Study to Establish Levels of Digital Literacy for Soldiers and Leaders in the U.S. Army

Jane Mobley, Ph.D.
Jane Mobley Associates

Prepared for: U.S. Army Training and Doctrine Command (TRADOC)

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Prior to the 21st century, literate *defined a person's ability to read and write, separating the educated from the uneducated. With the advent of the new millennium and the rapidity with which technology has changed society, the concept of literacy has assumed new meanings… [today the "new literacy" describes those who] possess digital competencies to effectively navigate the multidimensional and fast-paced digital environment. . . Some studies describe non-IT literate individuals as burdened with an accent – non-native speakers of a language struggling to survive in a strange land.*

– *Educause Quarterly* 2008

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Acknowledgements

This report reflects the research and analysis of a multi-disciplinary team of individuals from Jane Mobley Associates (JMA), Science Applications International Corporation (SAIC) and 2md LLC, who brought academic, industry and Army experience to the study.

Many Army Soldiers, leaders and civilians made this research possible and the study team is grateful to everyone who took time to work on it with us. We are especially indebted to:

Ms. Marta Bailey, Director
TRADOC G3/5/7 Advanced Concepts Directorate
Mr. Mitchell Bonnett
Systems Division, HQ TRADOC, G-7 Advanced Concepts Directorate
Mr. Michael Sheridan, Chief,
Systems Division, HQ TRADOC, G-7 Advanced Concepts Directorate
COL Harry Tunnell, Executive Officer to the Commanding General,
U.S. Army Accessions Command

Focused research on a complex issue under tight schedule constraints depends for success on experienced direction, and this study team was exceptionally fortunate in the project leadership provided by Ms. Bailey and Mr. Bonnett.

Ms. Bailey served as project director. Her experience developing the Army Learning Concept for 2015 framed a long view for the research, lifting the inquiry toward 2015-2020 and the role of Digital Literacy in career-long learning.. Her enlightened guidance focused the team's work and her thoughtful editing substantially improved the final report.

Mr. Bonnett served as project manager. An instructional cognitive technologist, Mr. Bonnett brought to the study a combination of active Army duty, technology-related career experience and scholarly work that helped jumpstart the research effort and steer the team's progress throughout the study. Without his enthusiasm for the project and his ready availability to the team, the range of inquiry would have narrowed and the research schedule could never have been met.

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Executive Summary

The Commanding General, U.S. Army Training and Doctrine Command (TRADOC), directed a study of Digital Literacy to meet a variety of Army requirements in the "digital age." Specifically, the study was designed to:

- Characterize requirements for baseline levels of digital competence for all cohorts across the Army at accession;

- Provide analysis that identifies, determines and discusses appropriate levels of advancing Digital Literacy within each cohort (Enlisted, Warrant Officer, Commissioned and Civilian) for all cohorts, all levels;

- Develop Digital Literacy taxonomy (method of classification), lexicon (defined words) and semantic (language);

- Document Digital Literacy knowledge, skills and abilities to include ability to access, create, evaluate, manage, integrate and communicate information from multiple sources, thereby providing common Digital Literacy; and

- For all cohorts, IMT level: Describe competencies necessary for a Soldier/Civilian to perform tasks using specific technology.

The research hypothesis for this study was formulated out of the levels/cohorts model and vocabulary that the Army has used traditionally and successfully for education and training. The overall research findings do not support the primary hypothesis that Digital Literacy will or should manifest in advancing levels by cohort. Rather, Digital Literacy across the Army will be expressed in the following levels:

1. Baseline Level – includes all Soldiers and DA Civilians who would be expected to be competent, responsible users of digital technology and able to communicate, locate, transform and share ideas and information through digital devices

2. Functional Level – includes operators and managers possessing specific knowledge, skills and abilities to use, manage, assess and understand digital technologies and their application

3. Advanced Level – primarily composed of Cyber Warriors, Developers, Technical Engineers, System and Network Architects, CIO/CTO, etc., responsible for implementing/developing and maintaining the digital technologies and applications

4. Expert Level – the highest-capability users, managers and developers, representing the training, expertise and experience required to control risks and optimize opportunities of digital technology

Based on research findings, the study team recommends a widely usable definition focused on both professional and personal development, with a values statement that grounds the digital experience in the context of Army Values. This definition can be used across the Army and over time, because it is supported by a structure of Digital Literacy levels with defined competencies that can be customized for various echelons of learning and Military Occupational Specialties, will change in the rapidly expanding digital environment and can be readily updated.

Digital Literacy is the individual's awareness, attitudes and abilities to appropriately use digital tools in order to accomplish his or her Army mission and to better enable personal and professional development.

A digitally literate member of the Army team integrates relevant information and knowledge with judgment to support mission requirements, safeguard the security and wellbeing of others on the team and uphold the Profession of Arms.

Consolidated Study Findings

Digital Literacy terminology and definitions vary widely – across the Army and externally in industry and academia.

Army personnel surveyed/interviewed recalled little formal Digital Literacy training. The same held for study participants from industry and academia.

There is not a collective, Army-wide understanding of what Digital Literacy can or should accomplish for the Force.

Available testing (off-the-shelf or customizable) could be used when a person enters the Army to assess baseline ICT capabilities.

Digital device competency advances effectively with facilitated or peer-based learning, as opposed to classroom or formal structured content delivery.

Continuing development of Digital Literacy standards within K-12 education and implementation of curriculum to attain those standards will result in more predictable levels of digital competencies among new recruits by FY15.

If the Army made very few adjustments to training to accommodate Digital Literacy, by 2015, the Army would still be a substantially digitally literate Force.

Consolidated Study Recommendations

Adopt an Army-wide definition of Digital Literacy.

Formalize Baseline Digital Literacy requirement and assessment/instruction.

Convene senior leadership representative of Army organizations to identify overarching objectives that greater digital competency could address.

Conduct pilot efforts with available off-the-shelf instruction and assessment packages to determine suitability for Army-specific needs and possible incorporation into ASVAB.

Develop and reward collaborative peer-led digital learning and practice.

Evaluate and monitor state high school Digital Literacy competencies requirements to understand what baseline Digital Literacy levels K-12 instruction will provide new recruits. Require recruits from states without standards for digital competency to provide evidence of school-based or self-directed digital training.

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Overview of the Task

The Army of the future will learn differently, build leaders differently, train differently and redesign itself more quickly.

– GEN Martin Dempsey (*TRADOC Live* 9 MAR 2010)

The Commanding General, U.S. Army Training and Doctrine Command (TRADOC) directed a study of Digital Literacy to meet a variety of Army requirements that have taken on new dimensions in the digital age, when Soldier capabilities in the digital environment will affect traditional and emerging questions around the future force. Specifically, the study was implemented to address capabilities development. The results of the study were envisioned to be used by TRADOC leadership to:

> *make informed decisions about the capabilities of Soldiers within the Army's formations; make informed decisions about future force structure; and enable a continuum of learning that allows the Army to effectively and efficiently train and educate Soldiers and leaders throughout their careers. (Memorandum for Distribution, Mr. Joe E. Gallagher, Deputy Chief of Staff, G-3/5, 5 OCT 2011)*

The study was envisioned to complement other Digital Literacy initiatives related to TRADOC G3/5/7. These included:

- Multi-faceted initiatives, such as the Army Capabilities Integration Center (ARCIC) work under the program name Connecting Soldiers to Digital Apps (CDSA), designed to explore opportunities and risks associated with equipping Soldiers with smartphones for use in operational, administrative and training tasks;

- Shared initiatives, such as multi-Services studies on making digital capabilities part of the Armed Services Vocational Aptitude Battery (ASVAB) used to assess potential candidates for service;

- Branch-specific inquiry, such as the Signal Corps Center of Excellence (Signal CoE) study of digital communication tasks; and

- Army-wide inquiry, such as U.S. Army Accessions Command's (AAC) interest in testing for digital competencies among Future Soldiers and newly assessed personnel.

The current study was intended to examine the context of the digital environment, providing an outside perspective drawn from industry and academia about definitions of Digital Literacy and what expectations could be derived from those and applied to Army personnel in advancing echelons of training and responsibility.

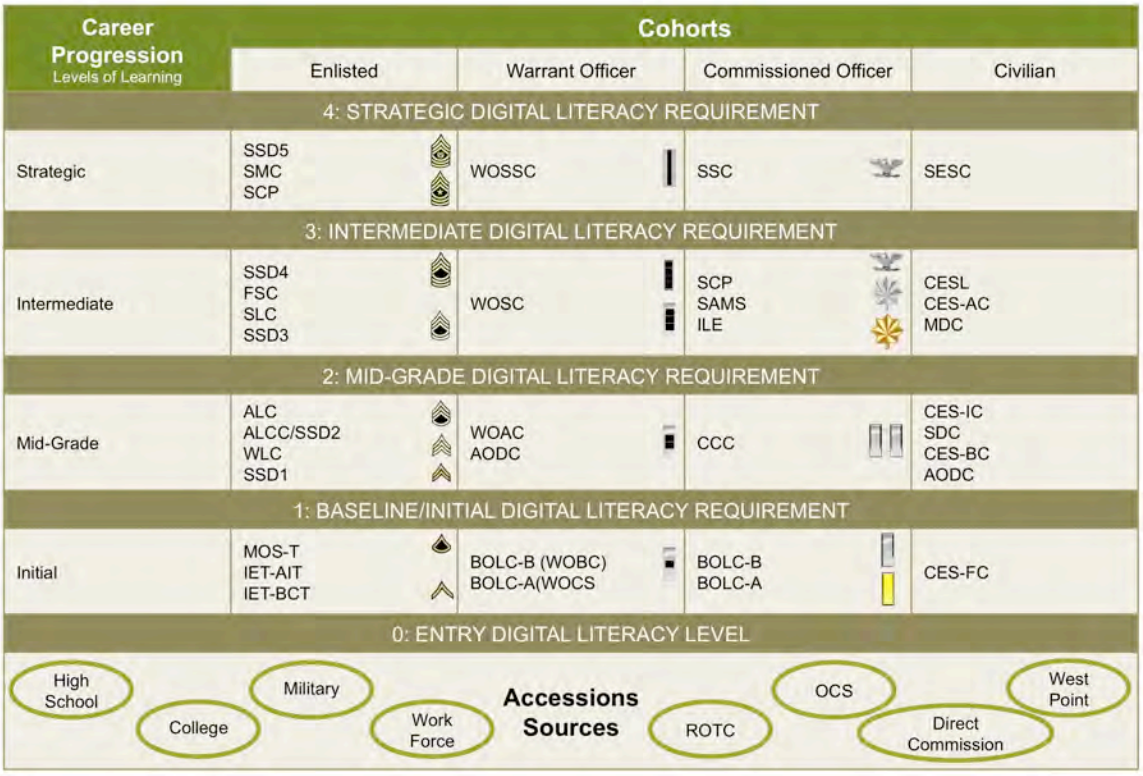

Figure 1: Framework for Analysis of Advancing Levels

The initial study requirement anticipated that Digital Literacy would advance in levels reflective of individuals' advancement in their cohorts (defined for the study as Enlisted, Warrant Officer, Commissioned Officer and Civilian).

The focus of the study was on language widely used to discuss and develop Digital Literacy in organizations, academic settings and generally, and on definitions of competencies thus described in the relatively new lexicon of the digital environment. An outside contractor team was engaged to develop a concept report that would:

- Provide an external viewpoint on Digital Literacy
- Establish baseline levels of Digital Literacy
- Examine broad perspectives by cohort (Enlisted, Warrant Officer, Commissioned Officer and Civilian) and by Professional Military Education levels (as illustrated in Figure 1).

Specifically, the study team was directed to establish and characterize a baseline that recognizes, captures and defines advancing levels of Digital Literacy for the Army and to address the following:

1. Establish definitions for baseline Digital Literacy and then for each advancing level of Digital Literacy;

2. Characterize requirements for baseline levels of digital competence for all cohorts across the Army at accession;

3. Provide analysis that identifies, determines and discusses appropriate levels of advancing Digital Literacy within each cohort (Enlisted, Warrant Officer, Commissioned Officer and Civilian) for all cohorts, all levels;

4. Develop Digital Literacy taxonomy (method of classification), lexicon (defined words) and semantic (language);

5. Document Digital Literacy knowledge, skills and abilities to include ability to access, create, evaluate, manage, integrate and communicate information from multiple sources, thereby providing common Digital Literacy; and

6. For all cohorts, IMT level: Describe competencies necessary for a Soldier/Civilian to perform a task using specific technology.

The study was to focus on areas where TRADOC could have an impact, in particular Centers of Excellence, to inform the TRADOC common tasks, not branch or MOS-specific tasks; to consider what aspects may be "platform agnostic;" and to consider the function of Digital Literacy in lifelong learning. Guiding research questions were:

1. How are the baseline and advancing levels of Digital Literacy defined?

2. Are there universal or "common core" Digital Literacy requirements across all cohorts?

3. Is there is a "demographic gap" in Digital Literacy across the force?

4. Do Digital Literacy requirements differ across Army cohorts?

5. How well does the Army Training, Leadership and Education structure align/keep up with technology development pace and trends?

Additionally, the study team was asked to consider:

1. How will Digital Literacy learning demands change between now and 2015?

2. What will the 2015 Digital Literacy requirements be, and what Digital Literacy education will TRADOC need to implement to meet 2015 Digital Literacy demands?

3. What Digital Literacy education development recommendations emerge from the study?

The study team was supported by a Digital Literacy "TIGER Team" of stakeholders (Annex D) representing Centers of Excellence, the Combined Arms Center at Fort Leavenworth, Kan., and the Army Civilian University at Fort Belvoir, Va.

Approach

A multi-disciplinary research team was assembled to conduct this six-month study. The team was composed of study and analysis experts; thought and implementation leadership in digital enterprise; and professionals with wide reach in industry and academia and deep Army experience and understanding.

A dissertation design was applied as an overarching methodology to the study, along with data analysis to facilitate broader Digital Literacy conversations. The three primary phases of the study are depicted in Figure 2.

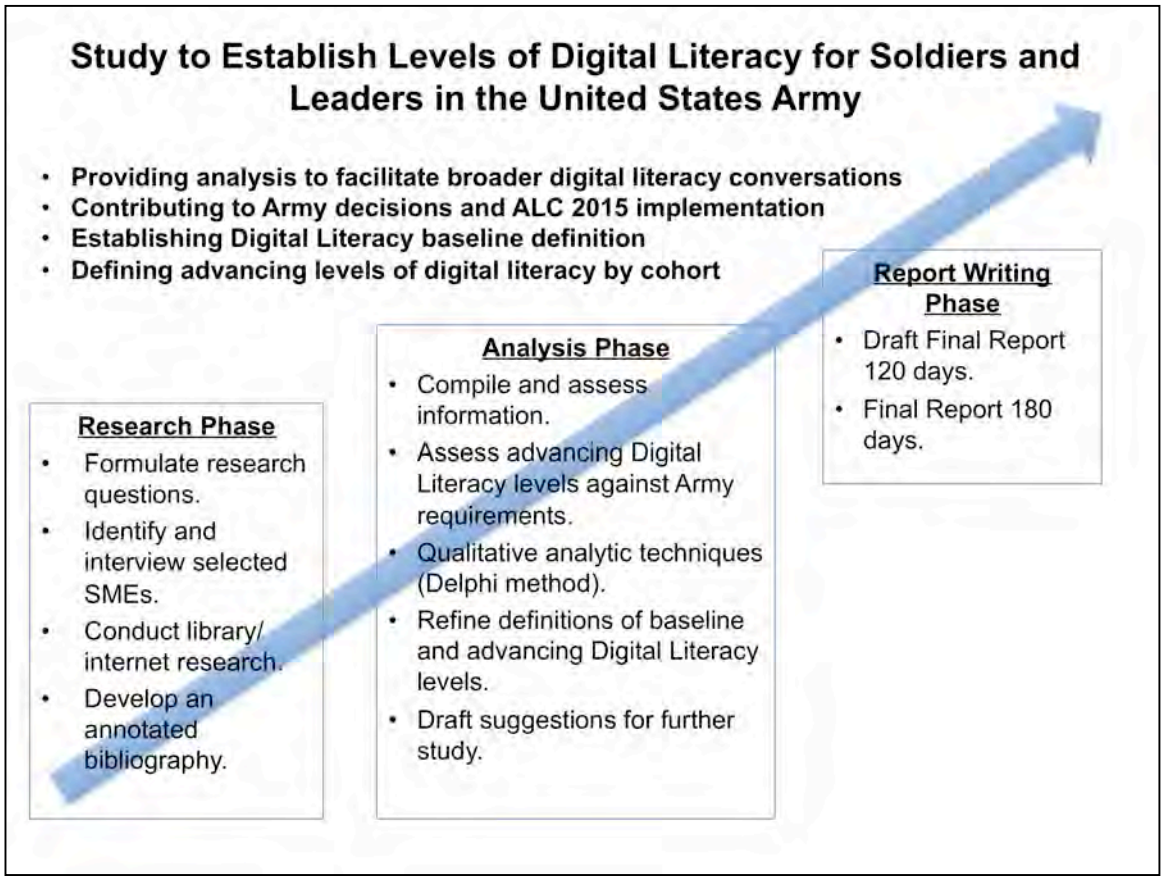

Figure 2: Research Design Methodology

Research Phase

The research phase included a scholarly literature review; in-depth interviews with professionals representing academia, industry and the U.S. Army; administration of a brief survey tool (to backup and enhance the data gathering and analysis alongside interview data); and multiple data calls and informational engagements with various Army organizations.

As a part of the research, the team examined more than 150 promising articles, papers, books or presentations; conducted interviews with 59 industry professionals and scholars representing academic institutions throughout the United States and an array of professionals from across the Army; analyzed data gathered from 42 surveys administered to backup and enhance data obtained in interviews; and reviewed multiple reports and documents from TRADOC recent studies (i.e., Signal CoE Study, USAAC Digital Literacy and Testing Study, studies on Common Core Requirements for Language and Cultural Awareness, the U.S. Army Learning Concept for 2015).

Analysis Phase

The analysis phase provided the opportunity for the summary of initial findings from all of the various components of the research activity to continuously inform progressing activities and phases of the study. Ultimately the research team conducted a thorough and thought-provoking analysis that identified and discussed the appropriate levels of advancing Digital Literacy within each of the study cohorts.

The team applied qualitative analytic techniques that allowed for the assessment of advancing Digital Literacy levels against Army requirements along with the refinement of definitions of baseline and advancing Digital Literacy levels.

Continuous engagement with the TRADOC study leadership team (TRADOC G-3/5/7 Advanced Concepts Directorate) provided multiple opportunities for preliminary reporting of study findings and course adjustments.

Reporting Phase

A carefully sequenced schedule for In Progress Reviews (IPRs) was implemented throughout the six-month study. The 30-day IPR was designed primarily for the study team to brief its study design/methodology, restate understanding of the study scope and objectives, provide an update on early research phase activities and obtain any additional guidance and relevant data from the TRADOC study leadership team (TRADOC G-3/5/7 Advanced Concepts Directorate). The 60-day IPR provided a more substantial brief of research phase findings and challenges. A 90-day IPR was presented to Deputy Chief of Staff, G-3/5 to provide an update on the study, report testing hypothesis and resulting premise for completion of the study and preliminary recommendations. This IPR provided the opportunity for TRADOC leadership to offer feedback on the study prior to briefing the TRADOC CG in the final portion of the study. TRADOC Deputy Chief of Staff G-3/5/7 and the Commanding General were briefed at approximately the 120-day mark in the study.

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Introduction

Demands of Operational Environment and Needs of Soldiers for Information and Connection

America's Army in the 21st century is arguably one of the most complex information environments on earth. Shaped increasingly by an era of persistent conflict and escalating threats, with Forces deployed across the globe, the Army Family is now more than a million personnel in uniform, as well as a quarter million Army civilians, with all their families, plus the constellations of commercial, industry and community people that support Army members' service. For this environment and these people dispersed around the world, the needs for information, direction, communication and connection are inexpressibly vast.

Soldiers at every level face an overload of information to process. For example, the amount of intelligence gathered by surveillance technologies has increased 1,600 percent since 9/11. Many studies are under way to determine how the human brain can cope with technology without being overwhelmed by it; for the military, this is a critical factor in combat and right decision making (Shanker and Richtel 2010). The need to receive, respond to and process information must be satisfied by means that unfailingly support the Army's mission, meet rigorous standards of performance, address myriad task-specific requirements and accommodate shrinking budget parameters.

Advances in technology paradoxically offer ways to meet vast information and communication needs and, at the same time, they add more layers of complexity. Digital devices hold limitless promise to reach across time and distance to deliver information and connection – but they also foretell unending demands for change, training, supervision and resources. Today, a range of discussions occurring from senior leader level summits to Future Soldiers' Facebook posts weigh the price to be paid on many levels for the Army enterprise to become a "digital Army."

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Army Digital Literacy in Context

Digital Literacy Global and National: The Context for Digital Literacy in America's Army

The pace of change related to digital technology is explosive. In 1993, the first person-to-person text message was sent. In just the past 10 years, the number of text messages exploded from 400,000 each day to 4.5 billion. Daily Google searches grew from 100 million to 2 billion. The average time a person spent online expanded from 2.7 hours a week to 18 hours a week. In 2000, Facebook, iTunes and YouTube did not yet exist (*Newsweek* 2010).

Almost as soon as one device or software hits the marketplace, the digital world adopts even newer devices, newer applications, newer terminology, newer ways to teach and conduct business, newer ways to think about communication and connect digital users. In the last three months of 2010, sales of smartphones topped those of computers for the first time: 100.9 million smartphones were shipped worldwide, a staggering 87-percent increase over the same period one year before (O'Brien 2011). At this momentum, how will the digital environment evolve and change 21st century culture in the next five to 10 years? Will there be instant thought transmission in a telepathic format? Permanent, unlimited cloud archive storehouses? Holographic displays? Powerful collaborative visualization decision-based tools (Anderson, Rainie 2010)?

Workers will need a functional understanding of the objective goal of their task rather than a specific tool skill because that tool will likely be replaced with several alternatives or will become obsolete (Kosatka 2010).

Already, educators face a shifting landscape when it comes to Internet technologies and their power to expand the learning potential of the digital environments' participatory cultures. Twenty years ago colleges had to teach digital skills; now students come in knowing as much as or more than the faculty (Small 2010). In industry, future digital workplaces will become increasingly complex and ever-changing. Workers will need a functional understanding of the objective goal of their task rather than a specific tool skill because that tool will likely be replaced with several alternatives or will become obsolete (Kosatka 2010).

How the Digital Sphere is Changing Culture

The Internet has upended geography by removing previously perceived constraints of space and place (Anderson, Rainie 2010). People can connect with others around the world through a cell phone, Wi-Fi network or some other digital means almost anywhere – libraries, airports and airplanes, cafes or coffee shops, community centers, bars and restaurants, public parks, houses of worship (Hampton 2009).

Today's youth are growing up with digital and interactive media technologies as an integral part of their lives. Teens are actively involved in what scholars describe as "participatory cultures" – cultures with relatively low barriers to civic engagement and artistic expression; strong support for creating and sharing one's creations; and various types of informal mentorship whereby what is known by the most experienced is passed along to novices. A participatory culture is also one in which members believe their contributions matter and they feel some degree of social connection with one another (Jenkins 2006).

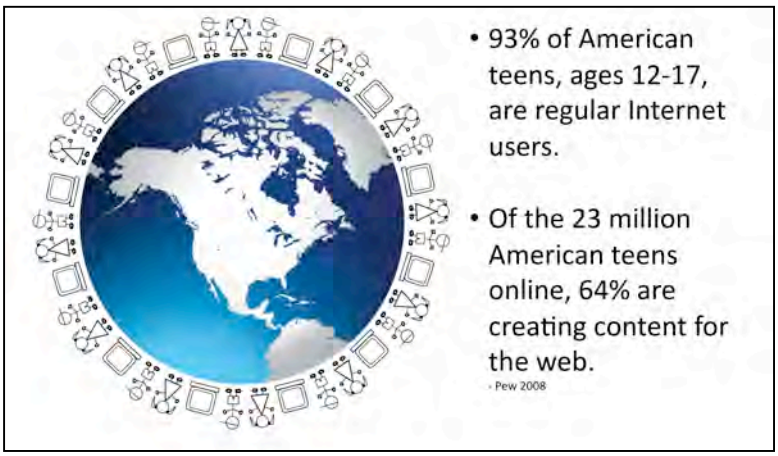

Figure 3: Internet Usage Among American Teens

Other cultural transformations include:

- The mobile phone has replaced the landline telephone as the most frequently mediated form of communication (Hampton 2009).
- People are spending more time online than they do watching television (*Newsweek* 2010).
- Cards and letters are the least frequent means of social contact (Hampton 2009).
- The "apps culture" has morphed the mobile phone from a voice device to a multi-channel device, to an Internet-accessing mini-computer (Percell *et al.* 2010).
- Almost anyone can create and distribute information on the Internet. Filters that once applied to production and distribution of print and visual media have changed, making it more difficult for the user to evaluate content within the social, economic, political and historical contexts in which it was produced (Livingstone 2003).
- Children who have access to computers have mastered pointing and clicking with a mouse by the time they are 3½. Pre-schoolers and toddlers play games on smartphones (Corebett 2010).

