning outcomes?
.....
.....

(5) What do you feel are some of the limitations with incorporating digital literacy using academic technology processes in the classroom? .....
.....

(6) What makes you draw this conclusion about digital technology? .....
.....

(7) Do you collaborate with the librarians to incorporate information literacy into your classes?.....
.....

(8) Would you consider digital literacy professional development with the librarians on the adoption of digital information literacy into your curriculum?.....
.....

Appendix C

Focus Group questions –

The focus groups are conducted either face-to-face, teleconferencing or via Skype. The participants shall be contacted via email Thank you for your time and input. Participants are told the interview will be recorded electronically, and then later transcribed If you have any questions at all please feel free to contact me Ms. Nancy Adam-Turner for any technical helpdesk issues # 304-327-4052.

Scholars and notable senior adminstrators have stated how Community Colleges adapt to change, thus, making them more open to incorporate digital technology (Cohen, Brawer, & Kisker, 2016, Vaughn, 2006). With that premis are there expectatins that all areas of instruction and administration include digital technology?

Digital Literacy Adoption.

A] How has incorporating academic technology influenced teaching methods?

Please explain …….

……

Please explain why not…….

……

B] Does the institution have particular faculty digital literacy (DL) standards for instruction in place?

Please explain …….

……

Please explain why not…….

……

C] How do you perceive digital literacy (DL) might enhance student learning outcomes (SLO)?

Please explain …….

……

Please explain why not……

……

Digital Literacy (DL) and digital Information Literacy (DIL) Inclusion

D] What is your understanding of the faculty's DL role compared to the library's role in DL-IL?

Please explain ……

……

Please explain why not……

……

E] How would you envision broader faculty/ librarian's incorporation of DL & digital information literacy DIL?

Please explain ……

……

Please explain why not……

……

F] What sort of training opportunities and content support assistance to faculty/ librarians for DL & DIL?

Please explain ……

……

Please explain why not……

……

THANK YOU FOR TAKING THE TIME TO TALK WITH ME- Your Professional Experiences and Opinions are most valuable

Appendix D
Participant Letter of Consent (*participation in Interview Research*)

I _____, volunteer to participate in a research project conducted by Nancy Adam-Turner, MLS ABD (Principle Investigator). I understand that the project is designed to gather information on my attitude (epistemology) towards Digital Literacy (DL) and Digital Information Literacy (DIL) adoption with academic technology incorporation as components in my teaching style on campus. I will be one of approximately 25 people being interviewed for this research.

1. My participation in this project is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one on my campus will be told.

2. I understand that most interviewees in will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.

3. Participation involves being interviewed by researchers from Bluefield State College. The interview will last approximately 45-55 minutes. Notes will be written during the interview. An audio tape of the interview and subsequent dialogue will be made. If I don't want to be taped, I will not be able to participate in the study.

4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

5. None of your responses will be shared with any other party, only those involved in the study will have access to results. This precaution will prevent my individual comments from having any negative repercussions.

6. I understand that this research study has been reviewed and approved by the Institutional Review Board (IRB) for Studies Involving Human Subjects: Behavioral Sciences Committee at the Old Dominion University, VA. For research questions regarding subjects, the Institutional Review Board may be contacted through Dr. Dana Burnett, dburnett@odu.edu, Education Leadership office, ODU, VA.

7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

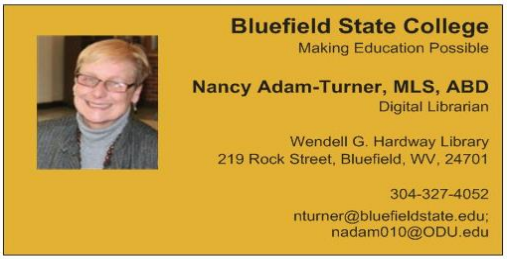
8. I have been given a copy of this consent form.

_____:___/___/_____ _____

My Signature and Date Professional Department.

_____ _____

My Printed Name Signature of the Investigator



For further information, please contact: Nancy Adam-Turner, MLS, and Doctoral Candidate, Old Dominion University, VA. Digital Librarian, Internet & Instruction, Bluefield State College, Bluefield, WV 24701.
304-326-4056 (Ref. desk); nturner@bluefieldstate.edu

Introduction: Using this survey to collect information in an effort to identify the faculty and librarian's perceptions and attitudes of digital literacy (DL) toward learning using academic technology (AT). The information will help to identify what are the main issues that affect faculty and librarians DL and digital information literacy (DIL) inclusion into the curriculum. The study is are looking for solutions to improve DL adoption, inclusion in pedagogy and enhance student learning outcomes.