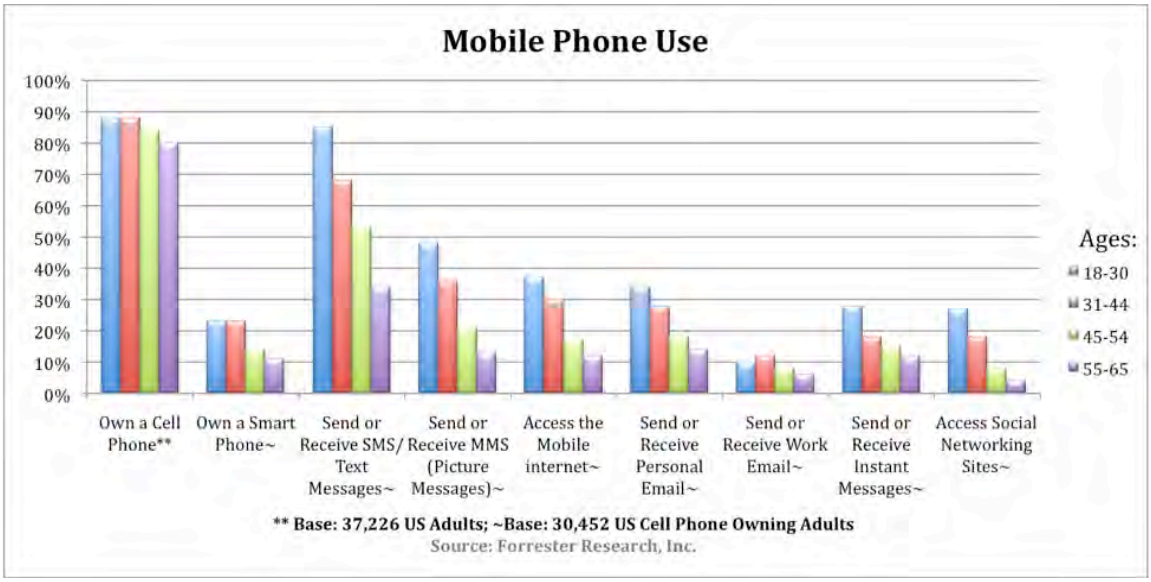

Figure 4: Mobile Phone Use

Picture in Time

The Pew Internet & American Life Project's *Generations 2010* report issued in December 2010 presents the most recent snapshot of how different generations use the Internet.

- More than 79 percent of all adults use the Internet.
- Generations that go online by age:
  - 93 percent of teens (ages 12-17)
  - 95 percent of Millennials (ages 18-33)
  - 86 percent of Gen Xers (ages 34-45)
  - 81 percent of Younger Boomers (ages 46-55)
  - 76 percent of Older Boomers (ages 56-65)
  - 58 percent of the Silent Generation (ages 66-73)
  - 30 percent of the G.I. Generation (ages 74+)

Other research studies revealed that:

- More than half of all teens have created media content, and roughly one-third of teens who use the Internet have shared content they produced (Jenkins 2006).
- A full 97 percent of teens play video games. Approximately one in five adults plays games every day or almost every day (Lenhart 2008).

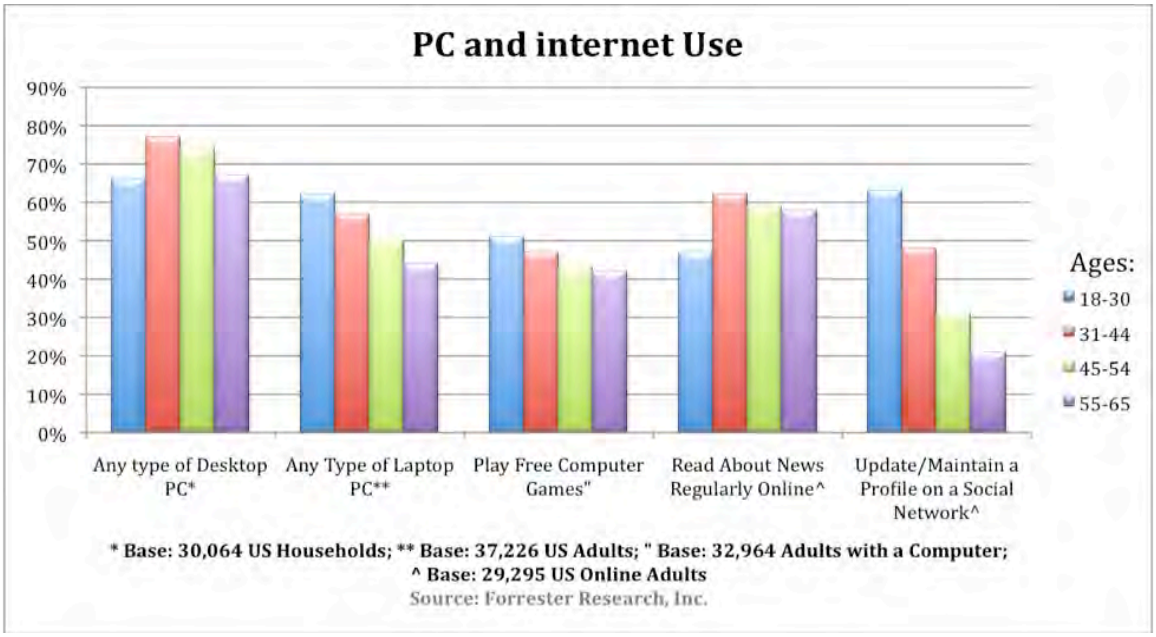

Figure 5: PC and Internet Use

International Discussions

At the Lisbon Council in 2000, European Union (EU) heads of state and government pledged to turn the EU into the world's leading knowledge-based economy by trying to ensure that every citizen had access to the information society and to fully exploit Information and Communication Technologies (ICTs) to prevent people from being excluded (EurActiv Network 2007).

The i2010 was launched in 2005 and was the European Commission's five-year strategy to strengthen the digital economy. The primary goals of the i2010 were:

- Create a Single European Information Space, which promotes an open and competitive internal market for information society and media services.
- Strengthen investment in innovation and research in ICT.
- Foster inclusion, better public services and quality of life through the use of ICT (Gerhard 2007).

More recently, the European Commission prepared its i2020 Strategy's 10-year digital agenda, designed to maximize the social and economic potential of ICT by increasing Digital Literacy through a more accessible Internet and through more e-learning. Examples of the EU strategic processes include:

- The International European Computer Driving License (ICDL/ECDL) is the world's leading credential for competency in computer use.

- The Youth on the Move initiative promotes and supports flexible learning pathways, non-formal educational activities, lifelong learning and learning mobility. It aims to extend and broaden the quality, attractiveness and responsiveness of higher education and improve the employability of young people (European Commission 2010).

- The SPreaD (Strategic Project Management Tool Kit for Creating Digital Literacy Initiatives) is a European collaboration that provides a conceptual design to evaluate, plan and manage large-scale Digital Literacy programs.

Non-European nations, including Canada, Australia and New Zealand, are also developing Digital Literacy standards and are studying the costs and benefits of accelerating ICT adoption and use by their citizens, but none as aggressively as the EU.

However, the main factors that limit Digital Literacy within the EU parallel those in the United States and other information societies, factors that may not be easily overcome:

- Poverty and social conclusion;

- Education and skills gap in ICT (Digital Literacy);

- Poor or no access to the Internet in remote areas or regions;

- Personal factors, such as age, gender or disability (EurActiv Network 2007).

Disparities

Not everyone in America owns a computer or has access to the Internet, a disparity that creates what some scholars have called a digital divide – a chasm between those who have or do not have computers in their homes and schools, as well as a broadband infrastructure to make the Internet quickly available 24/7. Because the Army recruits and enlists Soldiers from all streams of American life, rich and poor, urban and rural, high school graduates and Ph.D.s., issues that are linked to the digital divide will continue to be a significant factor in the near term (perhaps five years). However, as even the nation's poorest schools are now gaining computers enough for all students to use regularly, this digital gap will close.

> "Increasingly, as computer use is ever less a lifestyle option, ever more an everyday necessity, inability to use computers or find information on the web is a matter of stigma, of social exclusions; revealing not only changing social norms but also the growing centrality of computers to work, education and politics" (Castells 2002).

Other disparities continue to exist.

- Age is the most common barrier to ICT adoption and use. People who find the Internet and digital technology irrelevant or uncomfortable are most often older adults, people over the age of 55 (Pew 2010).

- The second leading reason for non-adoptions is cost. According to Pew Research Center, 63 percent of households earning less than $30,000 are online; in comparison, 95 percent of households with incomes above $75,000 are online. Children in low-income homes are likely unable to access Internet-based sources of information for school projects or supplemental learning material (Pew 2010).

- In addition to basic computer access, there is a usability divide separates users familiar with the digital environment from those who need comprehensive training in order to "catch up" with the current standards (Schubert, Hickey 2009).

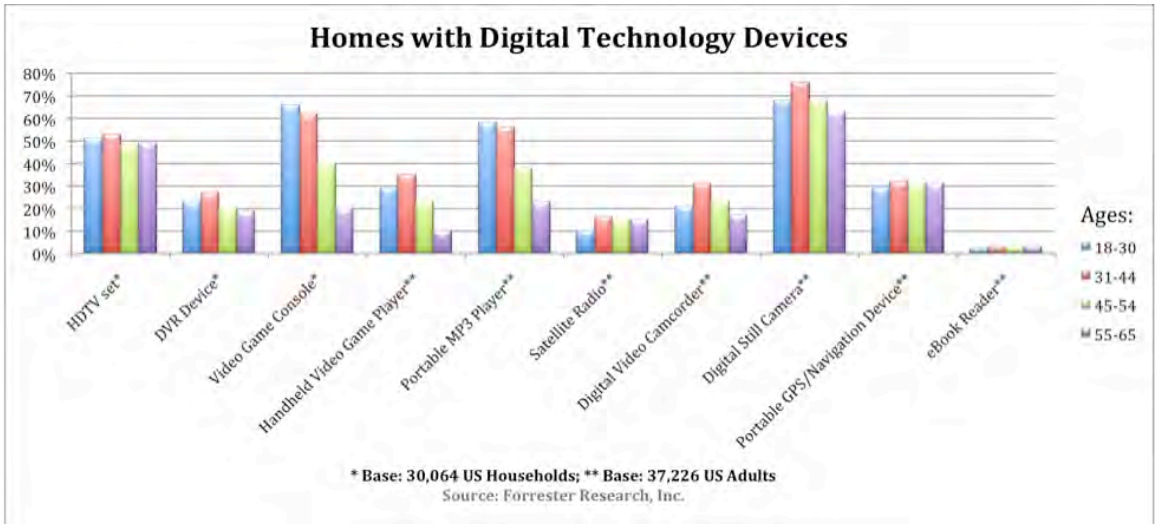

Figure 6: Homes with Digital Technology Devices

Industry's Perspective on the Digital Environment

Within industry, ICT early adoption and advancing levels of use are more common than in academia, primarily because of market competition to keep and attract customers. While the basics of buying and selling will not change in the future, what will change is how businesses employ ICT to help their customers find solutions and at the same time further the bottom line (Barker 2010).

In the future, the supply chain will continue to adopt more sophisticated ICT and will be prepared to interface, communicate and collaborate effectively with multiple technologies (Brown 2010). ICT is already making workers more efficient and productive. Industries report that their investment in Digital Literacy training and

infrastructure has reduced organizational support costs because spreading ICT skills throughout an organization results in more efficient use of IT staff and fewer staff required to handle basic administrative functions; and user satisfaction and utilization of IT systems are improved. Other benefits of higher Digital Literacy today are improved communication and social competence within the workplace. ICT will continue to evolve from implementation of systems that replace routine work to building systems that re-engineer business processes (Media Awareness Network 2010, Bunker 2010).

The challenge with forecasting the landscape of Digital Literacy comes in knowing the software and hardware in development channels right now (Hofstra 2010). Digital space is changing incredibly fast and commercial organizations are trying to figure out how the landscape is changing outside their companies. Mobile products, digital pads, games across the globe, the explosion of social media – all happened in the last five years. Transformation will be even greater in the next five years. Sophisticated companies question whether digital still be the baseline or whether another technology will have been introduced (Barker 2010). Companies will have to adjust to the idea of buying and upgrading technology more rapidly – the mentality will be more "flash and throw it away" versus investing in a system and application that will be relevant for at least five years. Digital investment will take on a transaction approach (Brown 2010).

While the age of the user often plays into Digital Literacy competence, most Digital Literacy "gaps" identified in industry are connected to a person's need to execute his/her job. If being more digitally capable allows people to do their jobs faster, and possibly get out of existing work, they are more apt to learn (Miller 2010). For effective Digital Literacy training over the next five years, the need to demonstrate the value technology will bring to workers in doing their jobs will persist. The training will be based on skill needs and easy access and will be ongoing as technology continues to evolve (Horrigan 2010). Some industries that had provided extensive computer skills training to new hires have already phased that training out because existing staff were trained and seemed to readily adopt basic technology. New recruits had and were expected to have the skills when they joined the organization. By 2015, younger staff members will have grown up in the day when gaming and mobile phones were a way of life and they will hunger for new technology at a rapid pace (Brown 2010).

Industry leaders forecast ongoing growth in consumers' engaging in the social media space and pay close attention to the analytical tools associated with ICT, including hit rates, unique individual hits and overall monitoring of activity. Messaging also will be extremely important in the future. Along with the fast pace of new technology, digital message content is abbreviated or reduced to bullet points, and it is being flooded into a sea of information where key messages are easily lost. Therefore, communicators will need to craft pointed messages that hit the target and then follow up with more detailed information in other easily accessible forums. Current

technology is not good at analyzing tone and tenor of messages, but emerging technologies look promising in addressing that (Brown 2010).

With brevity often being the style for social media, seasoned industry and academic observers voice concern that grammar skills will be lost and people will lose the art of communicating and the process of developing interpersonal skills, both important in conducting business and functioning in society. They see signs of such loss in younger staff and, as a result, speculate that there may be a greater need for redeveloping basic communications skills in the future (Brown 2010). Within the news media, for example, journalism professors see a new generation of students who do not want to conduct face-to-face interviews, but who are proficient with using Skype, a real-time visual communication program (Paul 2010).

Next Generation "Literacies:" What Schools are Teaching and Testing

Digital Literacy impacts education from kindergarten through college and into adult education and workforce training. It is a national priority. The U.S. Department of Education's 2010 technology plan "Transforming American Education: Learning Powered by Technology" states that competencies, such as critical thinking, problem solving, collaboration and multimedia communication should be woven into all educational content areas (Hobbes 2010). The Commerce Department's National Telecommunications and Information Administration is providing $4 billion through the Broadband Technology Opportunities Program to bring broadband infrastructure to local communities, supporting public computing centers and providing training opportunities (Hobbes 2010).

The Knight Commission 2009 report recommended the integration of "digital and media literacy as critical elements for education at all levels through collaboration among federal, state and local education officials" (Knight Commission 2009). Universities around the world have integrated Digital Literacy into programming, curriculum, instruction and community outreach and many in the U.S. have created Digital Literacy centers.

To date, there is no single, universally adopted set of standards for achieving Digital Literacy in U.S schools, higher education and the workplace. Organizations, such as the International Technology Engineering Educators Association (ITEEA), the International Society for Technology in Education (ISTE) and the Association of College and Research Libraries (ACRL) have developed standards for achieving varying types of literacies related to Digital Literacy, such as technological literacy and information literacy. These standards outline a general set of educational content and criteria that states and school districts can incorporate into curricula to facilitate student achievement of information or technological literacy.

The National Assessment of Educational Progress (NAEP) is the largest nationally representative and continuing evaluation of what American students know and can

do in various subject areas. The NAEP tests sample students in grades 4, 8 and 12 on subjects, such as math, science and reading. Under the Obama Administration, the National Assessment Governing Board added to the NAEP an assessment of technological literacy, which will be instituted nationwide in 2014 (Covello 2010). The assessment is currently being developed by WestEd and will measure "technology and engineering literacy" defined as the "capacity to use, understand and evaluate technology as well as to understand technological principles and strategies needed to develop solutions and achieve goals." The national assessment will be computer based (Covello 2010).

In addition to the NAEP (which measures performance in only three grade levels), other organizations have developed assessment methods and instruments that can be used for larger population segments. Assessment developers have used the International Society of Technology Education (ISTE) National Educational Technology Standards for Students (NETS•S) to create assessments for Digital Literacy and to indicate ideal performance outcomes (Covello, 2010). The ISTE website lists 14 assessment resources, such as:

- Certiport Internet & Computing Core Certification (IC^3) Program and Assessment is offered to individuals as a foundation to succeed in environments that require the use of computers and the Internet.

- Intel Learn® Program was developed with governmental and nongovernmental agencies to provide youth ages 8 to 18 years with opportunities to use technology effectively in after-school settings.

The Association of College and Research Libraries (ACRL) also listed a range of outcomes for assessing student progress toward information literacy. These outcomes provide guidelines for developing local methods to measure student learning specific to an institution's unique mission.

Two recent sets of standards identified levels of achievement anticipated at the completion of a K-12 education, based on 2007 technology. According to these standards, high school graduates generally should be able to accomplish sophisticated digital tasks:

- Document processes and procedures and communicate them to different audiences using oral and written techniques, such as flow charts, drawings, spreadsheets, graphs and webpages.

- Diagnose a malfunctioning software and network system and troubleshoot and analyze it as part of the maintenance process.

- Access information through the use of resources, such as the Internet, spreadsheet software and other tools.

- Have experience in designing, using and assessing different types of information and communication systems such as television, telephones, the Internet, data processing systems and graphic communication systems.

- Research, synthesize and transmit messages using digital media and compare and contrast information sources and examine the relevancy of messages.

- Use components of the language of technology – symbols, measurement, icons and graphic images – to communicate.

- Design, develop and test games.

- Employ simulations to critical thinking processes.

- Design a website that meets accessibility requirements.

- Create and publish online content.

Forecasting what students will be able to do in 2015 is difficult without knowing about advancements in technology that are in research and development channels now. Because of the rapid evolution of the digital environment, educational standards for Digital Literacy are the only indicators of what students will be able to do in the near future. However, the standards currently in place lack recent updates – two sets of widely-used standards reviewed for this study were updated in 2007, and one set was developed more than 10 years ago with no recent update. This finding identifies a challenge in keeping educational standards up-to-date with the rapid pace of technological innovation.

Perhaps the lack of standardization nationally can be attributed to the tension between academia and the scientific and corporate communities regarding both the definition of Digital Literacy and the way in which digital competencies should be taught in schools. There is no consensus around the meaning of Digital Literacy, and as a result, data collection to measure student achievement is scattershot (Trotter 2009).

Academic experts contend that students must acquire new process skills because the Internet enables electronic distribution of content. Young people now use "image, sound, color, space, avatars, video and movement" to make meaning online, requiring youth to become literate in various forms of representation and to understand how such resources can "interact with and complement one another" (Trotter 2009).

The scientific and corporate communities, however, argue that STEM subjects – science, technology, engineering and math – are fundamental to the definition of Digital Literacy. Still, other groups contend that Digital Literacy should "cover Internet safety, cyber-bullying and laws on the use of intellectual property" (Trotter 2009).

Government efforts at the federal level to promote Digital Literacy led to the passage of the No Child Left Behind Act in 2002, which set a national goal that all students would be technologically literate by 8th grade. The federal law, however, left it to the states "to define the concept and persuade schools to teach it" (Trotter 2009). President Obama has called on governors and state education chiefs to "develop standards and assessments that measure 21st century competencies and expertise – critical thinking, complex problem solving, collaboration and multimedia communication – in all content areas" (U.S. Department of Education 2010).

Subsequently, the U.S. Department of Education led the development of the National Educational Technology Plan (NETP) 2010. The NETP is a five-year action plan that presents a model of 21st century learning and incorporates technology in five essential areas: learning, assessment, teaching, infrastructure and productivity. The plan outlines five goals with recommendations for states, districts, the federal government and other education stakeholders to leverage technology to provide engaging and meaningful learning experiences, content, resources and assessment. These recommendations include creating and adopting standards that incorporate technology into learning; developing and adopting learning resources that utilize technology; designing and adopting assessments; and building the capacity of educators to use technology to improve learning and assessment.

Many states have adopted or are developing standards for Digital Literacy, or various forms of it, and have drawn on the standards developed by the ITEEA, ISTE and the AACL. As of 2009, more than 10 states had assessments to measure students' Digital Literacy (Trotter 2009). Currently, there are no federal mandates for implementing Digital Literacy standards in schools.

A critical factor in developing standards is how the web has revolutionized instruction and learning. New technologies are learned and adopted in informal, personal environments before they are adopted in schools or the workplace. For teens, young adults and older technology users, learning by doing is the norm (peer-to-peer emulations and tutorials) (Corbett 2010).

As a result, multimedia literacy is growing beyond the traditional reach of the education system. To address this shifting landscape, some educators are turning to different educational formats to engage their students. A Manhattan, N.Y., school offered "Quest to Learn," a program that provided students a place to practice new media literacy and learn technology and game design. It is organized specifically around the idea that digital games are central to the lives of children and can be

powerful tools for intellectual exploration (Corbett 2010). In January 2011, George Washington University also introduced an online high school in a first-of-its kind partnership with K12, a provider of online education. Students enroll in a college preparatory curriculum leveraged with technology and personalized counseling (George Washington University 2011). Synchronous and asynchronous collaboration applications between computers is flourishing in colleges and universities. The students no longer have to be in the same room as instructors and other students in their classes; they can interact with other students and teachers in different locations (Hardin and Ziebarth).

The ability to use digital technology is important, but academics do not consider it sufficient for acquiring a high level of cognitive proficiencies that will help students critically evaluate information provided. In his ongoing series about digital users in the *New York Times*, reporter Matt Richtel examined high school students' heavy digital diet and the impact on their ability to focus on school and prioritize the long-term benefits of education effort over short-term stimulus of digital interactivity. He noted a paradox in students who have deep proficiencies in computer skills, manipulation of data and creation of content, but who cannot accomplish and perform standard education tasks because of distraction. Distraction will be a significant challenge for Army students as the Army learning structure increases digital learning as a delivery approach, especially when handheld devices are used for delivering content that will have to vie with many other appealing or urgent information alternatives for students' attention.

Standards for Technological Literacy

The ITEEA developed the *Standards for Technological Literacy* (STL), a set of 20 standards to facilitate student achievement of technological literacy, defined as the ability to use, manage, assess and understand technology. These standards emphasize students' comprehension of the basic elements that go into any technology, such as the design process, development and production and use and maintenance (see Table 2 in Annex B).

The STL standards have not been updated since 2007. No study provides an overview of how many schools have adopted and implemented these standards.

National Educational Technology Standards

ISTE created a set of educational technology standards for students, teachers and administrators as roadmaps for "global learning in a digital age." These standards have been adopted and recognized in the United States and in countries worldwide; however, conclusions could not be drawn in regard to the number of schools that have adopted the ISTE standards. The standards were last updated in 2007. Each standard is accompanied by a broad listing of higher-order thinking skills foundational to student achievement of ICT literacy (see Table 3 in Annex B).

Information Literacy Competency Standards for Higher Education

In 2000, the Association of College and Research Libraries (ACRL) developed a set of standards, performance indicators and outcomes for assessing student progress toward information literacy in higher education. There is no evidence that the standards have been updated in the last 11 years (see Table 4 in Annex B).

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Background

The Army Learning Environment and Digital Opportunity

For TRADOC, the paradox of digital opportunity is focused on the learning environment. That learning environment is itself a microcosm of the Army's operational context: now global, complex and rapidly changing in ways both evolutionary (predictable, necessary and timely) and revolutionary (opportune, immeasurable and surprising).

A system of relevant and rigorous training and education is traditionally the determinant of the Army's might. But the TRADOC learning system has been increasingly challenged to accommodate its traditional system to current pressures, both on learners and on its training and education models of content and delivery. TRADOC continuously explores how to adapt learning models and address future information needs by finding more efficient ways to deliver high-quality learning content.

Understanding "point of need" learning and the use of "teachable moments" has been part of TRADOC's strategy to do more to take the lesson to the learner rather than bringing the learner to the lesson. Yet, too many "teachable moments" in 21st century Soldiers' or leaders' lives create an overcrowded environment with too much information and too many responsibilities. Layers of requisite learning are simultaneous, created by the enormity of mental, physical, emotional and relational demands faced by today's Army personnel. In this learning environment, there is little room for "reset" either for learners or leaders and no resources of time, money or people in an already-crowded training docket to make changes with traditional approaches.

Despite the paradox and challenges of the digital landscape, digital learning is a clear force multiplier. The digitally literate know how to access information and conduct business online in a secure and confident manner and know how to manage information and mitigate risks, such as viruses, spam, hoaxes, etc. Lessons from industry demonstrate that adaptation of Digital Literacy across an organization will reduce support costs, as fewer staff will be required to handle basic administrative functions. In addition, the increased collaboration of digitally literate staff, made more efficient through the use of information and communication technologies, will improve creativity and innovation in solving challenges (Media Awareness Network 2010). Important teaching takes place in a digital environment through peer-mentoring and viral learning, which promises the Army greater training effectiveness with less school time per student.

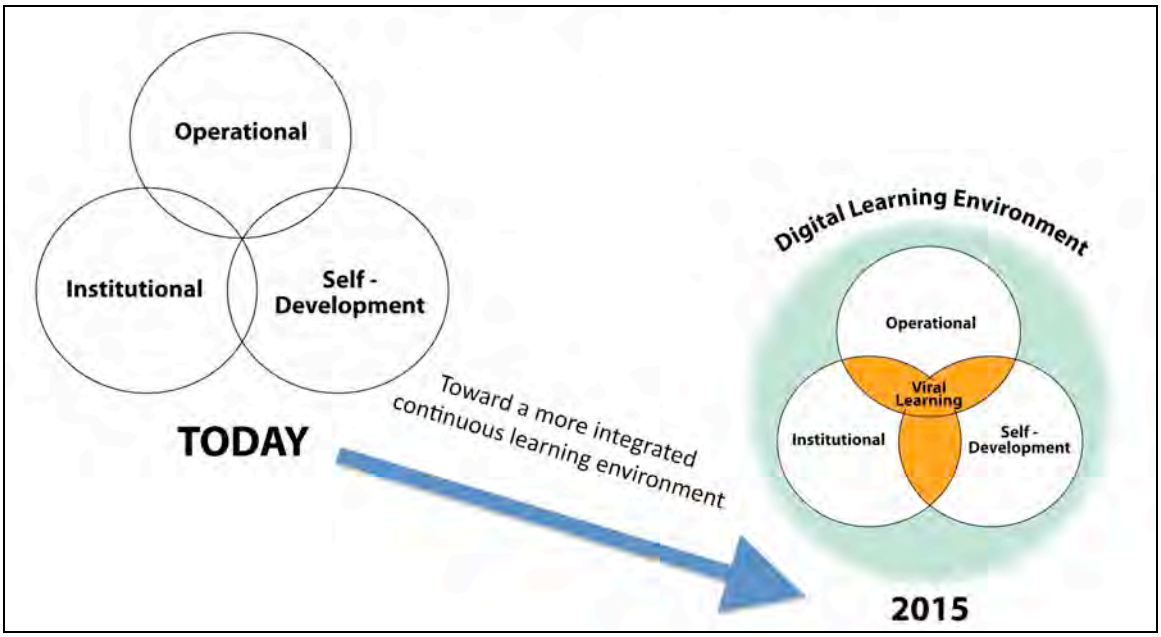

Figure 7: The Army Learning Environment will be a digital context by 2015. Some learning will be shared among learners through digital's participatory culture.

TRADOC senior leadership has pledged to "cut the chaff and augment the most effective aspects of our current learning system while ensuring [its] most affective aspects . . ." (Dempsey 2010).[1] The seeming benefits of digital learning to meet this pledge – digital's portability, accessibility and flexibility for developers, instructors and learners – have also raised concerns. Critical concerns are:

- Applicability: What can be delivered digitally and still meet Army standards of quality and performance?
- Affordability: What combination of opportunity and outcome most merits use of taxpayers' dollars?
- Security: How available is information to unintended audiences?
- Competency: What constitutes the Digital Literacy required for training, education and transfer to job and/or battle performance?

The focus of the current study is Competency – the Digital Literacy levels required for training, education and the transfer of knowledge, skills and abilities to job and/or battle performance. This also has implications for security because Digital Literacy is more than using digital tools – it includes the application of judgment that aids in protecting information and the people exchanging it.

For the purposes of this study, the Competencies inherent in Army-appropriate Digital Literacy are institutional and self-development domains and arenas of the Army digital environment where TRADOC can make broad and deep impact, especially TRADOC Schools and Centers of Excellence (CoE) (named as the primary intended audience for the study) and the TRADOC Common Core (as opposed to branch- and MOS-specific digital requirements).

The vision of the study is to gain a basic understanding of when and how, across an Army career, an individual's level of Digital Literacy increases, by whatever means (required training, social learning from others, investigation piqued by personal interest). The desire for and usefulness of this understanding is closely tied to the Army's desire to be a lifelong learning organization.

Lifelong Learning and Digital Literacy

"Lifelong learning" can be defined as the desire, coupled with the capability, to learn and to use knowledge for behavior and/or intellectual change and growth, continually throughout an individual's lifetime (an individual's Army lifetime is from accession to transition, or even beyond). "Lifelong learning" across the Army has been a key leader-development strategy. Today this concept is interpreted as "career-long learning," and the term refers to aspects of development and delivery of training and education largely accessed voluntarily (either as voluntary self-development or to meet requirements, but on the individual's schedule). Opportunities and responsibilities for encouraging this kind of extended learning and developing – and delivering the training to stimulate it – are shared by many Army organizations, such as the Civilian Education System (CES), the Army Continuing Education System (ACES), MOS-specific training from CoEs, with content and delivery that varies by organizational mission. Even the Army Professional Reading List can be considered a lifelong learning activity. The Army Management Staff College (AMSC) Excellence in Education Award Program, which recognizes excellence in education by a unit, school, garrison or agency, places an emphasis on Lifelong Learning.

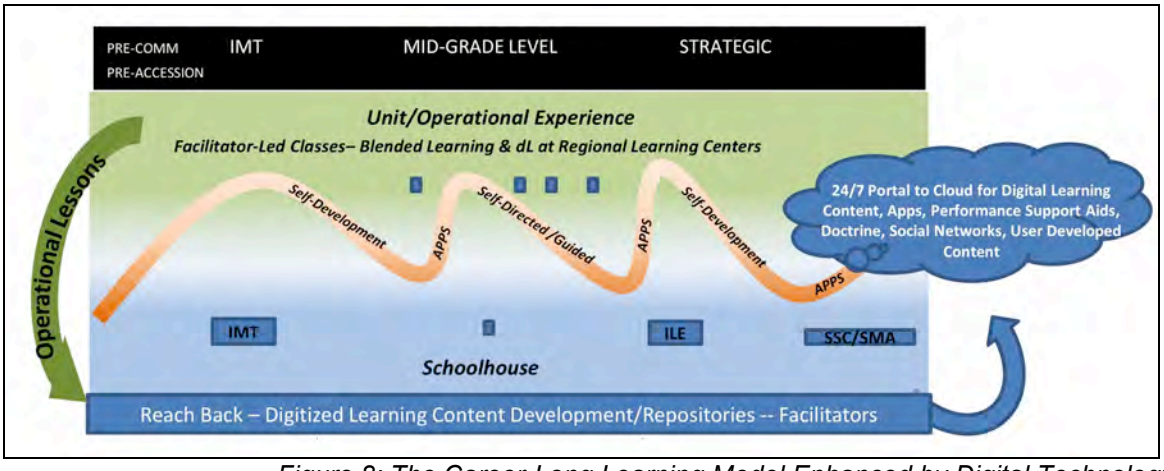

Figure 8: The Career-Long Learning Model Enhanced by Digital Technology

Establishing a baseline for Digital Literacy is fundamental for successful Army Career-long learning in any Soldier and Civilian programs, but it is especially critical to TRADOC as it implements the Army Learning Concept for 2015 (ALC 2015), designed to link the operating and generating forces in a rapid cycle of learning content development and distribution. Assuring that every Soldier and DA Civilian has baseline digital competencies can maximize the intersection of individuals' teachable moments with point of need training and learning content delivered digitally anytime, anywhere.

These foundational competencies will increasingly be evident in young Soldiers and Civilians new to the Army because of the efforts in America's schools to emphasize K-12 Digital Literacy through mandated standards and testing. These competencies can be assessed at recruitment or at civilian service points of entry; making these competencies "Army ready" will continue to be an early-career training necessity. Individuals who are already advancing through their Army careers will become more digitally literate at points of need, either required or voluntary.

In the 21st century, Digital Literacy will become a primary paradigm of lifelong learning for people all over the world. In the Army, that paradigm will be more fully actualized earlier in lower echelons of the Force, rather than across current career cohorts because of the "date simple" fact that a generation born after 1989 has grown up in a digital environment and therefore has a digital familiarity that people born earlier must purposefully acquire. Although some scholarship denies the validity of "digital natives" as a predictor of digital competence[3], the experiential reports of industry, now two decades into digitalized workplaces, insist that younger workers bring to tasks a *digital readiness* that older workers often don't exhibit (Horrigan 2010).

For the Army, Digital Literacy as an element of career-long learning will mean providing Baseline Digital Literacy (BD-Lit) training (or assessment-based equivalency) that is mandated for new Soldiers and Civilians and is also encouraged and made easily accessible for Soldiers, Leaders and Civilians at every echelon. ALC 2015 recognizes this need.

Army Learning Concept for 2015

The Army Learning Concept for 2015 (ALC 2015) has been developed to guide all Soldiers and leaders through a continuum of learning for the duration of their careers (Dempsey *TRADOC Live* 9 March 2010). ALC 2015 combines strategies to win in the competitive learning environment with encouragements (e.g., relevance, accessibility, outcomes orientation) to keep individuals committed to career-long learning.

Responsive to the operational tempo of an era of persistent conflict that permits the Army in general – and combat forces in particular – limited time for training, yet increased demands for rigor and relevance, ALC 2015 is centered on *adaptability.*

From its roots in the Army Capstone Concept, Army Leader Development Strategy and Army Training Concept, ALC 2015 is designed to be a learner-centric environment. Networked technology will provide a responsive, accessible infrastructure that can deliver tailored, relevant training and education to Soldiers and Leaders wherever they are, whenever they want to access it.

ALC 2015 is focused on developing thinking Soldiers with an emphasis on the cognitive and social skills that undergird the competencies proposed as crucial for the 21st century Soldier. Shaped by significant characteristics of learner-centric learning environments, ALC 2015 presupposes for its success that learners will possess digital competencies sufficient to access the networked resources. From that baseline level, increasing levels of Digital Literacy (including cognitive and social/relational capabilities and attributes) will be part of the individual's own advancing learning.

Exploring Baseline Digital Literacy Assessment and Training Across the Army

How best to take advantage of digital technology to train and educate Soldiers and Leaders in order to improve performance and outcomes in every Army setting has been the subject of myriad studies. In the 1990s, a number of these – and programs that resulted – focused on competency with computers, or Information and Communication Technologies (ICT) more generally. When, in 1995, TRADOC embarked upon a plan

Characteristics of a Learner-Centric 2015 Learning Environment

Single Portal to Digital Learning Resources
(Virtual Warrior University)

Blended Learning
Technology-Based Delivery
(with Instructor in the Loop)

Performance Support Aids
(Mobile Digital Devices – The Game Changer!)

Peer-Based Learning
(Digital Social Networks)

Soldier Created Content
(Wikis, Blogs, Apps, etc.)

Self-Structured Learning

Virtual Training Environments
(e.g., JTCOIC-Training Brain)

Values/Attributes
Inculcated-Reinforced

Track Progress
(Army Career Tracker)

Assessments, Evaluations
(Rigor and Relevance)

Adaptive Learning/Intelligent Tutors

DL Modules

Regional Centers
(Satellite Schools at Unit Locations)

Context-Based, Facilitated, Problem Solving Team Exercises

Figure 9: Functional Elements of ALC 2015

intended on "leveraging technology to improve training" at the 21 Army schools, part of the motivation was cost effectiveness, reducing the requirements for everything from printing texts to per diem costs and lost productivity of resident schooling, but the greater focus was to guarantee standardized, on-demand training anywhere in the world (Adams and Smith, 1999). In 1998, "digitization" was still a forward-sounding term and the Army anticipated requirements for the "digitized leader."

> *Personal mastery. The digitized leader will have to master many new skills to be effective on tomorrow's battlefield. It is axiomatic that leaders must continue to be tactically and technically proficient. However, in Force XXI, digitized unit leaders need to take the competency of technical mastery to new levels. Of critical importance is developing complete computer mastery and an understanding of the processes by which they work. Such mastery will set a firm example for the troops to follow (Gumbert, 1998).*

By 2002, technology was increasingly integral in much of the Army's course delivery system and TRADOC common core digital tasks to be taught in all schools had been identified[4]; Digital Common Tasks began to be taught per G3/5/7 directive two years later.

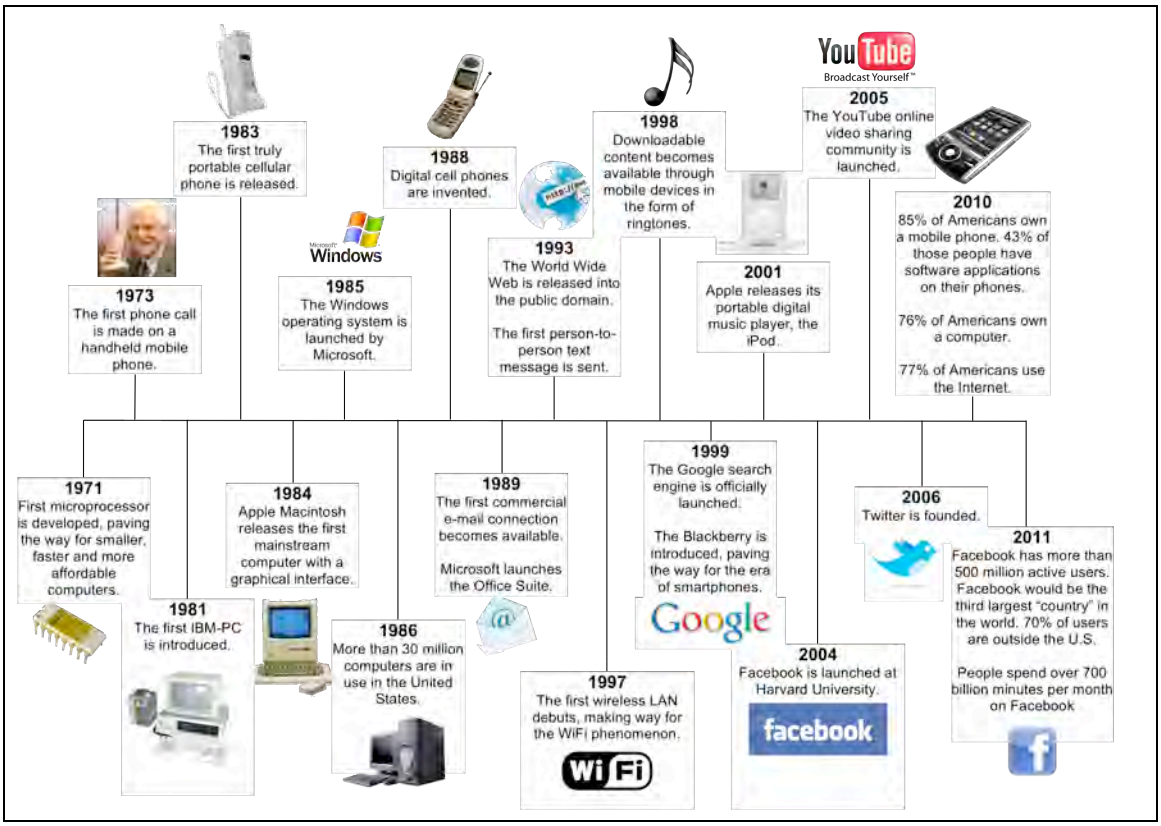

Figure 10: Thirty Years of Digital Technology

However, the pace of technology development was scarcely anticipated in 2002, the first year that Blackberry came to the market and put e-mail into the palm of a user's hand. Ten years after a leader's "personal mastery" was described as "complete computer mastery," any hope of attaining such a goal, especially by a person charged with leading troops, had become a mission impossible. Information and systems technology experts might claim mastery; for anyone else, an appropriate goal became Digital Literacy. In 2009 (AR 350-1, 18 DEC 2009) Mandatory Training Procedures included digital tasks.

Meanwhile, the Army began to map its universe of information, looking for ways to develop, define, manage, share and use the rich combination of learning, experience and practical application that characterize the Army enterprise. Knowledge Management (KM) studies, practices and programs proliferated. In 2010, the Commanding General of TRADOC ordered an "Independent Study of Knowledge and Information Management in the Generating Force" (Thomas and Muras 2010) that examined practices that impacted the efficiency with which TRADOC captured, filtered, codified, stored and distributed knowledge. The study focus was on concept/process solutions.

Taking process and systems into virtual reality with games and simulations has had enormous impact on Army learning from coursework to battle preparation (not to mention recruiting and the public's overall "Wow!" response to being able to access Army games). Just as industry and academia have found value in using digital games as learning tools[5], the Army has encouraged the development of "serious games" and simulations for training, education and simulation to immerse them in interactive, realistic situations that share knowledge and experiences that prepare Soldiers for their way ahead. A *Military Review* article on Small Unit Performance celebrated what games, simulation and other digital methods can mean:

> *With the advent of network connectivity, small units can now exploit new software programs to rehearse with joint, multinational, interagency and intergovernmental partners. Today, computerized mission rehearsal imagery and maps allow units to virtually see their objectives and routes to objectives through embedded training. This includes ground-level color photos or video footage of the area of operations. Virtual training has also expanded to the online Army Training Network and the Joint Training Counter IED (improvised explosive device) Integration Center, where devices like the Apple iPod Touch, iPhone and other devices allow Soldiers to download the latest vignette to hone skills such as collateral damage avoidance* (Vane and Toguchi 2010).

Exploration of the potential for immersive training, not only for combat troops but also across the Army through handheld devices, is under way. Originally an outgrowth of pilot programs that considered the value of digital applications (apps), including one that invited Soldiers to develop and submit apps, momentum has developed around the potential to "give every Soldier a personal digital assistant with

sufficient power, applications, speed and memory to handle current and projected requirements" (Vane and Toguchi 2010)[6].

Connecting Soldiers to Digital Apps (CSDA) is a program with several pilots in progress in early 2011, including an Initial Entry Training (IET) model, an ordinance training module and others, each exploring the ramifications of putting essential training literally into students' hands, any time, anywhere. CSDA points toward the hope that "through mobile Internet devices, any Soldier will be able to carry his or her lesson to the squad tent or to the dining facility, or use it for hip-pocket training" (Vane). As this and other opportunities dependent on digital technology have earned broad attention, the phrase "platform agnostic" has been used in discussion in and about the Army possibilities. It has been raised as a consideration in examining Digital Literacy, presumably because the phrase suggests technological adaptability that would be desirable toward having more people fluent with more digital devices.

Platform Agnostic Solutions

"Platform Agnostic" seems to be a phrase in fairly widespread Army use, both official and colloquial to judge by interview and survey-related conversations for this study. Referring to computers, the term means a code or an application that is able to run on any platform (platform is made up of an operating system and hardware); in general, software that will run on any operating system (e.g., Linux, Windows, Mac – an example is Acrobat Reader).

Across the Force, the indisputable value of interoperability encourages use of the term. It has been applied as readily to material, such as the "Convoy Active Safety Technology, a *platform-agnostic*, kit-based, driver-assistance system for tactical wheeled vehicle convoy automation"[7] as it has to instructional units available equally to PC and Mac users in digital applications. Certainly, the rapidly changing operational environment and the need to deploy technology solutions globally, quickly and across users with a range of skills and needs makes the concept of platform independence very appealing.

However, industry participants for this study cautioned that the accelerating rate of change in the digital environment has made "platform agnostic" – a useful term as recently as two years ago – now of diluted value in defining much in the digital environment. Part of the term's declining use value comes from the burgeoning "platform agnostic" possibilities, especially around mobile applications.

As it applies to Digital Literacy, skills that make "platform agnostic" possible are due in part to a maturity of the digital technology; moving from skills based on a single (likely proprietary) technology to skills that are based on a class of technologies. Once this transition is complete, the skill becomes the basis for all future technology enhancements for that specific class of devices, operating systems, etc. Development

and usability standards are also present in mature digital technologies, making the use of new tools easier for the user.[8]

Part of the reason that platform agnostic, as a term, is being used less in industry is that there is a general paradigm shift away from "locking in" a user's skills around a specific, proprietary technology. Instead, the trend is toward creating open technologies with usability factors in mind. In this paradigm, new vendors and associated technologies seek to enter the market with the idea that they are perceived to be "platform agnostic" – the goal being quick and easy adoption by the user without a significant learning curve. These technologies will be available and important to the Army and soon sufficiently ubiquitous that it seems likely the term "platform agnostic" will fade from descriptive use about Army technology, as it appears to be fading already in industry use. As a descriptor related to Digital Literacy, *platform agnostic* does not appear in this study.

Perception of Digital Literacy in the Army

A generalized perception exists among insiders that the Army has not kept pace with opportunities offered by advances in digital technology. This is ironic, given the fact of the Army's predominance in technology in a number of areas, notable among them: the most sophisticated fighting technologies in the world; ground-breaking – and life saving – digitally-aided Army medical research and treatment; the Army Game Project that launched America's Army (AA), a digital and online gaming phenomenon with more than 26 versions, billions of rounds played by gamers worldwide and a host of products built on the basic AA platform. Even so, and despite the fact that by 2010, digital competencies were fundamental to many learning circumstances and to tasks in branches and MOS's Army-wide, a substantial percentage of Army respondents surveyed for this study said the Army was at best "average" in its use of digital technology.

Army respondents were asked:

How well does the Army Training, Leadership and Education structure align/keep up with technology development pace and trends given these choices:

- On track: Instruction is as close to up-to-date as rate of technology change permits.

- Needs improvement: The pace of technology development is well-ahead of what the Army provides as training, leadership development and education.

- Substantially behind: The Army is not keeping pace with technology training in other workplaces and/or with what individuals can learn themselves in the digital environment.

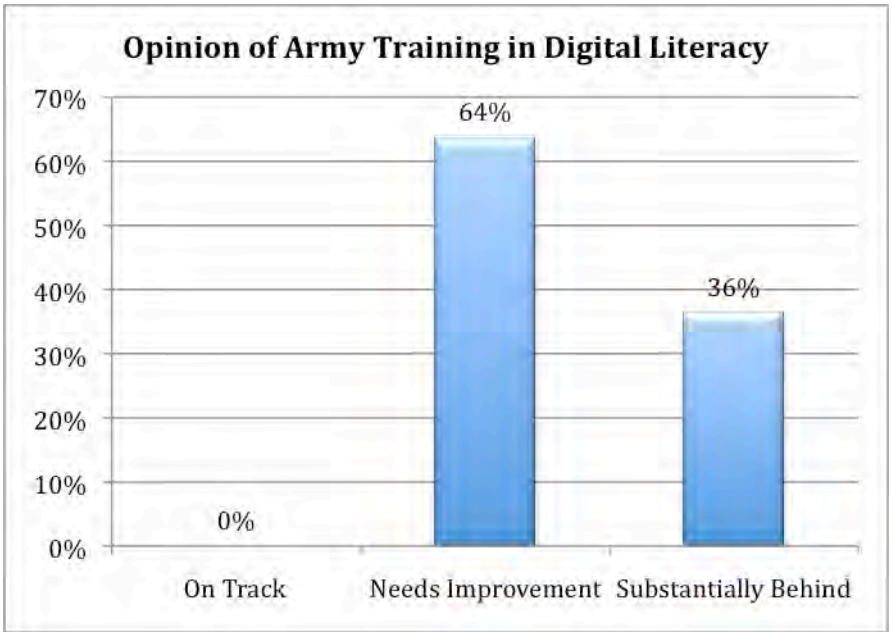

Figure 11: Opinions of Army Training in Digital Literacy

The responses do not necessarily indicate that the Army is behind the curve in its adoption of digital technologies and entry into the digital environment. Many other factors can also create such a perception; some that are evident include:

- An almost inevitable fact is that in very large organizations, many people have little understanding of achievements in other areas of the organization than where they actually work (e.g., Sprint's new 4-G phone was news to many people who work there about the time it was news in the media). As one officer interviewed for this study said, "I feel sure there is amazing technology in use all over the Army that I've never heard of and probably won't."

- Another contributor to the shared perception that the Army is "behind" the digital curve is that most people in the Army don't know what the curve really is. Most industry representatives interviewed for this study reported their organizations as "average" in Digital Literacy and "behind" the pace of digital development. The difference is that they expect to be "playing catch up" to digital advances, which are accelerating

To keep control of a technology pace advantageous to the organization – not to be tugged forward too fast by software developers – companies report that they engage in what some call "version skipping." Version skipping means recognizing that while a new version of software a company may have in use or wish to acquire is ready for market, the time may not be right for the company to purchase and/or train it, so a decision is made to skip that version and wait until a later version is released.

at a rate that even companies whose business IS digital technology can scarcely believe.

- Leadership is important in the Army – choosing the middle is not an admired approach. Yet in today's pell-mell digital pace, some organizations do precisely that. Version skipping is a good example of an increasing recognition that the pace of technology advances can literally be too much of a break-neck speed for organizations. Deciding to slow down can be regarded as good business practice, not as slipping behind the curve.

- Relatively few Army leaders are digitally literate. This is to some degree related to age and position responsibilities: Officers in their early 40s and beyond have had less lifetime exposure to digital devices than their subordinates, plus their positions provide them with capable subordinates to assist them. While many exceptions exist, in large part respondents agreed, "the farther up the ladder you go in the Army the fewer people you find who are very digital, except for their Blackberries."

> "The Pentagon is not digital. We are a paper environment. We circulate hard copies of everything. This morning I got a paper memo telling me to comply with the Paperwork Reduction Act."
>
> A Deputy Assistant Secretary of the Army (DASA)

- HQDA policymakers are, for the most part, tourists in the digital landscape. Industry examples suggest that when senior leaders (in the case of the Army, a significant percentage of both civilian leadership and senior military leaders) in an organization are not themselves digitally literate, approaches to advancing Digital Literacy across the whole may only be realized in dispersed programs, not in unifying policy.

- For this study, perhaps the most important factor affecting the perception that the Army is behind in its Digital Literacy may be the fact that Digital Literacy education is going somewhat incognito in the Army at this time. The Army personnel surveyed for this study could recall little or no Digital Literacy training that was not machine/device or MOS specific. A recently-retired Colonel, now a DA civilian employee, said, "In 28 years with the Army, I had one class in computers years ago and everything else I learned on my own." Although Digital Common Tasks were identified in 2002, tasks in the Common Tasks Test that could be performed digitally (e.g., reports, recommendations, etc.) do not mention digital requirements of any kind.

- Tests for baseline digital competencies are rarely, if ever, used. Now that computer skills are widespread, except for job-specific requirements, neither Soldiers nor Civilians are given ICT testing (this is true also in industry, where companies do not routinely test computer competencies). No study participant could identify any widespread Army assessment for general digital "fluency." The perception is that digital fluency for most people is entering the Army more from the individuals' social learning space (the web, games, social media, etc.) than from formalized offerings in Digital Literacy.

> "Why do I need to know how to do digital research when I can do this?" said one officer in an interview for this study, whereupon he leaned back in his chair, called out his office door, "Gentlemen!" and two young men were before him in an instant. "Yes, sir!" they said, and he said to the interviewer, "See what I mean?"