Table 3. Table of Specifications

	Cognitive		**Non-cognitive**	
Learning objectives—skills	Understanding—understanding of given information	Remembering—Recall or recognition of information	Thinking	Perceptions
Faculty and adjunct faculty instructors	What AT tools do you use as means for digital literacy (DL)? What are your concepts of digital literacy (DL)?	Have you had training to learn DL incorporation? Do you have a DL program or tool preference?	How do you consider DL useful to your pedagogy/ discipline?	Did you know DIL understanding improves student learning outcomes?
	Do you consider DL an integral component to your instruction?	How would you consider your level of DL self-efficacy?	How do you feel about students contacting you about DL matters?	What are the main issues/ barriers students face to DL & DIL?
Librarian & information technology Support	What is the librarian's role with DIL?	How do you provide IL & DIL content instruction and assistance to faculty for student learning?	What do you think are the reasons faculty do not incorporate DIL as part of the curriculum?	What are the types of support the librarian/library can offers to foster collaboration for teaching DIL?
Institutional administrators	What is your understanding of the faculty's DL role compared to the librarian's role in DL-DIL?	What sort of training opportunities and content support assistance to faculty/ librarians for DL & DIL?	How would you envision broader faculty/ librarian's incorporation of DL & DIL?	What do you think are the main issues for a lack of DL-DIL inclusion in the curriculum?

Table 3. This is the table of Specifications, which is a blue print of the questions that will be posed to all interviewee subjects. The interviewees are the faculty (to include adjunct faculty) librarians, technology support and institution administrators from community colleges in southern Virginia and West Virginia college. The participants shall be contacted via email and telephone to request their participation in the survey. The onsite sample participants will also be contacted by the researcher with a follow-up call in an effort to co-ordinate volunteering to do the face to face inteviews and a focus group.

Thank you for your time and input. If you have any questions at all please feel free to contact me. If you have technical questions please contact Mrs. Nancy Adam-Turner for any technical helpdesk issues # 304-327-4052.

Appendix E.

Mountain One- Location A

Pseudonym SPLA	5	14	13	15	6	4	12	3
Gender	F	F	F	F	F	F	F	F
Yrs. Teaching in HE	5	5	10	10	10	20	20	20
Discipline	GS-CHEM	GS-RAD	GS-RAD	GS-EMS	GS-MATH	ENG-SPEECH	GS-NURJS	PSYCH
Professional Dev. Confr. (a)	N	Y	Y	Y	Y	n/a	Y	n/a
DL training (b)	N	N	Y	N	N	n/a	Y	n/a
DL	7	7	0	0	5	0	8	0
DL	7	7	5	0	5	0	6	10
IL	6	9	3	5	0	1	6	10
IL	0	9	5	5	0	1	6	10
IL	0	8	5	5	1	7	7	10
IL	7	10	n/a	10	1	10	0	10
DIL	5	0	0	5	0	0	8	10
DIL	0	5	5	5	0	0	8	10

Pseudonym	16	10	11	2	7	8	1	9
Gender	M	M	M	M	M	F	F	F
Yrs. Teaching in HE	10	15	20	20	20	20	20	20
Discipline	GS-EMS	ENG	MATH	ENG	SOC	LIS	LIS-ADMIN	DEV-ENG & Math-ADMIN
Professional Dev. Confr. (a)	Y	Y	N	Y	Y	Y	Y	Y
DL training (b)	n/a	Y	n/a	Y	Y	Y	Y	Y
DL	7	8	0	7	10	0	5	8
DL	7	8	0	0	10	0	5	8
IL	9	8	5	8	0	10	8	10
IL	9	8	5	8	10	10	8	8
IL	9	9	0	8	10	10	10	8
IL	10	10	0	10	10	10	10	10
DIL	9	0	n/a	5	10	0	0	8
DIL	9	8	0	5	8	10	5	7

Appendix E. (cont'd)

Mountain Two –Location B

Pseudonym SPLB	2	12	8	4	10	6	14	5	1	7	9	3	11	13
Gender	F	F	F	F	F	F	F	F	F	M	M	M	M	M
Yrs. Teaching in HE	NEW	1 SEM	2	4	5	10	15	15	20	10	15	20	20	20 +
Discipline	ENG	ENG	BUSN / Math	GS	PSYCH	GS	Applied Science & Tech	GS	LIS	AD MIN	IT	GS	GS	AD MIN
Professional Dev Conference (a)	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
DL training (b)	YES	NO	NO	NO	YES	NO	YES	YES	YES	NO	YES	NO	YES	NO
DL	9	5	8	10	2	1	9	4	9	4	10	2	5	4
DL	7	5	10	2	3	4	5	3	10	4	10	1	5	n/a
IL	9	8	10	2	1	7	10	4	10	4	10	1	5	4
IL	9	7	7	1	1	10	10	4	10	4	10	1	5	4
IL	8	7	9	2	5	1	10	7	10	4	2	1	5	0
IL	8	7	9	1	5	1	10	7	10	4	2	1	5	0
DIL	5	6	8	1	1	2	10	10	10	4	1	2	5	5
DIL	5	6	8	1	2	1	8	7	9	4	10	2	5	4