While perception is not reality, perception can influence attitudes, aptitudes and behavior. Important to the Army's becoming a "digital Army" is the perception of the organization's sufficiency in the digital environment. This can be encouraged by setting a baseline Digital Literacy expectation, with training and/or assessment required of all Soldiers, preferably at entry but certainly by the time IMT is complete, and that training also made available to any Soldier or leader who wishes to access it (ideally with senior leader encouragement to do so).

Studying Digital Literacy in the Army

As more Soldiers have come to the Army with at least some digital capability (and usually at least one personal digital communication device that offers access to e-mail, games and even web browsers), the more it has been evident that the pace of digital skills acquisition has well outdistanced how much the Army knows about what Soldiers can digitally do. Several studies have begun exploring this.

A Signal Corps study emerged from the potential to cross-walk aspects of communication or other digital tasks with assessments of Soldiers' levels of digital competency and found conjunctions of task and ability that could spread out among the Force some digital communication responsibilities formerly limited to digital specialists. Early in 2010, the Commanding General (CG) of TRADOC tasked the Signal Corps to establish baseline Digital Literacy for all Soldiers in the FY13-17 time period "in order to allow understanding of some tasks that can be migrated from the current Signal Soldier to the common competency of all Soldiers.[9]"

The question of what digital knowledge, skills and abilities (KSAs) Soldiers possess is a larger question. Some related questions have been included in the Global Assessment Tool (GAT) in 2011 on assessment testing. A continuing AAC study is under way to answer questions about assessment of Digital Literacy skills among new

recruits, Reserve Officer Training Corps (ROTC) students and young people in delayed entry programs, as well as Soldiers in Initial Military Education (IMT).

Adequate testing when a person enters the Army could asses baseline digital capabilities (or higher for those who possess them) to identify two important sets of people: those who need to be brought up to baseline Digital Literacy and those who bring sufficient digital skill with them into the Army that they can be given opportunities to use and advance their skills both in MOS-specific ways and, in general, to mentor others in the peer learning model so important to the digital environment.

Educators and industry training experts warn that Digital Literacy assessments, especially for young people raised with ready access to digital media, are problematic: technical testing can show device or software proficiency, but not other important elements related to judgment. In more qualitative assessment, a digital "signature" of current 17-25 year olds is a tendency to self-report higher digital capabilities than they actually have, many of them mistaking hours per day exposure to digital media with the variety of knowledge, skills, abilities and critical thinking that characterizes higher order Digital Literacy (Paul 2010).

The Army will participate with the Navy and Air Force in a pilot project to develop assessment testing. Additionally, a continuing AAC study is underway to answer questions about assessment of Digital Literacy skills among new recruits, Reserve Officer Training Corps (ROTC) students and young people in delayed entry programs, as well as Soldiers in Initial Military Education (IMT). One purpose of the Digital Literacy Levels study is to provide a foundation for such early-echelon assessments.

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Army Digital Literacy Today

Digital Debate

No one doubts that *connection* is crucial to the future of the Army. A decade of war in an era of persistent conflict has emphasized the importance of connections across the globe in myriad dimensions. At the same time, technology has accelerated opportunities for connection more rapidly than can be readily described. In a net-centric world, Digital Literacy is a functional differentiator between those who are connected to information, each other and the capacity to create shared success and those who are not (Jenkins).

Although advances in digital technology and applications can benefit the Army in training and operations, greater ICT dependency by the military and, indeed, the public in general raises many concerns. Among them are ones germane to the Digital Literacy inquiry. Some aspects of the "dark side of digital" can have immediate impact:

- ICT is vulnerable to hackers and computer "viruses" or "worms" that can infect computer systems, disrupt or damage hardware that controls equipment systems and steal, alter or compromise information. Even very sophisticated users are subject to these digital threats; less sophisticated users much more so.

- Digital can be injurious to users in various ways; for example, cyber weapons can have the same effect as traditional bombs in terms of triggering explosions. Attacks on mobile phones are expected to intensify in 2011, putting both the user and organizational data at risk. Damage of a different kind will occur as the use of social media increases (Facebook, Twitter). Researchers expect personal data posted online will make it increasingly easier for cybercriminals to engage in identify theft (Alperovitch et al 2010).

- Service members already face the threat of identity theft due to the continued use of their social security numbers as personal identifiers at home and abroad. The Department of Defense is addressing this problem (Richtel 2010).

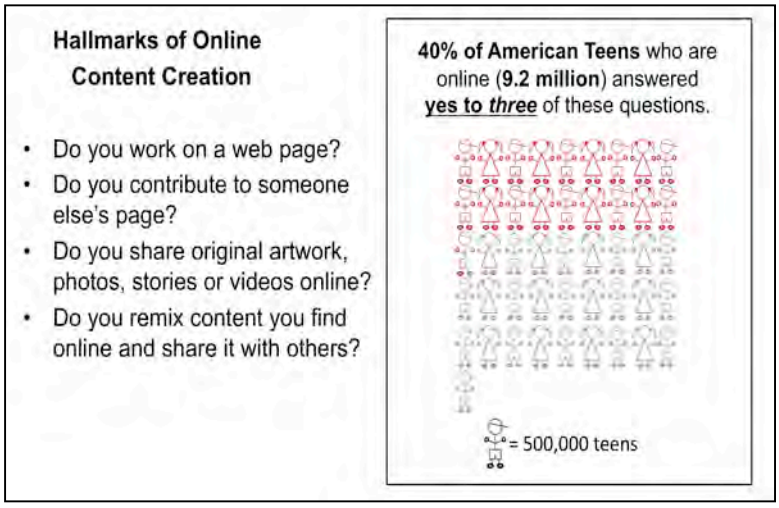


Figure 12: Profound Shift – Young People as Creators not just consumers of content.

- The emergence of electronic cyber warfighting capabilities is the most important military development in decades, but legal experts are not sure how existing treaties and conventions apply to this domain and to Soldiers engaged in cyber warfighting activities.

Other concerns address longer term affects on humans, such as:

- On one side of the scientific argument are researchers who contend that e-mails, phone calls, text messages and other bursts of incoming information create a false sense of urgency and can undermine a person's ability to focus. The "ping" sound for incoming information stimulates the brain to provoke excitement, releasing dopamine – and that can become addictive. Even when devices are turned off, fractured thinking and lack of focus persist. Younger people may have more trouble focusing on tasks because they have grown up with technology that constantly shifts their attention (Shanker and Richtel 2010).

- Excessive connectivity can interfere with personal relationships. As the brain evolves and shifts focus to ICT, it drifts away from fundamental social skills. For Soldiers at every level, the issue is critical because they face an overload of information to process; the amount of intelligence gathered by surveillance technologies has increased 1,600 percent since 9/11 and that comprises only a fraction of what many Soldiers process in a day. Many studies are under way to determine how the human brain can cope with technology without being overwhelmed by it – a critical factor for the military, especially in combat. (Shanker and Richtel 2010)

The other side of the debate argues that ICT benefits the brain. Imaging studies show Internet users' brains are more efficient at finding information. Internet users show more brain activity than nonusers. Video games can improve reaction time and the ability to pick out details amid clutter. ICT use enhances the brain's capacity to be stimulated. Internet reading activates more brain regions than printed words. Users of ICT possess a greater working memory, are more adept at perceptual learning and have better motor skills. A 2005 Kaiser study found that young people who spend the most time engaged with ICT also spend the most time interacting face-to-face with friends and family. Although in the six years since, the advent of readily available handheld devices, such as portable game systems (e.g., Nintendo's DS series) and smartphones has led users young and old to become so engrossed in their screens that some researchers point to addiction behaviors and resulting relationship disruptions (CNBC 2011).

Concerns make risk management an essential part of the digital environment, but they don't change the fact that digital has become part of daily life for everyone in the Army family. Not every aspect of that is within the Army's purview, of course, but

enough that it is appropriate to examine what Digital Literacy means for Soldiers, Leaders and Civilians.

The very notion of "functional literacy" originated in the U.S. Army with the discovery in World War I that many recruits could not read and write sufficiently to be effective soldiers. In the 21st century Army, as in the world generally, the term "literacy" has taken on new meanings, many of them related to technology. In the past 20 years, scholars have developed the concept of "multi-literacies," to address the term "literacy" beyond its original application to the medium of writing (Buckingham).

Some of this thinking is useful to helping TRADOC address what "Digital Literacy" potentially means to the Army's *capabilities development* and all that term implies for "identifying, assessing and documenting changes in doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) that collectively produce the force capabilities and attributes prescribed in approved concepts or other prescriptive guidance" (TRADOC Regulation 71-20). Perhaps even more important is what "Digital Literacy" means to the ways Soldiers, Leaders and Civilians engage digitally with each other.

The Army's Long Range Training Strategy envisions an Army that has functional Digital Literacy at every level with programmatic opportunities for every Army cohort to access the continuous learning that advancing technologies promise and will provide. ALC 2015 pushes these opportunities closer to the learning individual than ever before in the Army's learning structure.

Digital Literacy is considered essential to realizing many of ALC 2015's objectives. But what comprises that necessary literacy? Who has it? How do individuals acquire it? How will the Army know where the "Digital Literacy gaps" may be and how can those be closed? These are essential questions.

Using the Term "Digital Literacy"

To begin with, researchers for this study found significant disagreement that "Digital Literacy" is even the term the Army should use to talk about the way users employ digital technology. Those dissenters would find substantial agreement in the private sector where most industry representatives interviewed said the term was simply not used at all. Industry leaders said they hired and promoted digital "fluency" or "proficiency." They described their customers as increasingly "digitally competent." Some went so far as to say that "literacy" was something of a contradiction in the digital environment, which was so often "graphical" and not "literate," in either the original meaning connected to writing and reading or in the connotations of "educated" or "thoughtful" that have accrued to the term over time.

A good example is Hallmark Cards, described by executives as "beginning its long digital journey" from ink and paper nearly two decades ago. Hallmark is now a

thoroughly digital enterprise that has quit using any references to literacies (media, technological, new, traditional, digital, etc.) of any kind and simply uses the term "digital" to address "everything that's based in 0s and 1s – that works because of computers, "according to Paul Barkley, whose title is simply Vice President of Digital. Other business executives and managers said similar things: "Our shorthand is 'digital,' it can mean architecture or the cloud. Very often, we refer to the digital ecosystem or digital landscape." "We use digital fluency – that designates an ability that is more than competent. Competency is adequate familiarity, but fluency is 'bilingual' or 'trilingual.'"

Institutions of higher learning do use the term, however, in academia it is not about becoming literate or fluent with digital technology. For educators, the term suggests using digital technologies to help students become more literate, more capable of delving deeply into bodies of knowledge. For scholars, the field of Digital Literacy has provided nearly boundless arenas for inquiry and debate. One interesting such arena, applicable to the Army's need to understand ways the digital environment affects the Army environment, views Digital Literacy as a "life skill" (Bawden), one so important that some scholars call it a "survival skill in the digital era."

Even to define Digital Literacy presumes "literacy *per se*" to be evident before digital capabilities can be grafted on. The concept of literacy carries weight and the fear of stigma. Nearly 15 percent of the United States' adult population cannot read and write sufficiently to function fully in daily life, but even lesser degrees of illiteracy are worrisome to some people. Indeed, some survey participants in this study objected to "Digital Literacy" as a standard in the Army because, as one said, "it really suggests the opposite, that you could be considered illiterate in some way." Others said they would not like to see the term put into regular use because they would not want on their records questionable scores on any kind of literacy assessment.

Today, the Digital Literacy underpinning suggests not only the older literacy of reading and writing along with the ability to function in society, but also more recent computer and ICT literacy. These are broader general education requirements than just Digital Literacy, and schools are questioning whether digitally connected learners sometimes can and do bypass the traditional knowledge bases that

Digital as a Tool, Not a Curriculum

Already schools in 33 states have experimented with putting all students on laptops to leverage the digital environment, and lessons learned are coming in from these efforts. By most accounts, Maine's program has been very successful with an unwavering commitment by school leaders, backed by parents. Some lessons learned may be very useful for Army TRADOC's approach to Digital Literacy; primary among these is "Use Technology as a Tool, not as a Curriculum Area." In training sessions for teachers, the emphasis was "What are the objectives we are trying to teach?" and not "What is the software?" and the focus not on how to use a spreadsheet, but on collecting and analyzing data (Kessler).

Figure 13: Digital as a Tool, Not a Curriculum

ground a fulsome literacy.

Yet, while the popular media is full of speculation that texting is teaching youngsters to ditch "old fashioned" skills, such as spelling, researchers are finding the opposite. Gaming appears to improve academic acuity and, actually, "txt msgs make kidz gr8t spelrs" (Toor), with spelling scores actually rising among children who text regularly. As the substantial body of inquiry by scholars and educators grows, the evidence points to the importance of integrating digital learning with more traditional subjects and delivery methods so that digital capabilities enhance other kinds of learning, and digital engagement becomes a tide that lifts all boats (not the wave that swamps some).

Industry and academic observers of people functioning well in the workplace or in educational settings agreed that every digitally capable person had some core competencies. These were described in myriad ways reflecting the many different perspectives in the digital ecosystem, but a good basic list of core competencies is this one:

- Reading and understanding digital and nondigital formats
- Creating and communicating digital information
- Evaluating information
- Assembling knowledge
- Managing media (Bawden)

Also essential to Digital Literacy is the user's *background knowledge*, which includes the world of information and the nature of information sources. Like spelling, this used to be the province of "literate" people who understood the basics of where printed information came from (authors, publishers, libraries, newspapers, etc.), but that "chain of credibility" has vanished in the digital information universe. Therefore, a crucial dimension of Digital Literacy has to be *critical thinking skills* and judgment to sort worthwhile information from all the rest and then to use/share information credibly. Closely allied to this dimension are the *attitudes and perspectives* that drive the social aspect of the digital environment; in a digitally literate person, these include responsible behavior or what some have called "ethical literacy" (Bawden, *et al.).*

The difference in the ways industry and thinkers in the commercial space talk about digital capability and the way educators or thinkers in the academic space talk about Digital Literacy is important to TRADOC's desire to develop a definition that can be used throughout the Army. Effectively, TRADOC creates both a "doing" and a "developing" culture. Over an individual's career, his or her acquiring the KSAs to "do the job and do it right," whatever the mission, is part of the broader personal physical, cognitive and moral development to which the Army is dedicated.

Industry defines Digital Literacy in terms describing how a person does a job. These may include all categories of engagement, but they focus on accomplishing work (Figure 14). One industry source simplified the question: "The definition of digital *competency* – we would never use *literacy* – is what does a person need to get the job done? Effectively. Done right." Educators more often use the definitions of Digital Literacy to describe the development of a whole person, both as a unique individual and as a member of a culture (Martin).

Clearly, the Army learning culture is uniquely structured to accomplish both the development of the whole person and the capacity to meet the mission (get the job done). Useful definitions for Digital Literacy in the Army's digital environment should reflect this dual commitment.

Three Fundamental Categories of Engagement

occur as people use digital media; these inform the best definitions:

- **Technological or Physical:** the ability to work with devices, software, hardware; computer skills
- **Cognitive or Mental:** the ability to question, to apply critical thinking, analysis, filtering, assessment, imagination, creation, combination ("mash-ups")
- **Social/Relational or Emotional/Volitional:** the ability to interact with other users in work or leisure activities; discipline, courtesy, ethics, moral choices

Figure 14: Three Fundamental Categories of Engagement

Digital Literacy as the Army's Term of Choice

Because so many terms are used popularly and professionally to describe digital competency, proficiency and expertise, it was important in the beginning of the current study to address whether, in fact, "Digital Literacy" was a good term for the Army to adopt. Survey results were mixed.

Respondents were presented with the following definition, and then asked to select the terms (drawn from frequently used terms found in the literature review) they found to best resonate with the given definition; and then rank their top three choices:

> ***The ability to communicate, locate, transform and share ideas and information through "new" or traditional media or skills and competencies necessary to use new and emerging technologies.***

The results are shown graphically, as follows:

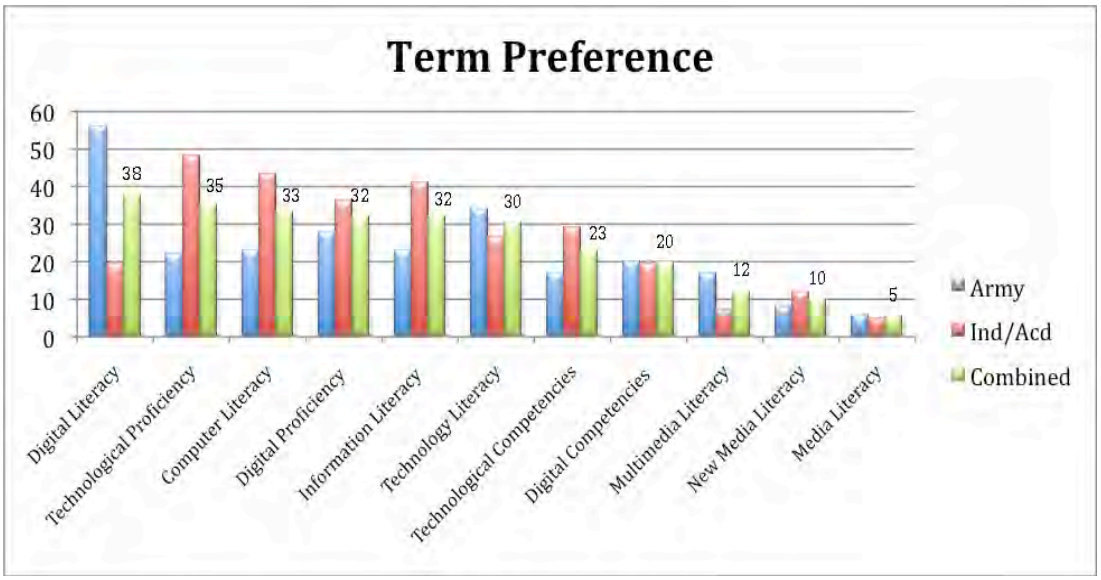


Figure 15: The Army Favored the Term "Digital Literacy."

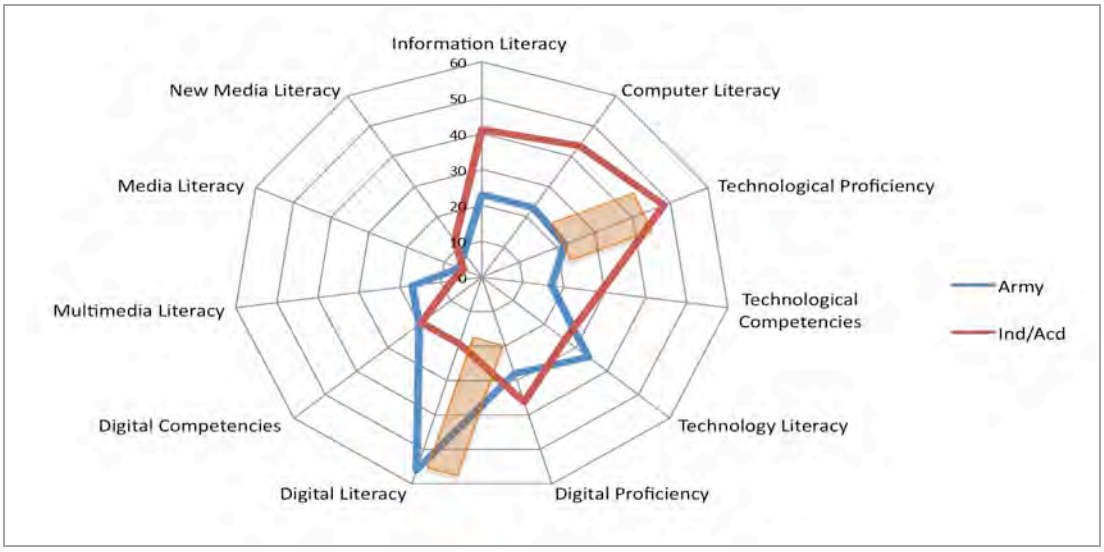


Figure 16: Conflicting Language
Conflicting language was used from the Army and industry/academia. This "radar chart" is built from the same data source as the bar chart.

The data reveals significant disparity in terms being used by the Army and industry/academia to correspond to the given definition. More specifically, although the two most prevalent combined terms are "Digital Literacy" and "technological proficiency," the term "Digital Literacy" is more than twice as prevalent amongst the Army, while "technological proficiency" is more than twice as prevalent amongst industry/academia.

There are likely two factors behind the disparity: 1) the Army has informally propagated the term "Digital Literacy" as a way of characterizing the study issue at hand, which caused a bias toward that term; and 2) preference of the specific and deliberate use of the terms "literacy," "competencies," or "proficiency," for which further examination can be found in interview analysis. Analysis of the combined values of the six top-rated terms reveals little statistical difference between term usage.

This lack of statistical difference may reflect the general absence of agreed-upon definitions for much of anything in the digital environment that is not process or product specific. This might as well be expected in the digital culture where intellectual property is wide open, and the invitation to tweak the concepts, contributions and creations of others is prized. This is the spirit of the "wiki," webpages that anyone can enter and edit. To that end, respondents were asked for their personal definitions of "Digital Literacy."

Survey respondents were asked to provide their own personal or organizational definition for the "Digital Literacy" concept, conveyed with the same definition used for the term preference question (above). These definitions were reported as follows:

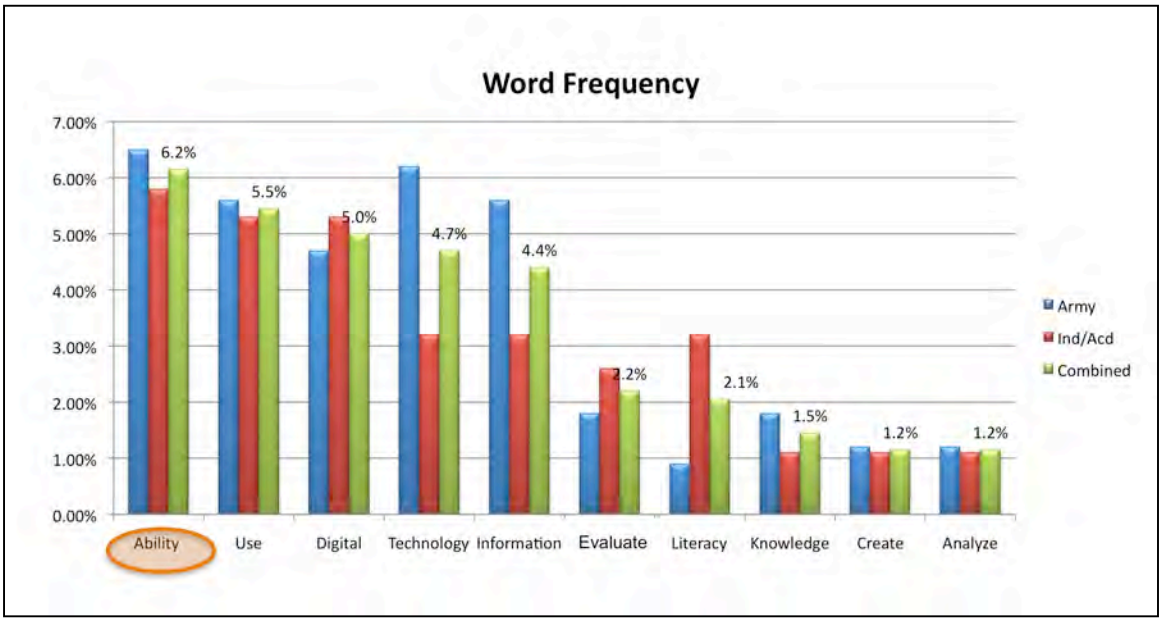


Figure 17: Word Frequency
Results were assessed using word factor analysis, with the words having the most occurrences from Army and industry/academia definitions charted above.

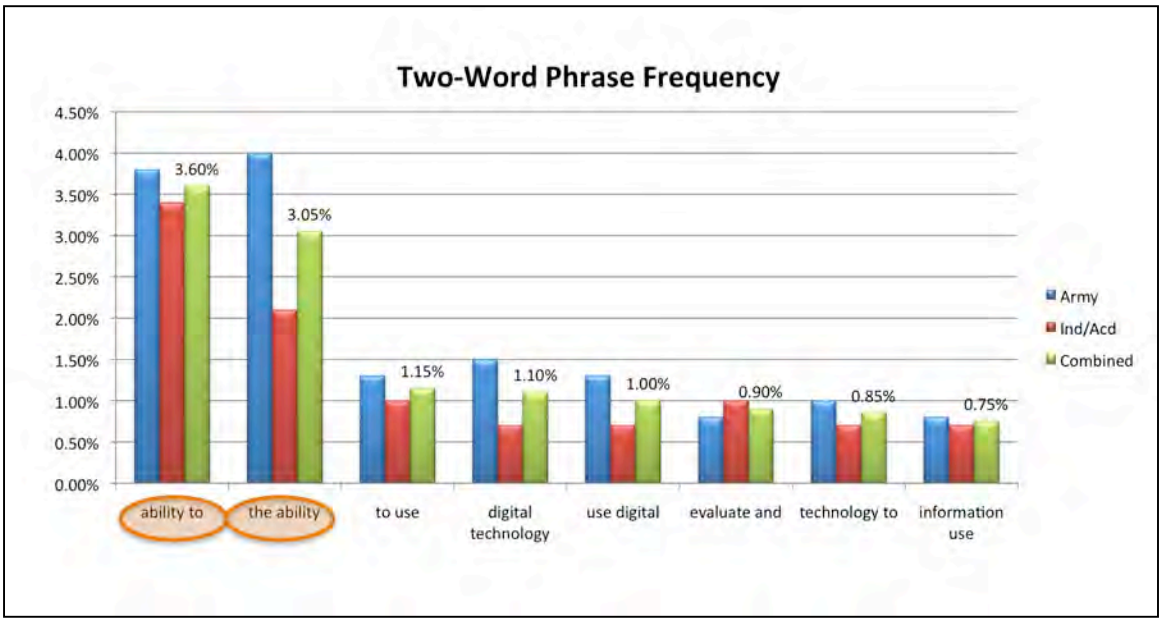


Figure 18: Two-Word Phrases
These were the two-word phrases most often connected in respondents' top of mind answers.