Appendix F

Location A (1) and B (2) by Disciplines DL, IL, and DIL Self-Efficacy Averages.

Location A - 1 Discipline	**Self-efficacy**	**Tipping point**
MATH	4.7	2
ENG	15.21	2
GS	15.58	2
PSYCH	21.67	2
DEV-ENG & Math	22.3	2
LIS	24.56	2

Location B - 2 Discipline	**Self-efficacy**	**Tipping point**
MATH	4.7	2
ENG	15.21	2
GS	15.58	2
PSYCH	21.67	2
DEV-ENG & Math	22.3	2
LIS	24.56	2

Appendix G.

Participants Data Findings Statistical Analysis

As the research questions reviewed participants' perceptions of DL and self-efficacy a Chi square and Fisher-Irwin tests is chosen for probability of variance where N-1 Two Proportion test is for comparing independent proportions for small sample sizes (Campbell, 2008). The test assessed whether the goodness of fit of the mean observed difference represented statistical significance between the two groups of two by two tables with small sample recommendation. When the expected occurrence counts fall below 1, the Fisher Exact test is used, where the variables under examination, (a) and (b) are mutually exclusive events. In this case participants' (N=41) professional development probability of variance ratio for group one faculty including librarians and group two factored the variables influence of professional development; (a) conference attendance and (b) discipline specific digital literacy training.

Table 16. Participants Probability Results Professional Development Variables (a) and (b)

Participant Group	Total Possible Event Occurrences	Professional Development Variable (a)	Professional Development Variable (b)	*P* - Value
SPLA Faculty & Librarians	16	11	7	
	There is a 83.94% chance the proportions are different. There is a 91.97% chance Group 1 has a higher proportion.	68.75	43.75	Two Tailed p-value: 0.16 One Tailed p-value: 0.08
SPLA Administrators	6	6	5	
	There is a 0% chance the proportions are different. There is a 50% chance Group 1 has a higher proportion.	100	83.33	Two Tailed p-value: 1 One Tailed p-value: 0.5
SPLB Faculty & Librarians	14	12	8	
	There is a 94.98% chance Group 1 has a higher proportion.	85.71	57.14	Two Tailed p-value: 0.10 One Tailed p-value: 0.05
SPLB Administrators	5	4	3	
	There is a 48.73% chance the proportions are different. There is a 74.37% chance Group 1 has a higher proportion.	80	60	Two Tailed p-value: 0.51 One Tailed p-value: 0.25

The conditional probability formula *P(A | B):* results shown in table 16. Demonstrate a statistical significance implied that professional development variable (a) conference attendance had a greater influence on group one faculty, librarians than group two administrators DL self-efficacy. A more in-depth probability of variance analysis should be performed that includes the sample participants' years of experience, gender and subject disciplines to understand better the implications of DL and DIL data to recognize the differences and identify correlation between variables.

Appendix H.

Participants Descriptive Statistics Analysis

Descriptive statistics for all participants in the three classification groups of administrators, faculty members and librarians' also suggested variation in the three literacy areas means shown in table 17 and 18. At location A across the three groups DL, IL and DIL self-efficacy responses reported a high cumulative mean value for IL, and lower DL and DIL mean values scores, shown in table 17 as expected.

Table 17. Location A Participant Groups Cumulative DL, IL and DIL Self-efficacy Scores

	Participants Group		
	Administrators	**Faculty members**	**Librarians**
Literacy Category Means			
DL (cumulative)	13	4.22	5
IL (cumulative)	36	25.22	38
DIL (cumulative)	10	9	10

Table 18. Location B Participant Groups Cumulative DL, IL and DIL Self-efficacy Scores

	Participants Group		
	Administrators	**Faculty members**	**Librarians**
Literacy Category Means			
DL (cumulative)	6	10.91	19
IL (cumulative)	12	17.1	40
DIL (cumulative)	8.5	9.64	19

In a comparison between the two locations a couple of discreet differences were found. Location A faculty members and administrator participants show an average of approximately < 30 score higher IL cumulative self-efficacy value rating compared the location B groups. Location B faculty participants' groups show an average almost even score match in DL and DIL cumulative self-efficacy value rating compared the location A groups. The unexpected participant group anomaly was between the two locations librarian's scores, IL comparatively the same but the location B librarians DL and DIL scores showed more than a 50% higher cumulative mean scores. These results are interpreted as evidence of the different faculty disciplines that location B librarian support with IL instruction, but also DL and DIL support with the institutions digital technology and LMS programmatic demands.