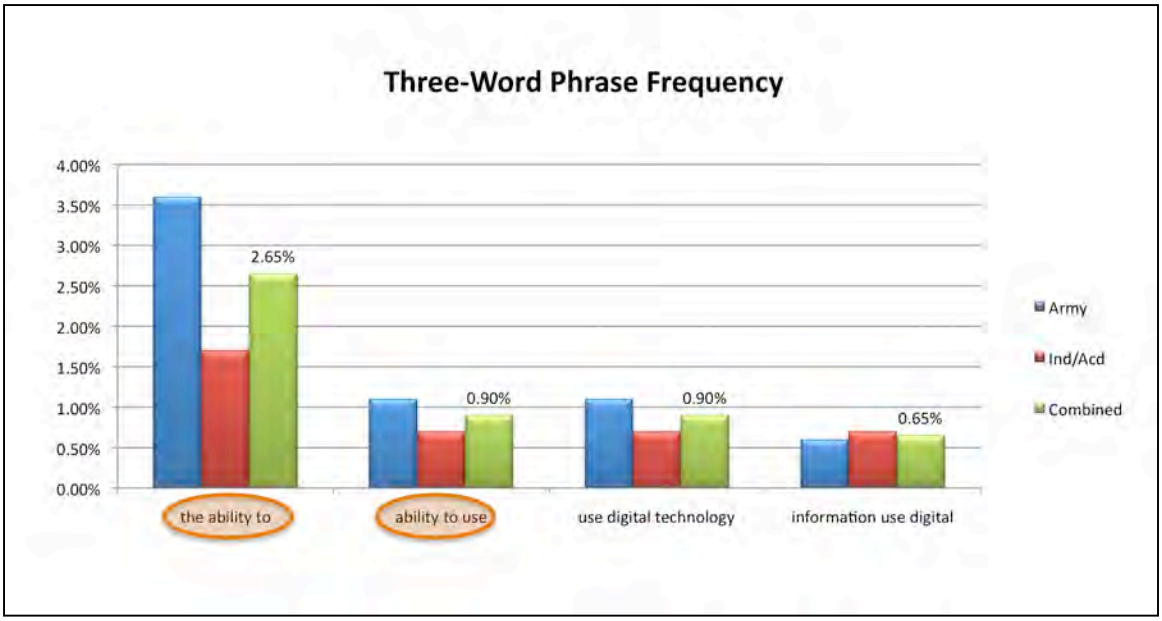


Figure 19: Three-Word Phrases
These were the three-word phrases most often connected in respondents' top of mind answers.

Although the data from each individual chart above is not particularly revealing by itself, an examination across all three charts reveals that the common theme across all definitions was the word "ability." The deliberate and repeated use of the word "ability" across all survey populations requires an understanding that "ability" is intended to convey a "proficiency that is acquired and developed through training or experience and connotes a competency and power to perform."

The words respondents used to define what the Army is calling "Digital Literacy" were generally consistent across the respondents from Army and industry/academia. As noted previously, there is significant disparity in the selection of terms used to represent the actual phenomenology that the Army calls "Digital Literacy."

Early in the study, the research team (representing a mix of corporate, former-Army and academic backgrounds) shared a bias against the Army's adopting "Digital Literacy" as the term to describe baseline and advancing levels of digital engagement and competencies. However, by the close of the study, the team is ready to recommend "Digital Literacy" as the term of choice because:

- Ideally, Soldiers and Civilians may strive for and many will achieve advancing levels from the baseline or fundamental (common skills) to the functional (sophisticated digital usage) to the advanced (digital transformation, innovation, creativity). Given the Army learning mix of "do the job and develop the person," individuals will indeed be deepening their levels of literacy even as their digital levels advance.

- TRADOC has sufficiently used the term with stakeholders inside the Army and out in public, notably in discussions of ALC 2015 and CSDA, that building on that initial groundwork will be more productive than fumbling toward other terms; plus, as the surveys clearly show, people use enough different terms that the process of changing from "Digital Literacy" to something else would be lumpy.

Core Competencies

Beginners to experts: Every digital user requires some core competencies. From many lists amassed on this subject, the research team selected key terms, compared those to terms used in a study under way in AAC and found substantive similarities or direct matches. From those terms, a list to test with survey respondents was developed.

Respondents were given the list of competencies and asked to select which ones were considered to be "core" within their organization with regard to Digital Literacy. They were then asked to rank the competencies they considered to be the top, or most important, competencies for digital users.

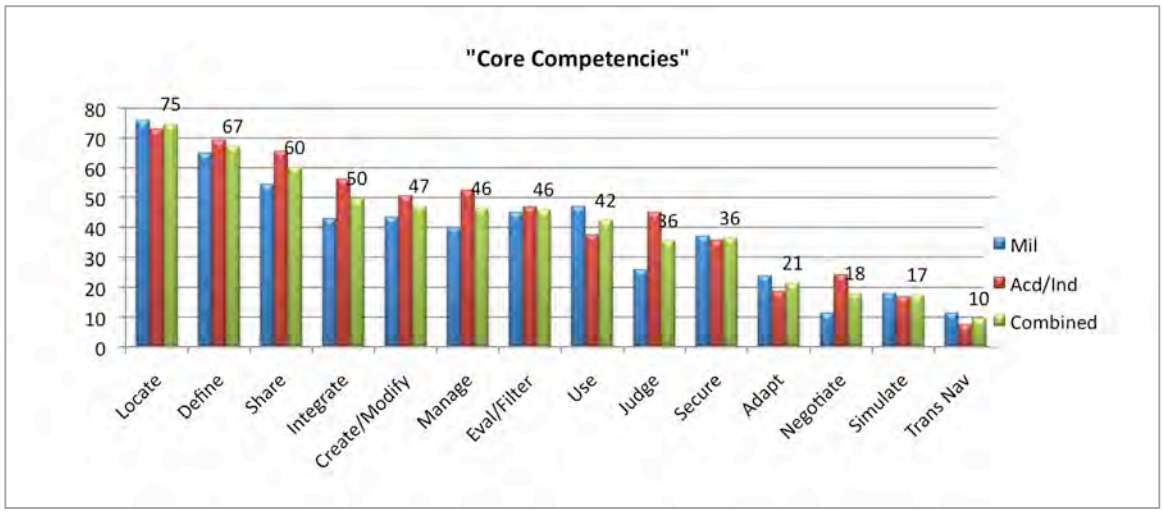


Figure 20: Core Competencies of Digital Literacy

Core Competencies of Digital Literacy

- Locate
- Share
- Create/Modify
- Evaluate/Filter
- Judge
- Adapt
- Simulate
- Define
- Integrate
- Manage
- Use
- Secure
- Negotiate
- Transnavigate

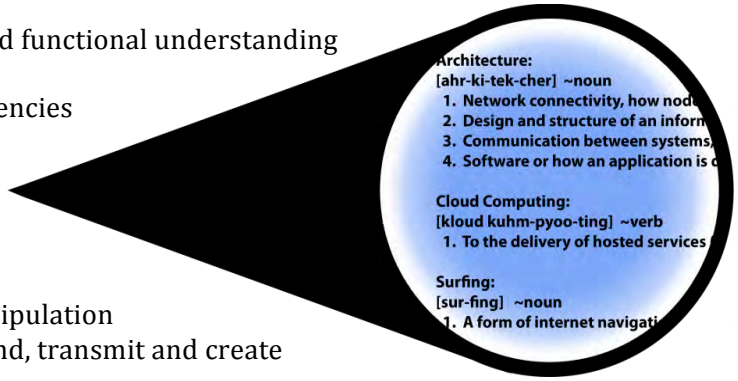
The competencies, or "abilities," represented within the Army, industry and academia are generally consistent across all populations. Clearly baseline capabilities are those that allow users to seek, find, understand, share, use, modify, manage and evaluate material. "Use" material seemed surprisingly mid-range in scoring, but interviewees later, given this same list felt they had been thinking of "use" as encompassed by "share, integrate, create/modify, manage" and it seemed unnecessary to select it again. People conceived these as common competencies. Further analysis of departmental functions would be needed to determine what competencies are specific to organizations or duty positions.

That the Army respondents rated "judge" as low as they did raises interesting questions. Do individuals not perceive themselves as responsible for passing judgment on the worth, credibility, security or use value of information they locate digitally, perhaps on the Internet? In fact, *judgment* was an element left out of Army definitions of Digital Literacy (and some industry/academic definitions, too). Clearly matters of critical thinking, analysis and judgment would need to be part of any Army Digital Literacy assessment/training.

From the surveys, interviews and literature research, the study team proposes a simple baseline Digital Literacy taxonomy. It provides an elemental organization of the growing lexicon of Digital Literacy terms for competencies (see Levels of Literacy charts beginning on page 56). And it provides organization for the semantic variations emerging in discourse about the digital environment (see Sample Digital Semantics on page 53).

Taxonomy of Competencies Encompassed Within Digital Literacy

- Digital device competence
  - Computer operation and functional understanding
  - Hardware operation
  - Device-specific competencies
  - Software proficiency
  - Network use
  - ICT general "literacy"



Example of how Digital Literacy semantics fit in taxonomy; more semantics on page 36.

- Cognitive capability
  - Interpretation and manipulation of symbols to understand, transmit and create meaning
  - Critical thinking
  - Filtering
  - Evaluation
- Types of literacy encompassed within Digital Literacy
  - Traditional, reading-based literacy
  - Media literacy
  - Visual literacy
  - Procedural literacy
    - Creating/producing original or interpreted material
    - Mixing/Mash-ups combining available material
    - Simulations and virtual realities

- Social/ Relational capabilities and responsibilities
  - Participation and collaboration skills
  - Courtesy/etiquette
  - E-mail, texts
  - Social media
  - Intersection with traditional learning/life environments (e.g., school, family, workplace, community)
  - Ethics and moral responsibility

Figure 21: Taxonomy of Competencies Encompassed Within Digital Literacy

Sample Digital Semantics

The following words and terms illustrate how language used in a non-digital context can have different meanings in a digital environment. Even within the digital context, an individual word may have different meaning in different areas of competence. Characterizing digital semantics is a vast and changing effort. This list provides a few examples.

1. Architecture – Architecture is a term with numerous applications in the digital environment, such as:
   a. Network connectivity, how nodes in the Internet are able to communicate with one another;
   b. Design and structure of an information system, e.g. a simulation may have an architecture or type of communication, network, servers classes and systems, cells;
   c. Communication between systems; and
   a. Software or how an application is designed and functions.
2. Cloud computing –Refers to the delivery of hosted services (software, platform, infrastructure) over the Internet "without requiring end-user knowledge of/or dependence the system's physical location and configuration."
3. Database – Information structurally organized and defined by common relations.
4. Domain – There are two possible uses in a digital environment:
   a. a digital environment or "location" on the Internet assigned to a person or entity; or
   b. an area of responsibility. This usage may occur among those engaged in cyber warfare.
5. Download – Commonly understood to mean the electronic transfer of data from one digital device to another.
6. Links – Connection between two digital environments.
7. Navigation – The ability to "move" through multiple digital modalities, such as:
   a. Digital Documents;
   b. Websites;
   c. Systems;
   d. Digital devices; and
   e. Flow of information.
8. Portal – The term has multiple uses in a digital environment:
   a. Digital gateways to other web pages;
   b. An "entrance" to an individual's or organization's domain; or.
   c. A mechanism for collaboration.
9. Query – The act of searching a digital environment or device for defined information. Can be a structured or unstructured search.
   a. Structured: Boolean search, e.g., using connectors such as "AND" , "OR"
   b. Unstructured: phrases or sentences
10. Scanning – The creation of a digital image from a physical document or images, e.g. photos, maps and drawings
11. Social networking – The use of digital devices to communicate, create and share content, and facilitate knowledge and information sharing.
12. Surfing – A form of Internet navigation focused on finding information or seeking connections.
13. Tablets – A hand held digital device featuring a touch screen, with interaction also enabled by a stylus or similar tool.

Figure 22: Sample Digital Semantics

Defining Digital Literacy

The digital environment is more than technology. It is an environment shaped in the human dimension, by the digital user. This human dimension is paramount in digital communication, where the judgment and behavior of users are the foundation of the "literacy" part of the definition. For that reason, a Digital Literacy "values statement" is important to defining Army Digital Literacy. The proposed definition is:

> **Digital Literacy is the individual's awareness, attitudes and abilities to appropriately use digital tools in order to accomplish his or her Army mission and to better enable personal and professional development.**

A value statement could be:

> **A digitally literate member of the Army team integrates judgment with relevant information and knowledge to support mission requirements, safeguard the security and wellbeing of others on the team and uphold the Profession of Arms.**

The overarching consideration of a definition suitable for Army use is TRADOC's commitment as the command that "develops the Army's Soldiers and Civilian leaders and… to build a campaign-capable, expeditionary Army." As was mentioned earlier in this report, academic definitions usually try to encompass what Digital Literacy is in terms of what an individual can/will become (the whole person), and industry focuses on what an individual can/will do (job performance). TRADOC's definition needs to encompass both what the digitally literate individual can do and what he or she can become.

TRADOC's focus on "warfighting capability" defines all military training and related learning throughout the lifecycle of service of every Soldier and Civilian leader. TRADOC's focus on personal development is front and center in the Army's recent reinvigoration of attention to the Profession of Arms and the fundamentals of character (the combination of professionalism, ethics and moral behavior). A definition of Digital Literacy for the Army needs also to reflect TRADOC's leadership in addressing the Army's Human Dimension, the "think, do, be" aspects of training and educating for the fullest expression of an individual's capacities and capabilities. Finally, the study team believes that a good Army-centric definition of Digital Literacy needs to reflect the context of Army Values and the Warrior Ethos.

Practically speaking, the overarching definition should be short and as timeless as possible, given the pace of technology development. That will allow the basic definition to persist, and to be accompanied by a lexicon of terms that will evolve with changing technologies, performance requirements and personnel capabilities. Effectively such a definition functions as a vision statement.

Because "literacy" is personal, the definition sets out what Digital Literacy is in individual terms – a combination of awareness, attitudes and abilities; its requirement – digital tools – and its function: to accomplish the Army mission (perform) and develop the whole person. The definition can and should be accompanied by the values statement. Therefore:

Digital Literacy is the individual's awareness, attitudes and abilities to appropriately use digital tools in order to accomplish his or her Army mission and to better enable personal and professional development.

A digitally literate member of the Army team integrates judgment with relevant information and knowledge to support mission requirements, safeguard the security and wellbeing of others on the team and uphold the Profession of Arms.

A fairly simply taxonomy supports this definition and sets out advancing levels of individuals' Digital Literacy. The hypothesis of the study charge as originally written was to "identify levels of advancing Digital Literacy across cohorts," but this proved not to be true. Individuals do not become more digitally literate as they move from entry to officer levels, or rise within the DA Civilian workplace structure. In fact, 87 percent of Army survey respondents in this study thought that there were not advancing levels of Digital Literacy beyond a baseline level within their organization. This is a resounding response – a percentage significantly strong in a study such as this one where respondents all have different backgrounds and belong to different organizations within a larger whole.

Digital Literacy levels in individuals do advance, however, driven by training and education opportunities; by job- or circumstance-specific necessities; or (above all) by a personal degree of interest to learn and experiment in the digital space. Any individual could advance through all four levels – Baseline, Functional, Advanced and Expert – and could do so at almost any point in any Army career with sufficient personal motivation. Most will not, however, even the digital hobby "nerds," because to achieve mastery demands time and opportunity to learn and practice and without the MOS-specific assignments, few Civilians and even fewer Soldiers could fit such self-development into schedules that for most in today's Army are already over-filled.

Across the force in general, it is certainly reasonable and productive for the Army to set Baseline and even Functional standards of advancing levels of Digital Literacy and to expect all or most individuals to meet them. Standards for Advanced and Expert levels of Digital Literacy will usually be defined for individuals with job- or MOS-specific training and learning requirements.

In support of the Digital Literacy definition, the following charts show the Advancing Levels of Digital Literacy, competencies that accrue to each level and sample tasks that represent each level. The task list could be enormous and will be most useful if it

is flexible and adapted to various unit or civilian organization requirements. The competencies will change too over time, but this is a set of competencies in early 2011 that covers most of what individuals at the Baseline Digital Literacy (BD-Lit) and Functional levels will know. Advanced and Expert level competencies are described here as samples; unit or workplace requirements will define those in various settings.

These considerations helped shape the study team's thinking as myriad definitions created in industry and academia and by technology developers and others were examined (some samples in Notes)[10]. The best definitions expressed aspects that are physical (using devices), cognitive/creative and social (collaboration, sharing, etc.).

Overall Levels of Digital Literacy

Digital Literacy Level	Intended Audience	Capabilities	Correlating Competencies & Definitions	Measurement
Baseline 100% Of Army Population	All Soldiers & DA Civilians (All Users)	Technical/Digital	**Locate*:** search Internet, use databases, use applications **Create/Modify*:** create visual representation of data, update/maintain data, translate information to digital format **Manage*:** identify data management systems, organize for later retrieval	
		Cognitive/Critical Thinking /Creative	**Define*:** identify information need, identify possible sources **Use*:** support mission requirements, support decision making, synthesize data to information **Judge*:** evaluate reliability and credibility of different information sources **Secure* (Base):** protect sensitive information, practice information assurance **Evaluate/Filter*:** critically review information, retain or discard as appropriate	
		Social/Relational	**Share*:** correspond digitally, create visual/oral presentations, create written reports, post information **Integrate*:** combine from various sources, collaborate with others	
Functional 10% - 25% Of Army Population	Operational (Unit / Organization Staff, Instructors, Commander / Directors, etc.)	Technical/Digital	**Maintain (Func):** maintain and repair device/application/website focused on content **Information Mgt.(Func):** organize information for users	
		Cognitive/Critical Thinking/Creative	**Analyze(Func):** understand all device/program potential capabilities and incorporate **Transmedia Navigation* (Func):** follow the flow of information across multiple modalities **Secure (Func):** ensuring sensitive information is protected and information assurance is implemented	
		Social/Relational	**Collaborate (Func):** implement/use collaborative applications and programs	
Advanced 5%-10% of Army Population	Technical Professionals (KMA, KMO, KMI, IMO, System& Network Administrator, IMO, Help Desk, etc.)	Technical/Digital	**Maintain (Adv):** maintain and repair device/application/website focused on operational effectiveness **Information Mgt. (Adv):** organize applications/programs (COTS, GOTS) for users **Adapt*:** utilize new technology, demonstrate self sufficiency	
		Cognitive/Critical Thinking/Creative	**Transmedia Navigation* (Adv):** follow the flow of information across multiple modalities and be able to link together **Secure (Adv):** implement and maintain application and program security	
		Social/Relational	**Collaborate (Adv):** develop/maintain collaborative applications and programs **Align:** assess needs of multiple users and combine with technical capabilities	
Expert Less than 5% of Army Population	Digital Experts (Cyber Warriors, Developers, Technical Engineers, System and Network Architects, CIO/ CTO(G8/S6), etc.)	Technical/Digital	**Design:** design and develop new devices/software systems/technology **Apply:** conduct cyber operations	
		Cognitive/Critical Thinking/Creative	**Secure (Exp):** maintain highest level of security within all operations	
		Social/Relational	**Negotiate*:** travel across diverse communities, discern and respect multiple perspectives, grasp alternative norms	

Baseline Level

Baseline 100% Of Army Population	**All Soldiers & DA Civilians** (All Users)	**Technical/Digital**	**Locate*:** search Internet, use databases, use applications **Create/Modify*:** create visual representation of data, update/maintain data, translate information to digital format **Manage*:** identify data management systems, organize for later retrieval
		Cognitive/Critical Thinking/Creative	**Define*:** identify information need, identify possible sources **Use*:** support mission requirements, support decision making, synthesize data to information **Judge*:** evaluate reliability and credibility of different information sources **Secure* (Base):** protect sensitive information, practice information assurance **Evaluate/Filter*:** critically review information, retain or discard as appropriate
		Social/Relational	**Share*:** correspond digitally, create visual/oral presentations, create written reports, post information **Integrate*:** combine from various sources, collaborate with others

The Baseline Level of Digital Literacy includes all Soldiers and DA Civilians. They are expected to be competent, responsible users of digital technology and subsequently able to communicate, locate, transform and share ideas and information through digital devices/services to meet mission.

Technical/Digital Sample Tasks Include:

- SharePoint navigation
- Operate computer: mouse, keyboard, printer
- Use MS Word
- Use touch screen
- Use mobile device
- Connect device to LAN or internet
- Navigate the web
- Search Internet (Google, Bing, etc.)

Cognitive/Critical Thinking/Creative Sample Tasks Include:

- Secure Information including:
  - Create complex passwords
  - Recognize social engineering attacks
  - Recognize malicious websites

Social/Relational Sample Tasks include:

- Chat
- Communicate in a radio net
- Send a message in 16-line format

Functional Level

Functional 10% - 25% Of Army Population	**Operational** (Unit / Organization Staff, Instructors, Commander/ Directors, etc.)	**Technical/Digital**	**Maintain (Func):** maintain and repair device/application/website focused on content **Information Mgt.(Func):** organize information for users
		Cognitive/Critical Thinking/Creative	**Analyze(Func):** understand all device/program potential capabilities and incorporate **Transmedia Navigation* (Func):** follow the flow of information across multiple modalities **Secure (Func):** ensuring sensitive information is protected and information assurance is implemented
		Social/Relational	**Collaborate (Func):** implement/use collaborative applications and programs

The Functional Level includes operators and managers possessing specific knowledge, skills and abilities to use, manage, assess and understand digital technologies and their application to meet Army mission in real-world situations. They include Unit/Organization Staff, Instructors, Commander/Directors, etc. These Soldiers and Civilians not only retain all of Functional Level competencies, but the Baseline Level competencies as well.

Technical/Digital Sample Tasks Include: • Use programs and applications (COTS and GOTS) • Build basic collaborative sites (AKO, SharePoint)
Cognitive/Critical Thinking/Creative Sample Tasks Include: • Know immediate action to take when a cyber or electronic attack is evident
Social/Relational Sample Tasks include: • Use collaborative sites (AKO, SharePoint) • Establish and maintain a blog

Advanced Level

Advanced 5%-10% of Army Population	**Technical Professionals** (KMA, KMO, KMI, IMO, System & Network Administrator, BVO, Help Desk, etc.)	**Technical/Digital**	**Maintain (Adv):** maintain and repair device/application/website focused on operational effectiveness **Information Mgt. (Adv):** organize applications/programs (COTS, GOTS) for users **Adapt*:** utilize new technology, demonstrate self sufficiency
		Cognitive/Critical Thinking/Creative	**Transmedia Navigation* (Adv):** follow the flow of information across multiple modalities and be able to link together **Secure (Adv):** implement and maintain application and program security
		Social/Relational	**Collaborate (Adv):** develop/maintain collaborative applications and programs **Align:** assess needs of multiple users and combine with technical capabilities

The Advanced level is primarily composed of Cyber Warriors, Developers, Technical Engineers, System and Network Architects, CIO/CTO (G6/S6) etc. They are responsible for implementing/developing and maintaining the digital technologies and applications to meet Army mission in real-world situations. These Soldiers and Civilians not only retain all of Advanced Level competencies, but the Baseline and Functional Level competencies as well.

Technical/Digital Sample Tasks Include: • Hardware maintenance (motherboards, RAM, processors, etc.) • Use programs and applications (COTS, GOTS) • Build advanced collaborative sites (AKO, SharePoint) • Collaborative site maintenance • Create a webpage	• Install Symantec anti-virus client • Install an Operating System (OS) using a Graphical User Interface (GUI) • Determine connectivity using Internet Control Message Protocol (ICMP) • Configure Global Broadcast Service (GBS) Transportable Ground Receiver Suite (TGRS)	• Perform hard drive imaging • Correct a malfunction on an AN/UYK-128 (V) Automated Information System (AIS) • Design a webpage • Inspect installed operational generator sets
Cognitive/Critical Thinking/Creative Sample Tasks Include: • Know steps necessary to collect all critical information in event of cyber attack (e.g. system logs, etc.) • Provide input to Material Condition Status Report	• Conduct operational readiness inspection of assigned signal equipment • Conduct quality control on Unit Level Maintenance (ULM) of assigned signal equipment • Inspect installed operational generator sets	• Conduct communications security inspections
Social/Relational Sample Tasks include: • Select team radio site		

Expert Level

Expert Less than 5% of Army Population	**Digital Experts** (Cyber Warriors, Developers, Technical Engineers, System and Network Architects, CIO/CTO (G6/S6) etc.)	**Technical/Digital**	**Design:** design and develop new devices/software systems/technology **Apply:** conduct cyber operations
		Cognitive/Critical Thinking/Creative	**Secure (Exp):** maintain highest level of security within all operations
		Social/Relational	**Negotiate*:** travel across diverse communities, discern and respect multiple perspectives, grasp alternative norms

The Expert Level is the highest-capability users, managers and developers, representing the training, expertise and experience required to control risks and optimize opportunities of digital technology to meet Army mission in real-world, simulated and forecast circumstances. In addition, they retain all competencies previously listed in lower Digital Literacy levels. These Soldiers and Civilians not only retain all of Expert Level competencies, but the Baseline, Functional and Advanced Level competencies as well.

Technical/Digital Sample Tasks Include: • Design, engineer, build device / network / enterprise architecture • Design and develop programs, applications, websites, networks, and enterprise systems	• SharePoint development (workflow, web part) • App development (mobile, desktop, web, etc.) • Perform a backup procedure on a database • Perform a restore procedure on a database
Cognitive/Critical Thinking/Creative Sample Tasks Include: • Conduct cyber security / operations (defend, attack, exploit) • Evaluate and analyze programs, applications, websites, networks, and enterprise systems	• Prepare Signal Annex of the OPORD • Supervise the operation of communication equipment within the Standard Integrated Command Post System (SICPS) or Digital Tactical Operations Center (DTOC)
Social/Relational Sample Tasks include: • Set up, Run, Participate in a Configuration Control Board	

Assessing Digital Literacy

In academic settings, assessment instruments evaluate the level of proficiency to determine if an individual student needs additional training and practice in fundamental categories of technical, cognitive or social digital engagement. Standards, on the other hand, set out the level of achievement that is acceptable for all students (usually by grade level or age). Like standards, assessments of student achievement in Digital Literacy are changing due to the continuous transformation in technological skills and competencies needed to succeed in the 21st century. Some companies use digital competency assessments, but they are fewer and fewer as companies grow more comfortable with the fact that performance and job assignment outcomes provide sufficient assessment of whether a person is using digital tools adequately to do the task.

Many factors must be considered when selecting the best assessment instrument for measuring digital proficiency. These include "approach, feasibility, implementation, scope, reporting structure and cost as well as consideration of output needs and social context" (Covello 2010). Important to TRADOC will be exploring critical questions about assessment context and approaches:

- What are the objectives of the Digital Literacy assessment (e.g., skills and competencies the assessment will measure, processes vs. structures)?
- When will Soldiers be assessed?
- What methodology will be applied (e.g., self-assessment, external observation, qualitative or quantitative approaches)?
- How will the results be used (e.g., to inform decision making)?

Assessments can and will take a number of forms, similar to assessments of other Army training and education. These will include assessment instruments delivered digitally, assignment to tasks using specified digital tools, instructor/student interactive assessment exchanges online or in person, and observation. Particularly in the operating environment, most especially in combat where learning can be a "just do it" event, Digital Literacy capabilities or lack of them will be evident.

Although many of the digital tools and skills examined in this study are communication and/or learning tools (e.g., Microsoft Office), the operating environment is full of examples of sophisticated digital equipment and Soldiers trained to operate it, and also of digital innovation and on-the-job learning. For example, Honesty Traces (right) are maps plotted with exact routes taken by previous mounted patrols; they help keep patrols safer by combining time and space position information from Blue Force Tracker, so routes can be taken that surprise the enemy about where friendly forces will go next. This only works if routes and travel times are honestly reported and GPS reports are transformed into the traces, which require capabilities to use off-the-shelf GPS devices, Microsoft Access and Excel, ESRI, ArcGIS, SAIC GeoTracker and Adobe Acrobat Reader.

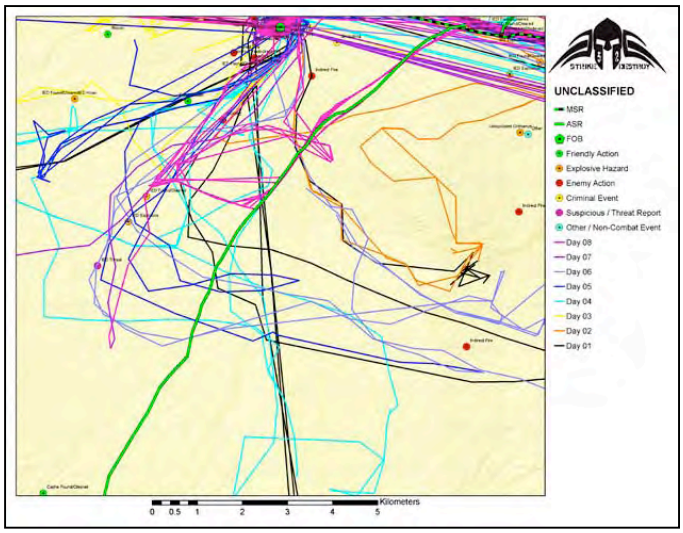


Figure 23: Honesty Traces
Crater caused by IED (top) and how it would appear (bottom, red spot at top of frame is crater, lines are routes) on Honesty Traces. The Operations Research/Systems Analysis division of the5th Stryker Brigade Combat Team, 2nd Infantry Division developed a brochure "Honesty Traces: Draw Something – Not Attention" to encourage Soldiers to engage with these digital opportunities to increase their own and others' safety.

Combining these digital tools to get the Honesty Traces results in a good example of the collaborative adaptations that characterize Digital Literacy.

Examples of the profusion of Digital Literacy assessment instruments available and Digital Literacy certification programs include:

- Microsoft has a Digital Literacy program that includes a certificate that functions like the course-level assessments. Governments and other organizations can use the tools provided by Microsoft to create a true certification-level exam and can sponsor testing sites with proctoring to formally validate a candidate's achievement.

- Intel offers Digital Literacy courses on assessment strategies to meet the needs of the 21st century classroom and to help K-12 students prepare to collaborate in a digital global world.

- The Internet and Core Computing Certification program (IC^3) is a Digital Literacy assessment and certification program. The IC^3 Global Standard 3 assessment and certification program was developed in 2008 and was adopted by the Global Digital Literacy Council after nine months of research and data collection from 400+ subject matter experts from more than 30 countries.

- The *iCritical Thinking* Digital Literacy assessment is an online exam developed by Certiport and Educational Testing Services. The intended audience of the *iCritical Thinking* assessment is high school and college students as well as teachers, employers and adult employees. The assessment simulates the use of common, vendor-neutral applications to measure students' information and communications technology literacy skills (Prabhu, 2010).

- The Project SAILS (Standardized Assessment of Information Literacy Skills) is an instrument for standardized assessment of information literacy skills (Covello, 2010). The assessment is aimed at higher education students.

- Instant Digital Competence Assessment (iDCA) tests knowledge and skills related to digital competence.

Sufficient assessment instruments and certification programs are commercially available that the Army will not need to develop its own, except for highly-specialized skills.

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The Way Ahead in Army Digital Literacy

A graph of the accelerating power of digital technologies in the past five years shows a line with a trajectory like a rocket to orbit. To graph the same period in software and online opportunities is just as dramatic a rise, with examples too numerous to chart successfully. The idea of training toward this volume of knowledge, skills and abilities implied in this digital plenitude would be daunting for any organization.

For the Army, engaged in war around the globe, trying to re-establish balance in the force in the face of the current OPTEMPO, the prospect of adding Digital Literacy elements to training curricula, more instructors to teach them, and more time for students to learn them is not practical or desirable. Research and analysis for this study shows it is also not necessary.

Two facts of life in the digital environment will lead to a "digital Army," a force comprised of functionally digitally literate individuals, at least by 2020. The facts are: 1) learner-led learning, the hallmark of digital's participatory culture, and 2) the combination of increasing digital capabilities taught from pre-K to high school graduation with the digital social universe youngsters now inhabit, which will bring to the Army individuals with levels of digital capability unimaginable even in today's very digitally capable 18-year olds. The outcomes of the intersection of these facts will be a highly digitally capable foundation for the Army by 2015. By 2020 digitally proficient officers will have taken over senior leadership from the individuals who have had the least lifetime exposure to the digital environment, those who do now and will still make up most of the "digitally illiterate" members of the Army. In 2020, the notion that BD-Lit would be part of professional military education will be laughable; entrants will be baseline digitally literate, ready to customize their capabilities to Army requirements. Even the expectation that BD-Lit would be a necessary training function in 2015 is not well founded.

Collaboration with industry and even academia can significantly ease how much of the "training work" of this the Army will have to provide. For instance, when Microsoft Office suite is replaced as the Army-wide computing software for general use, the new vendor (or Microsoft updating its products) will be an important partner. Requirements to vendors to provide a readily accessible Army-centric blend of online training with vendor-provided "digital gurus" to kick-off the learning process will be no different than the demands corporations already put on the software and hardware development companies with whom they contract. Influential new software will have off-the-shelf training packages in any case. Connecting Soldiers to these will mean planning and communicating and absorbing some costs – but these will be minimal against the Army's return on investment in any increasingly digitally capable force.

Learner-Led Learning

A seismic shift in the learning landscape has occurred with digital technology: learner-led learning neither trainer nor instructor led is a pre-dominant form of digital education. Learners are finding what they want to know or do and finding the means to learn it ,often through others who teach it to them.

Some of this type of learning seems not at all instructional but rather simply communicative or social (e.g., gaming has become a "community" of players who reconfigure virtual realities and teach each other new ways of entering, playing and winning) (New York Times 2010). The new "rules" spread quickly, changing the game, and with it the experiences of both seasoned players and new learners. Many of the digital competences the Army wants Soldiers to have will spread this way, along with vital information and knowledge.

This kind of viral learning has great promise for Digital Literacy in the Army. It creates interactive learning, without many formal "instructors," and it provides a peer support network for individual learners that is much more widespread and diverse than the traditional study groups generated from classroom contact. It also strengthens the Army's leadership initiatives because it encourages not only leaders who are acknowledged or anticipated, but also some who are "unlikely." The digital culture is a proven confidence-booster for participants who would not "speak out in class" in traditional environments (Jenkins 2006).

Of course, some direct training with instructors, observation and testing will continue to be important, especially when the devices are components of very sophisticated systems or the content is life-protecting preparation for battle. Even so, in the main, commonly used digital capabilities will be acquired by Soldiers and civilians teaching each other and themselves, with advancing levels prompted by job opportunities or requirements, new software or devices or interest piqued by observation or by recommendations of others.

While levels of Digital Literacy do not advance *de facto* as individuals advance through training, to some degree, advancing levels could be encouraged without much change to the TRADOC learning structure. Arguably, viral learning and self-education will not take many people to expert status in digital KSAs. It is possible, however, that sufficient advancement into functional and even advanced user levels would occur with a combination of requirements and opportunities: *requirements* to show evidence of digital capability and *opportunities* to find or use digital solutions for assigned tasks or discovered needs.

As more schools adopt standards of digital capability and teach toward them, more students will arrive on the Army's doorstep with grade-card proof of baseline Digital Literacy and, in some cases, beyond. If the Army communicates an expectation of BD-Lit, applicants will prepare for it and test-prep companies such as Kaplan, which offer ASVAB preparation courses, will include it. With or without such formalized

preparation, learners will find each other on the web and work together toward demonstrating that they can meet the Army's Digital Literacy expectations.

Asking individuals to take responsibility for proving BD-Lit, along with providing ongoing opportunities to connect to training and learning, could occur during advancing cohort levels. Some of the possibilities include:

- Require that recruited young people provide evidence of school-based or self-directed digital training (e.g., transcript entry, course certificate) or gain such certification during their time as Future Soldiers;

- Require a cadet to prove digital competency as part of the pre-commissioning training;

- In IMT core courses, provide opportunities for students to use required digital solutions to increase capabilities in practice (e.g., write a reports using Microsoft Word and embed digital imagery, etc.);

- During IMT, create opportunities for students to collaborate digitally, increasing Digital Literacy through peer-learning;

- In the next phases of training – branch specific courses – provide opportunities to employ digital technologies to support tactical operations (e.g., build a company operations database that includes Google Earth, KMZ files, etc.);

- Identify through observation and voluntary certification (available through commercial sources) individuals with better than average capabilities, interest and willingness to share and offer requirements/opportunities for them to serve as peer-learning leaders;

- Bring new technologies into intermediate level training, such as the Captains Career Course , with demonstrations and training for new technologies (some of it provided by companies that make the product) to be used in a military context.

- Create opportunities and incentives for personnel to engage with digital technology and each other in planned intervals – not leaving peer learning to random chance. Communities of Interest have worked well in industry and academia, but less formal opportunities can also be effective (e.g. a digital coffee group on Saturdays serving the same function as Apple Stores' Genius Bar, where anyone can stop in for a conversation with a digital "genius" about anything Apple device related).

When it occurs is not as critical as *that* it occurs. One scenario might be this:

The Army develops (or buys) a course or suite of courses for baseline digital competencies, some of them Army-centric (e.g., using AKO/DKO, Sharepoint, etc.), for the sake of this discussion called Digital Fundamentals for the Army (DFA), as well as DFA II, which adds more skills. All Army entrants are required to prove through certification or assessment that they have the most basic baseline computer capability, sufficient to be able to use digital tools to access learning materials and participate in training. They then have access to the online DFA suite and must pass assessments to be certified from DFA before moving on from IMT. DFA II certification (or some equivalent, perhaps depending on MOS) is a requirement to move from mid-grade to higher career levels. Perhaps most importantly, senior leader buy-in to the concept of an "all digitally literate" Army leads to a shared directive at highest civilian and military levels that all member of the force, Soldier and Civilian, must pass DFA certification, regardless of their rank or position or how long it takes to work the courses into their own OPTEMPO.

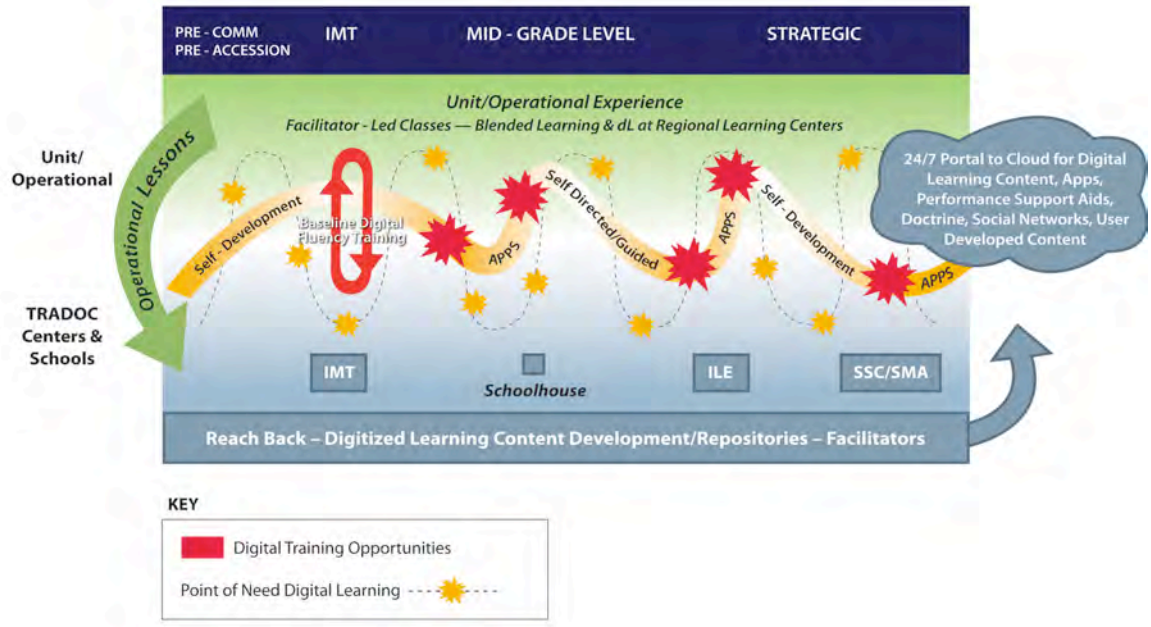

Figure 24: How Digital Literacy Training is Part of Lifelong Learning. Fundamental Digital Literacy assessment and training can be required early in a Soldier's career and made available to those longer in service. Specific digital skills will be "point of need" learning.

Adoption of this scenario could create an Army-wide recognition of the importance of digital capability to the success of the Army in every endeavor. Just as important, and even culture-changing, it also creates an Army-wide "community of interest," with all kinds of potential learning collaborations, including "mentoring up," the sharing of capabilities from more digitally savvy learners to those less so, regardless of the ranks or ages of "teachers" and "students." This scenario also emphasizes the "point of need" learning structure that undergirds ALC 2015. To make everyone in the Army

responsible to have a set of designated fundamental digital capabilities would move BD-Lit across the Army swiftly and effectively.

Army Digital Literacy 2020

If the Army made few adjustments to training in accommodate Digital Literacy, by 2020 it would still be a substantially digitally literate force. The inexorable wave of digital technology's advances and resulting human capabilities will wash over the Army no matter whether training occurs or not. There is, however, the issue of standards. Any old hodge-podge of digital capabilities brought by Soldiers and Civilians on their own will not meet the Army measure of Task Conditions and Standards (TRADOC Regulation 350-70). To do that, the Army will have to channel the digital wave.

Doing this will exact some patience for a different model than top-down instructing, because the digital environment is simply different from anything the Army has tried to regulate before. Most military instruction (even in subjects such as First Aid, which have counterparts in civilian life) is controllable, with content, methods of delivery, assessments (self- and instructor-directed), outcomes all taking place in a kind of separated "learning space," that is sometimes actual, and certainly psychological.

Digital learning is not like that. It is pervasive, global and 24/7. It is the context in which young Americans are at home, because it is the one they have known since birth. Even economic disparity does not keep them from participating, though it may limit the extent of their access to digital devices. If the digital environment were water, a significant percentage of young people, 17 years old and younger, are fish, and a considerable percentage of people 45 years old and older come into the environment in scuba gear, or in even more limited ways, as digital snorklers.

The seamlessness of this digital environment and the comfort of young people in it cannot be overstated for purposes of this study. This is essential to the idea of "advancing levels of Digital Literacy across cohorts." The reality is that levels of literacy will not rise across cohorts, but the "wave" of Digital Literacy will indeed advance across cohorts as lower (younger) echelons of Soldiers and leaders mature. They will take digital capability with them – enhancing it as they go – up through the ranks and positions of their careers. And as they do, the Army will change. Digital technologies will not be seen through a hardware- or device-first lens, as is now often the case. The seamlessness of the digital context will permit seeing the problem first and using the right digital tool to solve it.

For this to happen the push of digital competency up through the ranks must occur and with it a shift from thinking about digital in terms of machines at work and devices at home. This split is still part of many organizations that have been in business long enough to have middle-aged or older people in charge. Some, of course, have made the business commitment to becoming digital organizations and have

taken steps necessary to insure that. But many are struggling with the combination of digital change and the impact of "twenty-somethings" in the workplace.

As "millennials" have entered the workforce, one of the significant friction areas with people who have been there longer, especially those with senior experience, is the "work-life balance." Employers complain that young employees don't recognize a boundary between the workplace and the rest of their lives – that "work" and "life" are two arenas that should not be confused (thus employer discomfort with employees checking Facebook at work, even during a lunch break). Young employees suggest that a balanced life means that work and social realities are inevitably blended to some degree, since a third or more of all hours in the day can be spent in a workplace. Their work digital lives and home digital lives are all the same life and can intersect, overlap, converge, or divide again and again in the same 24 hours.

The effect of this divide on Digital Literacy in the Army (and many organizations) is observable and variously documented. Senior leaders may have Blackberries, iPhones and iPads that ferry them across the work/home divide, but most see devices as providing "work functions" that are different from "personal functions." They don't recognize the pervasiveness of the digital environment, so they are not tuned to the possibilities that so much activity that was not digital in the workplace could be. A good example is paper record keeping now done on computers in the same forms traditionally used; the process and outcomes have not yet been re-thought in digital terms that would allow the information to be shared and managed much more usefully (e.g., to populate data bases). These same leaders may well be managing photographs of grandchildren in sharable files on their smartphones but see that as a "personal" activity, not akin to work functions or desirable for transference to the work environment. Increasingly, work and personal separation in the digital sphere will vanish. As this happens, the Army (and other organizations experiencing the digital wave) will become genuinely digital organizations.

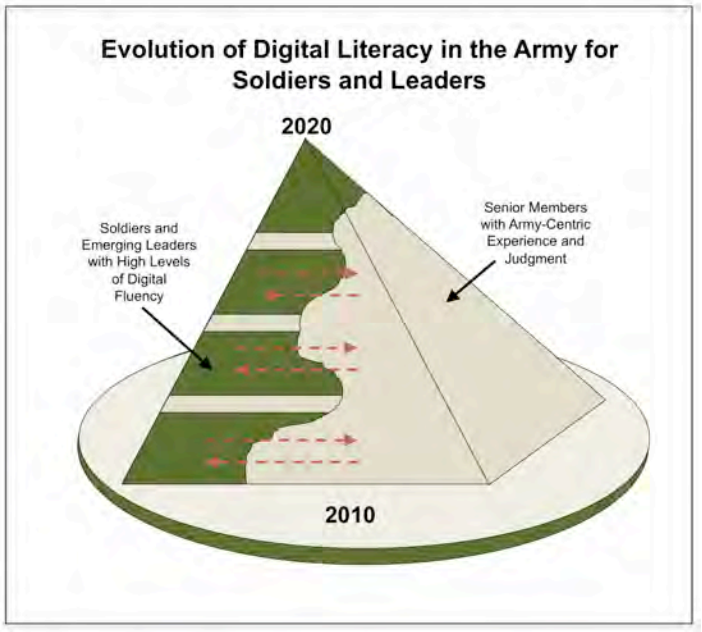

Figure 25: Evolution of Digital Literacy in the Army for Soldiers and Leaders

For the Army, the process can be more productive than painful, if every echelon is viewed as having important contributions to the whole. The technical and some of the social capabilities of younger Soldiers, Civilians and rising leaders will infuse the Army with digital capability and

eagerness for participatory learning and collaboration. The experience and judgment of individuals later in their careers will teach and model essential critical thinking skills and responsible behaviors. From every echelon can come what's needed to cross-nourish Digital Literacy in the next several years, until the "front line" of young leadership matures and the entire leadership/strategic level of the Army is digitally literate, directing an increasingly digitally capable force (see Figure 25).

A timeline might look like this: Today's entry-level cohorts move into mid-grade leadership levels in the next five years (assuming that today's new Enlisted Soldier who succeeds can be an E4 or E5 in five years, and today's commissionable entrant or ROTC graduate can be in the Captains Career Course) and behind them will be new Soldiers even more digitally capable than they were at entry. The Army can accelerate the proliferation of BD-Lit across the force by implementing a continuum of assessing digital capabilities, and offering digital training digitally delivered. Four or five years more, and most of the Army, top to bottom, will be digitally competent.

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Conclusion

A review of the background of TRADOC's and Army individuals' current interest in Digital Literacy shows a similar trajectory to that experienced by American industry, somewhat slower in the Army's rise than in some companies, as is fair to expect from one of the nation's largest and most diverse workforces. Advancement in levels of Digital Literacy across cohorts will occur whether the Army trains for it or not. But it is reasonable to believe that, as more and more digitally capable young people enter the Force, the Army learning structure will focus on providing individuals opportunities to use the baseline Digital Literacy brought with them into service. Formal training will focus on hardware and software tools specific to jobs, MOS's, situations and responsibilities, and peer interaction and learner-led learning will bring most people up to higher levels of functionality in their daily digital use.

This study finds that because the digital environment is becoming the context for daily life, Digital Literacy skills for Army personnel do not – and will not -- advance through echelons of training in an orderly progression. Digital learning is sporadic, sparked both by job or situation requirements and by personal or peer-encouraged interests. However, at every echelon, Soldiers and leaders can be held responsible for levels of digital competencies, most of which can be gained on their own, through online connections, participatory learning with other digital learners and/or off-the-shelf software and apps.

The Army's chief role in encouraging Digital Literacy for all Soldiers, leaders and Civilians will be to assess what users know and can do, in order to provide them with equipment, opportunities and encouragement to employ the fullest extent of their personal and collaborative digital knowledge, skills and abilities for mission success.

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Findings and Recommendations

Finding 1: Terminology and definitions of terms in the digital environment vary widely.

Across the Army and externally in industry and academia, a variety of terms and definitions are in use. Based on the literature and interview findings, the research team has drafted a definition of Digital Literacy that supports collective Army-wide understanding, and functions as a visioning definition that will persist in the fast pace changes in this arena.

Recommendation:
Review, modify as necessary and adopt an Army-wide definition of Digital Literacy.

Proposed definition:

> **Digital Literacy is the individual's awareness, attitudes and abilities to appropriately use digital tools in order to accomplish his or her Army mission and to better enable personal and professional development.**
>
> **A digitally literate member of the Army team integrates relevant information and knowledge with judgment to support mission requirements, safeguard the security and wellbeing of others on the team and uphold the Profession of Arms.**

Finding 2: The Army does not have a collective, Army-wide understanding of what Digital Literacy can or should accomplish for the Force.

Regardless of directives that may exist, personnel report that there are not conversations *between* various Army organizations about the problems that digital proficiency can address or different solutions (hardware, software, systems, etc.) organizations are considering independently. There is no vision for a "Digital Army," although the term is widely used. Evidence suggests that much of the digital discussion is organization-level and not Army-wide. Left on this course, maximizing digital opportunities will occur in some areas of the Army and not others. The question that must be answered is "How can the Army maximize digital capabilities and technologies to make the whole Army better?"

Recommendations:

1. Convene senior leadership representative of a wide variety of Army organizations to identify overarching objectives that greater digital competency could address across the force. The resulting leadership vision should include primary (forcewide) objectives and secondary (organization specific) objectives. This vision will potentially organize many of the existing efforts.

2. Assess current digital profile for benchmarking purposes. Conduct a survey of a sample the Force (every military and civilian echelon) to determine device preferences, capabilities, access to technology, personal engagement (social media, games, etc.). Due to the rate of change in the digital environment, update the assessment annually (similar to Pew Research Center's Internet and American Life Project).

Finding 3: Levels of literacy will not advance across cohorts, but the "wave" of Digital Literacy will advance as lower (younger) echelons of Soldiers and Leaders mature.