VITA

Nancy Adam-Turner, MLS ~ Digital Knowledge Management
email:nturner@bluefieldstate.edu, & nadam010@odu.edu

Education:

Community College Education Leadership Ph.D. Old Dominion University, VA, Graduate Dec, 2016
ILLI, Johnson C. Smith University Information Literacy Leadership Institute ILLI, NC, Feb 2008/09
M.L.S., Library and Information Science, Catholic University of America, DC, Feb 1997
M.Ed., Education, London Montessori Institute & College, UK, Feb 1985
Virginia Certification of Librarianship, State of Virginia, Aug 2002
Quality Matters (QM) certificates, instructional design and online class development review, 2015

Professional Skills, Subject Area Expertise, & Training & Awards

- Library Director/Project Manager/ Records Management & Digital Knowledge Systems Analysis
- Training and Technical Assistance Expertise; and Language Support Services
- USAF- 5 STAR Air Force Library of the Year 2006/ Civilian of the Quarter 2005
- Central Texas College, BAFB Educations Division-Spring 2005, Web Authoring, 1 credit class.
- USDA GRADUATE SCHOOL- FALL 2003, Inside XML, 2 credit class for professional development.

WORK EXPERIENCE:

Bluefield State College- Wendell G. Hardway Library February **2007 to present**
Bluefield, WV 24701: ***Digital Instruction Librarian:***

- Manage Digital Information Literacy (DIL) program digital resources instruction all levels & all formats of resources. Maintain DIL instruction web pages content and databases as well as electronic programs.
- Establish E-learning library Digital Information Literacy program, Blackboard online education program for students and Faculty and distance learning to support our satellite institutes. Expand onto Microsoft 'OneDrive' Cloud- Digital Learning Commons for Digital Literacy web resources.
- Prepare and complete a taxonomy and naming convention for BSC Higher Learning Commission (HLC) Accreditation Assurance argument report 2016, for the Director of Institutional Research. Organize electronic evidence knowledge base, and link all documents to report content into the HLC online data entry system.
- Bluefield State College, Biennial Regional Technology Conference Co-chair, 2013, 2015, 2017. Also a presenter for digital learning resources, library digital literacy and interactive the classroom
- Prepare and complete a taxonomy and naming convention for BSC Higher Learning Commission (HLC) Accreditation Assurance argument report 2016, for the Director of Institutional Research. Organize electronic evidence knowledge base, and link all documents to report content into the HLC online data entry system.
- Manage & expand the student interactive remote response program Turning Point "Clickers." Established in the library 2009, incorporated in Nursing school and the School of Business as a teaching and student assessment tool.
- Member BSC Strategic planning committee, BSC reaccreditation for Sept 2011 evaluation site-visit. Chairman, BSC Classified Employee Council (2011-2012).

USAF- Bolling Air Force Base May, 2004 to July 2006
Washington DC 20032: ***Library Director GS-12 (NF IV)***

- Management and supervision of 7 staff positions, Reference Librarian, IT Specialist; library technicians & aides; flex library aides plus volunteers/STEP stay in school library assistants.
- Projected annual budget of approx. 300,000.00 per annum to include salaries, annual contracts, [books, serials and DVDs] IT equipment and computer technology upgrades.
- FY05 Developed new library strategic plan, completed full inventory; FY 06 new marketing plan. Maintained operation instruction in accordance to Air Force & library policy amendments.
- Sept. 04 upgraded legacy library administrative program; from a UNIX based system to a web-based program- Softlink America Liberty3.net. Installation, data transfer and migration, staff training. BAFB Library Webpage online catalog and patron account records.

HEADSTART Bureau/ACF/HHS August, 2001 to April 2004
Trans Management Systems Corporation, Washington, DC
Senior Reference Librarian/Information Specialist Manager; (HSIPC)

- Training and Technical Assistance Branch- Developed and installed an internal records management program, set up protocols and directions for HeadStart managers and officers records files, included an achieves dating back -1985. Plus new policy & HeadStart initiatives, a database of amendments and corrections to HeadStart congressional regulations.