If the Army made few adjustments to training to accommodate Digital Literacy, by 2020, the Army would still be a substantially digitally literate force. The reality is that levels of literacy will not rise across cohorts, but the "wave" of Digital Literacy will indeed advance across cohorts as lower (younger) echelons of Soldiers and leaders mature. They will take digital capability with them – enhancing it as they go – up through the ranks and positions of their careers. The issue is how to channel this "digital wave" during the transition, so that experience and skills of mature Soldiers and leaders nourish the digital agility of younger people toward the eventual development of a Force that combines digital competencies with good judgment.

As this occurs, the Army will change. Digital technologies will not be seen through a hardware- or device-first lens, as is now often the case. The seamlessness of the digital context will permit seeing the problem first and using the right digital tool to solve it.

Recommendations:

1. Formalize and promote a Baseline Digital Literacy requirement and attendant instruction/ assessment.

2. Provide Baseline Digital Literacy (BD-Lit) training (or assessment-based equivalency) that is mandated for new Soldiers and Civilians and is also made easily accessible for Soldiers, Leaders and Civilians at every echelon. Bring senior leader influence to bear on mature individuals to interact with younger ones to "cross fertilize" their capabilities.

3. Pilot available commercial (e.g., Microsoft) testing packages to determine suitability for Army-specific needs and possible incorporation into ASVAB.

Finding 4: Collaborative learning, unstructured applications and instruction linked to an assignment all facilitate increased competency with digital devices.

Digital device competency advances effectively:

- With mentored learning, as opposed to classroom or formal structured content delivery.
  - This kind of collaborative learning is effective both for mixed groups (dissimilar ages, backgrounds, rank, etc.) and for peers (in age or job status or assigned task.

- When it involves play or unstructured creative applications.

- When an individual learns by doing (instruction and practice are simultaneous and associated with an assignment for which there is accountability).

Recommendations:

1. Capitalize on the Army's team orientation with focused digital learning activities reliant on collaborative learning and instruction:

   a. During IMT, create opportunities for students to collaborate digitally, increasing Digital Literacy through peer-learning.
   b. Create opportunities and incentives for personnel to engage with digital technology and each other in planned intervals – not leaving peer learning to random chance.

2. Tie digital instruction of any kind to immediate assignments or practice situations (experts say ideally within 48 hours).

   a. In IMT core courses, provide opportunities for students to use required digital solutions to increase capabilities in practice (e.g., write a reports using Microsoft Word and embed digital imagery, etc.).
   b. In the next phases of training – branch specific courses – provide opportunities to employ digital technologies to support tactical operations (e.g., build a company operations database that includes Google Earth, KMZ files, etc.)

3. Create opportunities for individuals and groups to solve problems and/or be creative with non-essential tasks (e.g., the Apps contest that solicited new applications developed by Soldiers) and to be recognized for the results (e.g., in addition to traditional recognition messaging, Army Facebook page would be good for this).

Finding 5: Digital Literacy standards and curriculum in the K-12 system by 2015 will result in more predictable levels of digital competencies among new recruits.

By 2015, continuing development of Digital Literacy standards within the realm of K-12 education and the implementation of curriculum to attain those standards will result in more predictable levels of digital competencies among new recruits.

Although nationally, education leaders have a goal to standardize digital competency requirements, actual standards will likely continue to be set by states.

Recommendation:

1. Evaluate current and track emerging state-required high school graduation requirements around digital competencies in order to understand the levels of K-12 school-based instruction new recruits will bring as a baseline.

2. For recruits from states where there are no state standards for digital competence:

    a. Require recruited young people to provide evidence of school-based or self-directed digital training (e.g., transcript entry, course certificate) or gain such certification during their time as Future Soldiers;
    b. Require a Cadet to prove digital competency as part of the pre-commissioning training.

Notes

[1] Dempsey, Martin E. "Army Learning Concept for 2015: Thinking Soldiers – Learning Army." TRADOC Live. March 2010. http://tradoclive.dodlive.mil/2010/03/09/army-learning-concept-for-2015thinking-soldiers-––learning-army/

[2] www.federalregister.gov/articles/2010/11/15/2010-28750/privacy-act-of-1974-system-of-records
Army's 2010 proposal to the Federal Register to add a system of Lifelong Learning records to its records systems).

[3] Views about "digital natives" are controversial. Marc Prensky, a speaker/consultant, coined the terms "Digital Natives" and "Digital Immigrants" in an opinion article in *On The Horizon*, (MCB University Press, Vol. 9 No. 5, October 2001). Prensky's seminal assertion turned on the concept that "today's students think and process information fundamentally differently from their predecessors" and that "it is very likely that our students' brains have physically changed – and are different from ours – as a result of how they grew up."
www.hfmboces.org/HFMDistrictServices/TechYES/PrenskyDigitalNatives.pdf

The idea of digital natives has generated a lot of controversy and considerable research. According to Henry Jenkins (2007), "Part of the challenge of this research is to understand the dynamics of who exactly is, and who is not, a digital native, and what that means." Generally, many current discussants agree that assigning the term simply by year of birth is misleading because too many other factors impact a person's comfort with digital technology.

In 2007, Drs. Siân Bayne and Jen Ross from the University of Edinburgh presented "The 'Digital Native' and 'Digital Immigrant': A Dangerous Opposition" at the Annual Conference of the Society for Research into Higher Education (SRHE). They state in their introduction that " The 'digital native' discourse (sometimes nuanced by alternative terminologies - 'Net Generation' (Oblinger 2003), 'Digital Generation,' 'Technological Generation' (Monereo 2004), 'Millenials' (Howe and Strauss 2000) and so on) pervades our discussions of the challenges of teaching current generations of students, despite its over-simplistic reduction of our understanding to a raw binary opposition. Serious critique of this discourse is long overdue." They conclude by criticizing the Digital Native Digital Immigrant as a "… marketised vision of higher education, a racialised and divisive understanding of student/teacher relationships and an associated series of metaphors which 'write out' the possibility of learner and teacher agency in the face of technological change." www.malts.ed.ac.uk/staff/sian/natives_final.pdf

In 2008, Drs. Sue Bennett, Karl Maton and Lisa Kervin, university professors, published "The 'Digital Natives' Debate: A Critical Review of the Evidence" in the

British Journal of Educational Technology. Their article bemoaned the lack of "empirically and theoretically informed" debate, finding that "our analysis of the digital native literature demonstrates a clear mismatch between the confidence with which claims are made and the evidence for such claims." "It is apparent that there is scant evidence to support this idea, and that emerging research challenges notions of a homogenous generation with technical expertise and a distinctive learning style. Instead, it suggests variations and differences within this population, which may be more significant to educators than similarities." They also found little evidence to suggest that schools need transformation to avoid "failing a generation of students," instead finding that "there is little evidence of the serious disaffection and alienation among students claimed by commentators." Developments reported by educators on hosts of sites dedicated to technology in learning support these assertions.
www.soc.northwestern.edu/justine/CC_Winter10/readings/BennettMatonKervinDigitalNativesDebate08.pdf

In 2009, Neil Selwyn published "The Digital Native – Myth and Reality," his "comprehensive review of the recent published literatures on young people and digital technology in information sciences, education studies and media/communication studies." He found that "young people's engagements with digital technologies are varied and often unspectacular – in stark contrast to popular portrayals of the digital native. As such, the paper highlights a misplaced technological and biological determinism that underpins current portrayals of children, young people and digital technology."
www.emeraldinsight.com/Insight/viewContentItem.do?contentType=Article&hdAction=lnkpdf&contentId=1800799

In 2009, Sharon Stoerger, an Indiana University Doctoral student, publishes "The Digital Melting Pot: Bridging the Digital Native-Immigrant Divide" in *First Monday*. As part of this article, Stoerger debunks the "digital native tech-savvy myth" stating, "…there are numerous claims about the technological capabilities of these students. However, some scholars argue that the empirical evidence to support them is lacking (e.g., Kennedy, et al., 2006)." "The digital native–digital immigrant metaphor serves to place individuals into separate silos based on over–generalized and oftentimes inaccurate characteristics."
http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2474/2243

Initially, few serious researchers took seriously Prensky's assertions that argued the human brain had physically changed because of the Internet. Advances in brain imaging technology in the last five years, however, have given researchers insight into the brain's functioning under conditions of engagement with digital technology. Increasing agreement can be found for the idea that, "The current explosion of digital technology not only is changing the way we live and communicate but also is rapidly and profoundly altering our brains. Daily exposure to high technology—

computers, smart phones, video games, search engines such as Google and Yahoo—stimulates brain cell alteration and neurotransmitter release, gradually strengthening new neural pathways in our brains while weakening old ones." (Gary Small and Gigi Vorgan, "Your iBrain: How Technology Changes the Way We Think," *Scientific American Mind* (October 8, 2008). "The technology is rewiring our brains," said Nora Volkow, director of the National Institute of Drug Abuse and one of the world's leading brain scientists in a *New York Times* series, "Your Brain on Computers," on technology's affects on human behavior (*New York Times*, June 7, 2010).

Research is evolving even as technologies change, some of those engaging users and others assessing that engagement. For the Army, the research emphasizes caution in simply assuming that age will be the differentiator in Digital Literacy – while, at the same time, recognizing that Soldiers of the future will learn differently, whether from learning styles formed from exposure since birth to digital delivery of information or from actual brain changes created from lifetime exposure to the light, sounds and moving images of "hot media."

[4] Memorandum ATOM-P 350 17 JUL 02

[5] Corbett, Sara. "Learning by Playing: Video games in the classroom." *New York Times.* 15 Sep. 2010. www.nytimes.com/2010/09/19/magazine/

[6] Vane, Michael A. and Robert M. Toguchi. "Achieving Excellence in Small-Unit Performance," *Military Review* (May 2010). http://usacac.army.mil/CAC2/MilitaryReview/Archives/English/MilitaryReview_20100630_art011.pdf

[7] *www.tardec.info/GVSETNews*

[8] An example might help to illustrate the platform agnostic concept:

Susan is driving a car leaving Washington, D.C. She owns an Apple iPhone that is running low on its battery. They become lost as they leave the city. Because Susan is a good driver, she asks Doug (who is in the passenger seat) to use her mobile mapping application to find where they are and the most efficient route to the hotel.

Doug has never held an iPhone before, which would pose a problem if the devices (smartphones), applications (operating systems, mapping software) or concepts (GPS, cell technologies) were immature.

But they are not. As it turns out, Doug is a fluent user of an Android smartphone on another carrier network. Because of this, his literacy can be quickly applied to a class of digital technologies. For instance, he knows that a smartphone uses a lot of battery energy, so he is careful to only use the phone as needed. He knows that

there is typically a power button on the side of the device and, with a little fumbling around, Doug is able to find it. Doug knows how to launch applications and knows there is probably a mapping application somewhere, finds it and launches it. Because most phone keyboards work in the same way, he is able to use the virtual keyboard and type in the desired location. He is careful not to do this in a tunnel or other area where a GPS signal might be weak because it risks inaccurate determination of his present location.

The key understanding is that each of Doug's skills in this example of literacy are based on the class of technology (smartphones) rather than a specific technology (Apple iPhone 3GS).

The implication for the Army's Digital Literacy model is important in the way levels of competency can be applied. Determination of competency can be made on the class of devices or applications used (i.e., targeting systems), rather than a specific vendor's targeting system application, thus increasing resource flexibility for wartime deployment scenarios. And the relative levels can be matched so that the level of Digital Literacy for the device is related to the level of Digital Literacy for the software used on the device.

"Platform agnostic" has been such an appealing concept that it was quickly picked up from early digital lingo by corporate marketers promising flexibility in their products. The term migrated to more far-ranging descriptions, suggesting products or information that would function across a variety of media, venues, conditions, organizations or other "platforms." For example, newspaper editors have called "platform agnostic" any news deliverable on cell phones, in print newspapers or on the Web (Koblin, 2008). Discussions of the same topic in multiple organizations are called "platform agnostic." Even some technology users describe themselves that way: "I'm now a bona fide platform agnostic. My personal tech armory includes iPhone and Android, iPad and Ubuntu netbooks, desktop Ubuntu and a Macbook Pro," confessed a blogger. (http://bitten.twiceshy.org/platform-agnostic-productivity)

[9] Memorandum, HQs, TRADOC, AFTC-K, *Signal Functional Area Assessment (FAA) Guidance, 11 FEB 10*.

10

Source	Technology/Digital Proficiency	Cognitive/Critical Thinking Skills	Social-Relational Skills (including Ethics)
TRADOC	• New Media	• Communicate, locate and transform ideas and information	• Share ideas and information
Accessions Command	• Multiple formats • Digital devices or services • Digital technology • Media • Real world applications of technology	• Process, integrate relevant information effectively	
Covello, S. Syracuse University 2010	• Computer literacy • IT/ICT literacy • Technology literacy	• Media literacy • Communication literacy	• Understanding – Plagiarism – Author/ownership – Privacy • Ethics • Shared and collaborative knowledge
Jones-Kevalier, et. al. *EDUCAUSE* 2009	• Digital environment – information presented primarily in numeric form and for computer use • Reproduce data and images through digital manipulation	• Read and interpret media (text, sound, images) • Evaluate and apply information gained from digital environment • (Most critical) Ability to make educated judgment about online information	
Bruce, B. "Adolescents and Literacies in the Digital World"	• Multiple sources (music, video, online databases)	• Integrate knowledge • Think critically • Historical grounding • Interconnectedness of economic and social environment	
Queens University of Charlotte (NC) 2010	• Understand new technologies and their impact	• Media literacy: evaluate content for accuracy and bias	• "Help" create content
New Zealand (Government Source) 2010	• Digital technology, communication tools and/or network	• Locate, evaluate, create and use information	
Carlacio and Heidig, Cornell 2009	• Multiple formats, wide range of sources when presented by computer	• Ability to understand and use information	• Ethical and responsible

Table 1: Definitions of Digital Literacy

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Annexes

Annex A – Assessing Digital Literacy

Annex B – Digital Literacy Standards

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Annex F – Interview Commentary

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Annex A – Assessing Digital Literacy

The International Technology Engineering Educators Association (ITEEA) has created an assessment framework, standards and criteria for educators who implement the Standards for Technological Literacy. The publication is available for download on the ITEEA website.

Assessment developers have also used the International Society of Technology Education (ISTE) National Educational Technology Standards for Students (NETS•S) to create assessment standards for Digital Literacy and to indicate ideal performance outcomes (Covello, 2010). The ISTE website lists 14 assessment resources that align with the ISTE NETS•S, such as.

- Certiport Internet & Computing Core Certification (IC^3) Program and Assessment. The certification assesses Digital Literacy and is offered to individuals to provide them with a foundation to succeed in environments that require the use of computers and the Internet. See additional information below.
- Intel Learn® Program. This program was developed with governmental and nongovernmental agencies to provide youth ages 8 to 18 years with opportunities to use technology effectively in after-school setting. Trained staff in after-school settings, such as local community centers, administers the program.
- Intel Technology Literacy®. This curriculum provides active, hands-on projects for embedding technology in core curriculum for students ages 11-15.

The Association of College and Research Libraries (ACRL) information literacy standards developed in 2000 listed a range of outcomes for assessing student progress toward information literacy. These outcomes provide guidelines for school faculty, librarians and other professionals for developing local methods to measure student learning specific to an institution's unique mission. The ACRL asserts that "different levels of thinking skills are associated with various learning outcomes – and therefore different instruments or methods are essential to assess those outcomes." (www.ala.org/acrl)

The following examples represent a sampling of the Digital Literacy assessment instruments available as well as training resources, curriculum and Digital Literacy certification programs.

Microsoft Digital Literacy

Microsoft has a Digital Literacy program that includes free, online e-learning modules for Digital Literacy training in a self-study or classroom environment and a Digital Literacy certificate test. The program's curriculum covers a broad range of ICT literacy skills and can be accessed on the Microsoft Digital Literacy website. Instructor resources can be accessed by creating an online account.

The Microsoft Digital Literacy curriculum "provides a baseline Digital Literacy skills standard supported by assessment, e-Learning and a certificate of completion" (Microsoft, "Digital Potential"). The curriculum can be adapted to meet specific needs.

The basic curriculum includes resources to teach and assess computer concepts and skills for people who are just beginning to use a computer for the first time. The standard curriculum version offers five courses on Computer Basics, the Internet and the World Wide Web, Productivity Programs, Computer Security and Privacy and Digital Lifestyles. Each course has an e-learning module and an assessment. The advanced curriculum covers ICT skills training.

The certificate functions like the course-level assessments and includes a set of 30 questions that test objectives across the different courses. Governments and other organizations can use the tools provided by Microsoft to create a true certification-level exam and can sponsor testing sites with proctoring to formally validate a candidate's achievement.

The Microsoft Digital Literacy program supports workforce development by providing awareness and readiness for technology-related careers and a baseline set of skills for further study. Upon completing the program, workers potentially can be better prepared to develop key competencies, bridge training to workplace opportunities and be suited for work placement and ongoing professional development opportunities. (Microsoft 2010)

Intel

Intel offers Digital Literacy resources for K-12 educators, including curriculum and courses for middle school students, technology projects, teacher resources and other information. It also offers courses on assessment strategies to meet the needs of the 21st century classroom and to help students prepare to collaborate in a digital global world. The Intel resources are aligned with the ISTE NETS•S.

The IC^3 Global Standard 3 Certification

The Internet and Core Computing Certification program (IC^3) is a Digital Literacy assessment and certification program created by Certiport, a private sector company that provides career-oriented certification solutions to industry and academia. The training and certification program covers a broad range of computing knowledge and skills that proves competency in the areas of: Computing Fundamentals, Key Applications and Living Online.

The IC^3 Global Standard 3 assessment and certification program was developed in 2008 and was adopted by the Global Digital Literacy Council after nine months of research and data collection from 400+ subject matter experts from more than 30 countries. The assessment and certification program entails three exams. The objectives of each exam are:

Computing Fundamentals

- Identify types of computers, how they process information and the purpose and function of different hardware components
- Identify how to maintain computer equipment and solve common problems relating to computer hardware
- Identify how software and hardware work together to perform computing tasks and how software is distributed and upgraded
- Identify different types of application software and general concepts relating to application software categories
- Identify what an operating system is and how it works and solves common problems related to operating systems
- Use operating system to manipulate a computer's desktop, files and disks
- Identify how to change system settings, install and remove software

Key Applications

- Be able to start and exit an application, identify and modify interface elements and utilize sources of online help
- Perform common file-management functions
- Perform common editing and formatting functions
- Perform common printing/outputting functions
- Be able to format text and documents including the ability to use automatic formatting tools
- Be able to use word-processing tools to automate processes such as document review, security and collaboration
- Be able to modify worksheet data, structure and formatting
- Be able to sort data, manipulate data using formulas and functions and create simple charts
- Be able to create and format simple presentations

Living Online

- Identify network fundamentals and the benefits and risks of network computing
- Identify different types of electronic communication/collaboration and how they work
- Identify how to use an electronic mail application
- Identify the appropriate use of different types of communication/collaboration tools and the "rules of the road" regarding online communication ("netiquette")
- Identify information about the Internet, the World Wide Web and websites and be able to use a Web browsing application
- Understand how content is created, located and evaluated on the World Wide Web
- Identify how computers are used in different areas of work, school and home

- Identify the risks of using computer hardware and software and how to use computers and the Internet safely, ethically and legally

Educational Testing Services (ETS) iCritical Thinking

The *iCritical Thinking* Digital Literacy assessment is an online exam developed by Certiport and Educational Testing Services, a nonprofit assessment development and research organization. The exam aligns with the ACRL standards for information literacy. The intended audience of the *iCritical Thinking* assessment is high school and college students as well as teachers, employers and adult employees. It helps employers and educators determine whether a student is ready for the workforce or for academia (Prabhu 2010).

The exam was "developed in response to a need for large-scale institutional assessment of information literacy and technical skills founded on cognitive and problem-solving skills" (Covello 2010). It features real-time, scenario-based tasks that measure an individual's ability to navigate, critically evaluate and understand the vast amount of information available through digital technology.

The assessment does not evaluate use of specific products; instead, it simulates the use of common, vendor-neutral applications to measure students' information and communications technology literacy skills (Prabhu 2010).

Project SAILS

The Project SAILS (Standardized Assessment of Information Literacy Skills) assessment was developed out of a Kent State University initiative to develop an instrument for standardized assessment of information literacy skills.

The assessment aligns with the ACRL information literacy standards and consists of 45 multiple-choice questions that cover concepts such as research strategies; selecting sources; developing and revising search strategies; evaluating results; retrieving materials; and documenting sources (Covello 2010). The assessment is aimed at higher education students.

iDCA (Instant Digital Competence Assessment)

The iDCA tests consist of a series of questionnaires for assessing and developing knowledge and skills related to digital competence. The iDCA includes multiple-choice, matching and short answer items covering three sections: technological, cognitive and ethical issues. The assessment aligns with the ACRL standards.

Annex B – Digital Literacy Standards

Standards for Technological Literacy

The ITEEA is a membership organization consisting of elementary school through college/university faculty supervisors who recognize the critical importance of technology education for all people.

The ITEEA developed the *Standards for Technological Literacy* (STL), a set of 20 standards to facilitate student achievement of technological literacy, defined as the ability to use, manage, assess and understand technology.

The *STL* are organized into categories and include the following:

The Nature of Technology	
Standard 1	Students will develop an understanding of the characteristics and scope of technology.
Standard 2	Students will develop an understanding of the core concepts of technology.
Standard 3	Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.
Technology and Society	
Standard 4	Students will develop an understanding of the cultural, social, economic and political effects of technology on the environment.
Standard 5	Students will develop an understanding of the effects of technology on the environment.
Standard 6	Students will develop an understanding of the role of society in the development and use of technology.
Standard 7	Students will develop an understanding of the influence of technology on the history.
Standard 8	Students will develop an understanding of the attributes of design.
Standard 9	Students will develop an understanding of engineering design.
Standard 10	Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
Abilities for a Technological World	
Standard 11	Students will develop abilities to apply the design process.
Standard 12	Students will develop abilities to use and maintain technological products and systems.
Standard 13	Students will develop abilities to assess the impact of products and systems.

The Designed World	
Standard 14	Students will develop an understanding of and be able to select and use medical technologies.
Standard 15	Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
Standard 16	Students will develop an understanding of and be able to select and use energy and power technologies.
Standard 17	Students will develop an understanding of and be able to select and use information and communication technologies.
Standard 18	Students will develop an understanding of and be able to select and use transportation technologies.
Standard 19	Students will develop an understanding of and be able to select and use manufacturing technologies.
Standard 20	Students will develop an understanding of and be able to select and use construction technologies.

Table 2: Standards for Technological Literacy

Standards 12 and 17 are noteworthy because they pertain to the ability to select, use and maintain technological products and systems, including information and communication technologies.

For example, Standard 12 applies to the ability to:

- Learn to use a particular technological product or system
- Select appropriate technologies for a given situation
- Problem solve by analyzing malfunctions and coming up with appropriate responses
- Maintain products by troubleshooting, testing and diagnosing

The following information offers insight into the technological proficiencies students of all ages and grade levels would have if the STL were widely implemented in schools.

As early as grades K-2, students will be exposed to various types of technologies and given opportunities to use them correctly. They should be able to discover how technological products work, use hand tools correctly and safely as well as name them correctly and recognize and use everyday symbols, such as road signs, computer screen icons, symbols for people who are disabled, as a means of communication in the technological world.

By grades 3-5 students will learn more about how to use products and systems and what to do if they are not working properly. Students in grades 3-5 should be able to:

- Follow step-by-step directions to assemble a product
- Select and use tools, products and systems for specific tasks
- Use computers to access and organization information through use of computer software or the Internet

- Use common symbols, such as numbers and words, to communicate key ideas (e.g., the alphabet, punctuation marks, commercial logos)

To meet Standard 12, students in grades 6-8 will explore, use and maintain a variety of tools and machines, consumer products and technological systems. Students will learn how to follow directions provided by manuals or protocols to use a product or determine whether it is working properly. They will learn to use tools, such as a calculator and computer, to collect and analyze data and information to determine whether a system is operating effectively. They will need to develop a "systems-oriented way of thinking" to understand how a system works in order to maintain it effectively.

Students in grades 9-12 will demonstrate a key element to technological literacy – the ability to use and maintain technological products and systems. To meet Standard 12, high school-level students should be able to:

- Document processes and procedures and communicate them to different audiences using oral and written techniques, such as flow charts, drawings, spreadsheets, graphs and webpages
- Diagnose a malfunctioning system and use diagnostic tools, materials, machines and knowledge to maintain it
- Troubleshoot, analyze and maintain systems to ensure safe and proper function
- Operate systems, such as two-way communication radios or transportation systems that move goods, so that they function in the way they were designed
- Access information through the use of resources, such as the Internet, spreadsheet software and other tools.

Standard 17 comprises the following: Students will develop a basic understanding of and be able to select and use information and communication technologies. The assumption is that by the time students reach kindergarten they will already have experience using technologies to communicate with friends and families and to find answers to questions.

At the K-2 grade levels, Standard 17 emphasizes students' learning about the communication process and the different ways they can locate and communicate with others. Students will learn that data is information that has been organized and that information and communication tools and systems are available in many different forms. Students are expected to be able to operate computers to perform basic tasks, such as writing, learning basic operations, communicating and creating graphic images.

Students in grades 3-5 will have hands-on experiences in accessing facts, processing data into information and interpreting the information to produce knowledge. Students are expected to use a computer to access facts and data and turn it into

information by using a spreadsheet or writing a report. Students may also use communication tools such as digital cameras, video equipment and the Internet.

In grades 6-8, students would develop an understanding of how information and communication systems function and enable people to gather and process information and communicate more effectively. They would be provided with opportunities to use information and communication systems to solve problems, make decisions, communicate with others and organize and maintain information. Students will learn how the design of a message is influenced by factors such as the intended audience, medium, purpose and nature of the message.