Census Bureau February, 2001 to July 2001
Suitland, MD: ***Systems Librarian, Census Library Systems-SIRSI***

- Managed the SIRSI Unicorn library system and ILS on an NT platform for the library collection, Novell platform.

Library of Congress December, 1999 to October 2000
Washington, DC 20540: *Project Manager Sheet Shelf List (SSL Archive) Folio Data Conversion*

America Online April, 1999 to July 1999
Dulles, VA: ***Internet Database Manager/Web Research Editor Special project***

PUBLICATIONS & PRESENTATIONS:

- Society for Information Technology and Teachers Education (SITE) 2016, proposal brief publication and poster presentation**, "**Does Academic Technology Namely Digital Information Literacy (DIL) Enhance and Improve Student Learning Outcomes?" March 21-25th, Savannah, Georgia.
- Dissertation proposal brief paper. Adam-Turner, N. (2016). Does Academic Technology Namely Digital Information Literacy (DIL) Enhance and Improve Student Learning Outcomes? In *Proceedings of Society for Information Technology & Teacher Education International Conference 2016* (pp. 1519-1525). Chesapeake, VA: Association for the Advancement of Computing in Education (AACE).

Grant Proposals- unfunded Grant Proposals

- **2016 Institute of Museum & Library Services (IMLS)-Laura Bush Foundation, Planning grant. Exploring Technology and Digital Information Literacy (DIL) to design and implement a Virtual (digital) Librarian program that Improves Learning Outcomes?** Bluefield State College (BSC) proposes a planning grant for the establishment of an Academic Technology (AT) Research committee sponsored by the office of the provost at Bluefield State College (BSC), managed by BSC digital librarian, and partnered with the surrounding local higher

education institutions' chief academic officers' members that lack either a digital librarian and/or a librarian. The research will explore the issues and current systems status of each institution in order to identify the best strategies for implementation of a prototype VLP model. The goal is to implement a VLP model to expand digital resources into live dashboard enhancing student learning outcomes. A broader impact is for the VLP model to be transferable to minority serving institutes (MSI) and Historically Black Colleges (HBCU).

- **2015 Institute of Museum & Library Services (IMLS) Sparks Go fund;** Bluefield State College (BSC) - Digital Information Literacy (DIL) - Outreach Program for Juvenile/Young-Adult Drug Offenders. The digital information literacy (DIL) program as an outreach program for the community to instruct "at risk" juveniles and young adults. BSC will partner with the Southern Regional Juvenile Drug Court (JDC).
- **2014 Institute of Museum & Library Services (IMLS) Laura Bush 21 Century Foundation.** Bluefield State College- Library's "Making Research a Reality" an interactive STEM based information literacy foundation student program in collaboration with biology faculty BIO-research studies. This project is aimed at improving the educational access and academic achievement of underprepared and underserved, low-income students.
- **2014 Dept. of Education: First in the World (FITW).** Bluefield State College Learning Commons: STEM Incubator for a Learning Community. Establishment and utilization of Science, Technology, Engineering and Mathematics (STEM) incubators to increase enrollment and completion of the underrepresented, underprepared and low-income students in STEM degree and certificate programs through a 4-year, tiered method and evidence of promise standard.
- **2008 Dept. of Education,** Office of Postsecondary Education request for RFPs from the Improvement of Postsecondary Education (FIPSE) competition. An information literacy proposal to develop and establish an Information Literacy Leadership (ILL) program at an HBCU, Bluefield State College.
- "2001 Literacy Toolkit" updated content and links from 2000 edition. Published Nov 2001 available on line @ www.headstartinfo.org/publications.
- National Head Start Assoc. NHSA 2002 Annual Conference Phoenix, AZ. Designed book poster insert and Early Head Start research table for Head Start Education Branch literacy toolkit presentation packet.
- Special Libraries Association Annual Conference- San Antonio, Texas, Jul. 2001. Guest speaker for the Information & Technology Committee on "A Digital Library project, interaction between Federal and Private sector contracts"
- "2001 Literacy Toolkit" updated content and links from 2000 edition. Published Nov 2001 available on line @ www.headstartinfo.org/publications.

PREVIOUS AFFILIATIONS AND MEMBERSHIPS

- American Libraries Association, ALA, graduate member, 2015 to present.
- The Library and Information Technology Association (LITA) is the division of the American Library Association, member 2015 to present.
- West Virginia Library Consortium (WVLA) 2007-2009 & 2010 to present professional membership.
- Virginia Teachers Association 2009. Virginia Libraries Association, VLA membership in 1999-2000.
- Special Libraries Association, SLA 1995-1996, Student Member, Washington DC Metropolitan local Chapter, Awards Council.