Students in grades 9-12 would experience activities in designing, using and assessing different types of information and communication systems such as television, telephones, the Internet, data processing systems and graphic communication systems. They would understand the purpose of each system and how to select the best system for a given situation. Students would be able to research, synthesize and transmit messages using mass media and to compare and contrast information sources and examine the relevancy of messages. In addition, students would communicate to others using components of the language of technology – symbols, measurement, icons and graphic images.

National Educational Technology Standards

The International Society for Technology in Education (ISTE) is a membership organization for educators and education leaders engaged in improving and advancing the use of technology in pre-K-12 grade levels and teacher education. The organization represents more than 100,000 education leaders and emerging leaders throughout the world. Its membership includes individuals, affiliate organizations and corporations worldwide.

ISTE created a set of educational technology standards for students, teachers and administrators as roadmaps for "global learning in a digital age." The standards include the following.

Creativity and Innovation

Students demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology. Students:

a. Apply existing knowledge to generate new ideas, products or processes
b. Create original works as a means of personal or group expression
c. Use models and simulations to explore complex systems and issues
d. Identify trends and forecast possibilities

Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students: a. Interact, collaborate and publish with peers, experts or others employing a variety of digital environments and media b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats c. Develop cultural understanding and global awareness by engaging with learners of other cultures d. Contribute to project teams to produce original works or solve problems
Research and Information Fluency
Students apply digital tools to gather, evaluate and use information. Students: a. Plan strategies to guide inquiry b. Locate, organize, analyze, evaluate, synthesize and ethically use information from a variety of sources and media c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks d. Process data and report results
Critical Thinking, Problem Solving and Decision Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using appropriate digital tools and resources. Students: a. Identify and define authentic problems and significant questions for investigation b. Plan and manage activities to develop a solution or complete a project c. Collect and analyze data to identify solutions and/or make informed decisions d. Use multiple processes and diverse perspectives to explore alternative solutions
Digital Citizenship
Students understand human, cultural and societal issues related to technology and practice legal and ethical behavior. Students: a. Advocate and practice safe, legal and responsible use of information and technology b. Exhibit a positive attitude toward using technology that supports collaboration, learning and productivity c. Demonstrate personal responsibility for lifelong learning d. Exhibit leadership for digital citizenship
Technology and Operations
Students demonstrate a sound understanding of technology concepts, systems and operations. Students: a. Understand and use technology systems b. Select and use applications effectively and productively c. Troubleshoot systems and applications d. Transfer current knowledge to learning of new technologies

Table 3: National Educational Technology Standards for Students

ISTE also developed a set of profiles that include a sampling of the types of learning activities that technology literate students should be able to complete at key grade levels in their precollege education.

Examples of learning activities that pre-kindergarten to grade 2 students (ages 4-8) might engage in include:

- Using digital tools and media resources for illustrating and communicating ideas and stories
- Researching and collecting data on an environmental issue and using digital resources to propose a solution
- Using e-mail and other electronic means to engage in learning activities with students from other cultures
- Engaging in a collaborative work group to produce a digital presentation through use of a variety of technologies
- Navigating in virtual environments, such as electronic books, simulation software and websites

Students in grades 3-5 (ages 8-11) might engage in the following experiences and learning activities with technology and digital resources to meet the ISTE standards:

- Creating or modifying works of art for use in a digital presentation through the use of digital-imaging technology
- Selecting and applying digital tools to collect, organize and analyze data to evaluate theories or test hypotheses
- Using digital instruments and measurement devices to conduct science experiments
- Identifying and investigating a global issue and generating possible solutions using digital tools and resources
- Using digital planning tools in group learning projects

Examples of learning activities students in grades 6-8 (ages 11-14) might engage in to meet ISTE standard include:

- Using a model, simulation or concept-mapping software to describe and illustrate a content-related concept
- Creating original animations or videos
- Using digital tools and resources to gather data, examine patterns and apply information for decision making
- Participating in an online learning community
- Using data-collection technology, such as probes, handheld devices and geographic mapping systems

Students in grades 9-12 (ages 14-18) might have the following experiences with technology and digital resources in schools that implement the ISTE standards:

- Designing, developing and testing a digital learning game to demonstrate knowledge and skills related to curriculum content
- Employing simulations to practice critical thinking processes
- Designing a website that meets accessibility requirements
- Configuring and troubleshooting hardware, software and network systems to optimize their use for learning and productivity

- Creating and publishing online content

Information Literacy Competency Standards for Higher Education

The Association of College and Research Libraries (ACRL) developed a set of standards, performance indicators and outcomes for assessing student progress toward information literacy in higher education. The ACRL is considered the premier source for assessment of ICT Digital Literacy competencies at the post-secondary level. (Kempster Group 2009)

Standard One
The information literate student defines and articulates the need for information. Performance indicators for standard one include students' demonstrated ability to: • Define and articulate the need for information • Identify a variety of types and formats of potential sources for information • Consider the costs and benefits of acquiring the needed information
Standard Two
The information literate student accesses needed information effectively and efficiently. Performance indicators for standard two include students' demonstrated ability to: • Select the most appropriate investigative methods or information retrieval systems for accessing needed information • Construct and implement effectively designed search strategies • Retrieve information online or in-person using a variety of methods • Refine the search strategy if needed • Extract, record and manage information and its sources
Standard Three
The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system. Performance indicators for standard three include students' demonstrated ability to: • Summarize the main ideas to be extracted from the information gathered • Articulate and apply initial criteria for evacuating the information and its sources • Synthesize main ideas to construct new concepts • Compare new knowledge with prior knowledge to determine the value added, contradictions or other unique characteristics of information • Determine whether new knowledge has an impact on an individual's value system and takes steps to reconcile differences • Validate understanding and interpretation of the information through discourse with others • Determine whether the initial query should be revised
Standard Four
The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose. Performance indicators for standard four include students' demonstrated ability to: • Apply new and prior information to the planning and creation of a particular product or performance • Revise the development process for the product or performance • Communicate the product or performance effectively to others

Standard Five
The information literate student understands many of the economic, legal and social issues surrounding the use of information and accesses and uses information ethically and legally. Performance indicators for standard five include students' demonstrated ability to: • Understand the ethical, legal and socio-economic issues surrounding information and information technology • Follow laws, regulations, institutional policies and etiquette related to the access and use of information resources • Acknowledge the use of information sources in communicating the product or performance

Table 4: Information Literacy Competency Standards for Higher Education

Annex C – Digital Literacy Definitions

1. (TRADOC?) Digital Literacy: the ability to communicate, locate, transform and share ideas and information through new media.

2. (Accessions Command) Digital Literacy for the Army (proposed definition): Digital Literacy is the ability of Army team members to understand and use information in multiple formats from varied sources when presented via digital device or service. It is the ability to employ digital technology, media, and services to process information effectively. A digitally literate member of the Army team integrates relevant information with real-world applications of technology in support of mission requirements." 6 July 2010 briefing to LTG Freakley, USAAC.

3. Defining digital and visual literacy: " . . . Digital Literacy represents a person's ability to perform tasks effectively in a digital environment, with digital meaning information represented in numeric form and primarily for use by a computer. Literacy includes the ability to read and interpret media (text, sound, images), to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments. According to Gilster (Gilster, P. A Primer on Digital Literacy. John Wiley & Sons. 1997), the most critical of these is the ability to make educated judgments about what we find online." Jones-Kavalier, B., Flannigan, S. Connecting the Digital Dots: Literacy of the 21st Century. *EDUCAUSE Quarterly*. Vol. 29, Number 2, 2009.

4. "Digital Literacy means understanding new technologies and their impact. Media literacy means the ability to evaluate content for accuracy and bias, and to help create it." Source: Queens University of Charlotte www.queens.edu/News-and-Events/About-Queens-News/Queens-University-of-Charlotte-becomes-digital-literacy-pioneer.html

5. "The ability to use digital technology, communication tools or networks to locate, evaluate, use and create information."Digital Strategy Glossary of Key Terms. www.med.govt.nz/templates/MultipageDocumentPage 16298.aspx?&MSHiC=65001&L=0&W=%22digital+literacy%22+&Pre=%3Cb%3E&Post=%3C%2fb%3E.

6. "The ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers." Gilster, P. *Digital Literacy*. New York: Wiley and Computer Publishing, 1997, p.1.

7. "Adolescents need to learn how to integrate knowledge from multiple sources, including music, video, online databases and other media. They need to think

critically about information that can be found nearly instantaneously throughout the world. The need to participate in the kinds of collaboration that new communication and information technologies enable, but increasingly demand. Considerations of globalization leads us toward the importance of understanding the perspective of others, developing a historical grounding, and seeing the interconnectedness of economic and ecological systems." Bruce, B. Diversity and Critical Social Engagement: How Changing Technologies Enable New Modes of Literacy in Changing Circumstances." In Adolescents and Literacies a Digital World, e.d. D.E. Alverman. New York: Peter Lang.

8. "A definition of twenty-first century literacy offered by the New Media Consortium (2005) is 'the set of abilities and skills where aural, visual and Digital Literacy overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms' (p. 8). We would modify this definition in two ways. First, textual literacy remains a central skill in the twenty-first century. Before students can engage with the new participatory culture, they must be able to read and write. Youth must expand their required competencies, not push aside old skills to make room for the new. Second, new media literacies should be considered a social skill." Jenkins, H. et al. Confronting the Challenges of Paarticipatory Culture: Media Education for the 21st Century. Chicago: The MacArthur Foundation. p. 19.

9. "The ability to use ICT and the Internet becomes a new form of literacy – 'Digital Literacy.' Digital Literacy is fast becoming a prerequisite for creativity, innovation and entrepreneurship and without it citizens can neither participate fully in society nor acquire the skills and knowledge necessary to live in the 21st century."

   "Digital Literacy involves being able to carry out successful digital actions embedded within life situation, which may include work, learning, leisure, and other aspects of everyday life."

   "Digital Literacy, for the individual, will therefore vary according to his/her particular life situation, and also be an ongoing lifelong process developing as the individual's life situation evolves."

   "Digital Literacy is broader than ICT literacy and will include elements drawn from several related 'literacies," such as information literacy, media literacy and visual literacy."

   "Digital Literacy will involve acquiring and using knowledge, techniques, attitudes and personal qualities, and will include the ability to plan, execute

and evaluate digital actions in the solution of life tasks, and the ability to reflect on one's own Digital Literacy development."

"Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process."

Martin, Allan. "DigEuLit – A European Framework for Digital Literacy: A Progress Report." *Journal of eLiteracy,* Vol. 2 (2005). www.jelit.org/65/01/JeLit_Paper_31.pdf

10. "Digital Literacy is the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers."

    Digital Literacy includes searching on the Internet, installing new software and coping with hyperlinks.

    "Digital Literacy learning can be regarded as a spiral – an ongoing process in which people become thoroughly familiar with instrumental (I), structural (S1) and strategic (S2) skills. These skills are not only honed but also subject to change in account of the constantly renewed personal, communicative and technological context in which they are applied. The entire learning process beings anew each time."

    Newrly, Petra and Michelle Veugelers. "How to Strengthen Digital Literacy? Practical Example of a European Initiative 'SPreaD.'" *eLearning Papers*, Feb. 2009. www.elearningeuropa.info/files/media/media18513.pdf

11. Refers not only to access and understanding of professionally produced digital content, but crucially also to its creation and publication by non-professional users and consumers, for both playful and purposeful ends (also known as media literacy). Harley, J., Banks, J., Burgess, J., and McWilliam, K. "The Uses of Multimedia: Three Digital Literacy Case Studies." *Media International Australia: Incorporating Culture and Policy.* 128 (2008); 59-72.

12. Digital information literacy: the ability to recognize the need for, to access and to evaluate electronic information. The digitally literate can confidently use, manage, create, quote and share sources of digital information in an effective way. Hegarty, B., Coburn, D., Jeffrey, L., Kelly, O., McDonald, J., and Penman, M. "Digital Information Literacy: Supported Development of Capability in Tertiary Environments." *Education Counts*. 30 Sept 2010. www.educationcounts.govt.nzpublications/tertiary_education/80624

13. Digital Literacy: the skills and knowledge to access and use a variety of digital media software applications and hardware devices, such as a computer, a mobile phone, and Internet technology; the ability to critically understand digital media content and applications; and the knowledge and capacity to create with digital technology. Other terms used include: digital media knowledge transfer network, multi-literacies, Digital Natives, Digital Immigrants. "Digital Literacy in Canada: From Inclusion to Transformation.' Media Awareness Network. July 2010. 30 Sept 2010 www.media-awareness.ca/english/corporate/media_kit/digital_literacy_paper_pdf/digitalliteracypaper.pdf

14. "Integrate digital and media literacy as critical elements of education at all levels through collaboration among federal, state and local education officials. Successful participation in the digital information ecology entails two kinds of literacy, or skill sets. One is typically called "Digital Literacy," learning how to work the information and communication technologies of our networked aged and understanding the social, cultural, and ethical issues surrounding these technologies. The second is "media literacy," the ability to access, analyze, evaluate, and create the information products that media disseminate." The Report of the Knight Commission on the Information Needs of Communities in a Democracy. 2009. www.knightcomm.org/wp-content/uploads/2010/02/Informing_Communities_Sustaining_Democracy_in_the_Digital_Age.pdf P.45.

15. "Digital Literacy, by extension, includes – the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers in an ethical and responsible manner." Carlacio, J. and Heidig, L. Teaching Digital Literacy Digitally: A Collaborative Approach. Cornell University. web.mit.edu/comm-forum/mit6/papers/Carlacio.pdf.

16. "Definition of Digital Information Literacy: Digital Information Literacy (DIL) is the ability to recognize the need for, to access and to evaluate electronic information. The digitally literate can confidently use, manage, create, quote and share sources of digital information in an effective way. The way in which information is used, created and distributed demonstrates an understanding and acknowledgement of the cultural, ethical, economic, legal and social aspects of information. The digitally literate demonstrate openness, the ability to problem solve, to critically reflect, technical capability and a willingness to collaborate and keep up to date prompted by the changing context in which they use information."Digital Information Literacy: Supported Development of Capability in Tertiary Environments Final Report 2010. www.educationcounts.govt.nz/publications/tertiary_education/80624

17. "ICT Digital Literacy as delineated in the California ICT Digital Literacy Assessments and Curriculum Framework is the ability to use digital technology and communication tools and/or networks to access, manage, integrate, evaluate, create and communicate information in order to function in a knowledge society." California ICT Digital Literacy Assessments and Curriculum Framework. www.ictliteracy.info/rf.pdf/California%20ICT%20Assessments%20and%20Curriculum%20Framework.pdf

18. "A person's ability to perform tasks effectively in a digital environment. . . Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments." Jones-Kavalier, B.R. and Flannigan, S.L. Connecting the Digital Dots: Literacy of the 21st Century. *EDUCAUSE.* http://connect.educause.edu/Library/EDUCAUSE+Quarterly/ConnectingtheDigitalDotsL/39969

19. "21st Century Literacy is the set of abilities and skills where aural, visual and Digital Literacy overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms. New Media Consortium. A Global Imperative: The Report of the 21st Century Literacy Summit. 2005. P. 8. www.nmc.org/publications/global-imperative

20. Digital Literacy Pathways in California: ICT Leadership Council Action Plan Report. July 2010. Appendix B. www.cio.ca.gov/Government/Publications/pdf/Digital%20LiteracyMaster_Final_July_2010.pdf

    a. Information literacy: Encompasses aspects of the evaluation of information, and an appreciation of information resources (Bawden 21).
    b. Skills: Recognizing a need for information, identifying what information is needed, finding the information, evaluating the information, organizing the information or connecting the information (orientation, exploring, focusing, locating), interacting with information (thinking critically, evaluating) and making use of information (transforming, communicating, applying) (Bawden 21-22).
    c. Computer literacy – Discreet skill set (Martin 157).
    d. ICT literacy – using digital technology, communication tools, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society. Continuum, changes over time (not mastery of static or technical skills) (Soby 130).

e. Skills – assess, manage, integrate, evaluate and create (Soby 131).
f. Digital competencies – use tools interactively, interact in heterogeneous groups, act autonomously. Mere knowledge and skills are not sufficient in themselves. Strategies, attitudes and procedures are also required (Soby 133).
g. E-literacy – Combines the traditional skills of computer literacy, aspects of information literacy (the ability to find, organize and make use of digital information) with issues of interpretation, knowledge construction and expression (Bawden 25).
h. Network literacy – Focuses on effective use of Internet and other networked resources (Bawden 24).
i. Multi-media literacy – Ability to match the medium we use to the kind of information we are presenting and the audiences we are presenting it to (Soby 139).

Annex D – Literature Review Report

Overview

The purpose of the literature review was to investigate and document credible standards and strategies and effective practices and policies being used to define, standardize and measure Digital Literacy devices and usage now and in the future. The literature review attempted to capture the knowledge and ideas about Digital Literacy in academia, industry and the U.S. Army.

Research in Digital Literacy followed several avenues: definitions of Digital Literacy; critical elements of Digital Literacy policy and implementation; perspectives of Digital Literacy from different sectors both in the U.S. and abroad; and deliberations about the influence of the digital environment on individuals and the culture. There was sufficient commonality in materials to identify areas of concentration or themes around which the findings could be grouped for clear reporting.

Methodology

The study team followed an established qualitative research methodology to scan the most current literature for useful information using both manual and electronic means. The team examined more than 150 promising documents, articles, government documents, media, presentations and books on Digital Literacy. The team applied principles of analysis to identify valid studies, data and reports for inclusion in an annotated bibliography. Sources in the annotated bibliography include periodicals, Digital Literacy case studies, state and federal Digital Literacy websites, academic institution reports on practices, scholarly papers and books. The annotations may have value to TRADOC as it considers Digital Literacy requirements and policies.

Research questions

The literature review was framed around answering the Performance Work Statement research questions about:

- Definitions of baseline and advancing levels of Digital Literacy;
- Universal (common core) Digital Literacy requirements;
- Demographic gaps in Digital Literacy;
- Digital Literacy requirements; and
- Training, leadership and education structure keeping pace with technology development and trends.

Key Findings

- Researchers found several definitions of Digital Literacy that ranged from the technical skill to use digital devices to the cognitive ability to think about and process information gathered and materials produced via the devices to the social skills of interacting with other users.
- In the U.S., there is no single, universally adopted set of standards for achieving Digital Literacy in schools, higher education and the workplace.

- At least 50 percent of the research identified various assessments standards, criteria and frameworks developed and used in industry and academia that define Digital Literacy forms and present policies for education, training and performance outcomes.
- There is no consensus around the meaning of Digital Literacy, and as a result, data collection to measure student achievement is scattershot (Trotter 2009).
- The more Information and Communication Technology (ICT) becomes central to the modern society [and warfare], the more important it will be for the governments, organizations and educational institutions to identify and manage the development of skills and the abilities required to use them (Livingston 2003).
- Much of the research showed that the greatest gains in strengthening Digital Literacy come from developing an integrated strategy with common understandings. Several researchers identified elements that can be used to frame an integrated strategy.
- Learning by doing is the norm, according to several works. New technologies are learned and adopted in informal, personal environments before they are adopted in schools or the workplace.
- Reports from industry concluded that higher levels of Digital Literacy skills in the workplace led measurably to innovation, improved creativity and increased productivity.
- Reports on the effect of interconnectivity on human brain activities and social interactions captured the ongoing tension between the adoption of intense digital use and questions about how it affects thinking capability and relationships. The findings were inconclusive (Winer 2010).
- Literature from the international arena indicated that the European Union (EU) had the most comprehensive strategies for addressing Digital Literacy in the international marketplace.
- Researchers identified factors that could create disparities in the adoption and use of ICT, such as age, geography, income, culture and access.

Definitions

The literature identified more than a dozen of definitions of Digital Literacy. The definitions generally fell within three fundamental categories of engagement with and through digital media.

- Technological: "Computer skills" – the ability to work with hardware (devices) and software (programs)
- Cognitive: "Thinking skills" – Critical thinking, analysis, filtering, assessment, creation, "mash ups"
- Relational: "Social skills" – the ability to interact with other users in work or leisure activities; discipline, courtesy, ethics, moral.

The various definitions included all or at least two of these categories as demonstrated graphically in the table on page 83. A listing of definitions appears on page 111.

Common Core Standards

Researchers could not identify a universal set of standards or criteria used within education or the workplace in the U.S. to assess technical, cognitive and social abilities in Digital Literacy. Instead, at least 50 percent of the research identified various assessments, standards, criteria and frameworks developed and used in industry and academia that define Digital Literacy forms and present policies for education, training and performance outcomes. These standards vary from document to document. The sources include:

- The ICT Digital Literacy Portal
- Microsoft
- Internet and Computing Core Certification
- Symantec Corporation
- The International Society for Technology in Education
- The Partnership for the 21st Century Skills
- The American Association of School Librarians
- The California ICT Digital Literacy Policy and Strategy
- iCritical Thinking Certification (from Educational Testing Service and Certiport)
- International Technology Education Association Standards for Technology Literacy

Specific elements in these standards and criteria are contained in the body of this report on page 127 and in Annex E.

In her report, Beverly Bunker highlighted benefits (for employers and employees) in adopting international non-proprietary standards for ICT skills – standards that are kept current with ongoing ICT development. A widely accepted Digital Literacy standard overcomes discrepancies with an individual's assessment of their own skills and the employer's expectations (Bunker 2010).

Jones-Kavalier and Flannigan observed that few educational organizations had developed comprehensive technology plans that specify technical learning objectives or ensure successful integration of technology to enhance students' digital and visual literacy. The same is true for professional development of faculties – training is needed to integrate technology into curriculum. (Jones-Kavalier, Flannigan 2006).

Demographic Gaps

The Pew Internet and American Life Project provided many demographic studies and reports on the adoption and use of various digital devices by different age groups, income levels, and ethnic background. The reports show widespread adoption of

digital devices. For example, as measured in January 2010, 46 percent of adults owned laptops; In addition, 83 percent of adults had cell phones or smartphones (Raine 2010).

The Pew Internet & American Life project's *Generations 2010* report issued in December 2010 presented the most recent snapshot of how different generations used the Internet.

- More than 79 percent of all adults use the Internet.
- Generations that go online by age:
  - 93 percent of teens (12-17)
  - 95 percent of Millennials (ages 18-33)
  - 86 percent of Gen Xers (ages 34-45)
  - 81 percent of Younger Boomers (ages46-55)
  - 76 percent of Older Boomers (ages 56-65)
  - 58 percent of the Silent Generation (ages 66-73)
  - 30 percent of the G.I. Generation (ages 74+) (Zickuhr 2010)

Researchers also found that the Internet was a fundamental and indispensable element in the lives of most teens and young adults. As a group, 17-24 year olds embrace social media and many are willing to share personal information online. Digital gaming is most prevalent among teens and young adults. (97 percent of teens play every day.) Watching online videos is nearly universal among young adults. (Lenhart, Jones, Macgill 2008)

Age was a key factor in determining digital skills, knowledge and application at home and at work. Several articles separated age groups similarly, using familiarity and attitudes toward adoption and use of ICT. For example, the Media Awareness Network divided groups as follows:

- Engaged – teens and young adults
- Hesitant – middle age adults
- Resistors – older adults

Age and lack of resources (money, equipment, access) were identified as the two major discriminators for Digital Literacy. Dr. John Horrigan categorized four populations with barriers to broadband adoption:

- **Digitally distant** who do not see the point of being online; they tend to be older (media age is 63); and nearly half are retired.
- **Digital hopefuls**' median age is 57 and they like the idea of being online, but lack resources, primarily due to cost. This group has the highest share of people who are Hispanic and African American. Nearly half of this group has income below $20,000.

- **Digitally uncomfortable** have a median age of 55. They have the resources to adopt ICT, but lack the skills to use digital devices. They also question the relevance of the Internet.
- **Near converts** have a median age of 45. Monthly access cost is their main reason for not adopting broadband use (Horrigan 2010).

Other factors in determining adoption and use of ICT cited in the literature include:

- Attitudes about strengths, risks, relevance of the Internet
- Skills in using technology
- Education
  - More than 40 percent of adults fall below intermediate levels of (traditional) literacy (Knight Commission 2009).
  - A home computer correlates with higher rates of school enrollment and graduation rates (Knight Commission 2009).
- Regional availability of broadband, mobile service
  - The "broadband gap" often hits poorer and more rural states (Pew 2010).
- Family status
  - Married couples with children have higher rates of Internet and cell phone use, computer ownership and broadband connections than other family and household types (Kennedy et al 2008).
  - According to one survey, the Internet plays an important role in keeping in touch with loved ones near and far (Kennedy et al 2008).
- Language
- Ease of use
- Culture, ethnicity
  - The use of the Internet among Hispanic populations, particularly younger members, is rising annually and is now equal to that of African Americans. Both are still below the usage by white, non-Hispanic populations (Pew 2010).
- Disparities among populations
  - Digital divide between populations with access to ICT and those without.
  - Economic divide between children with home access to Internet and those without
  - Usability divide between populations with comprehensive training and those without (Schubert and Hickey 2009).

Digital Literacy Requirements

Much of the research showed that the greatest gains in strengthening Digital Literacy come from developing an integrated strategy with common understandings. This includes, but is not limited to, the following actions identified in various documents:

- Develop and apply a definition of Digital Literacy (Kempster Group 2008).

- Identify critical components or elements of a Digital Literacy policy and implementation (Kempster Group 2008).
- Identify key stakeholders (Kempster Group 2008).
- Draft a policy framework (Kempster Group 2008).
- Develop a business case that addresses the cost, schedule, performance and risks over a span of time to determine the benefits of investing in technology and training (Department of Defense 2009).
- Provide a common infrastructure for developing a system easily used and shared by all constituencies (Kempster 2008).
- Adopt international standards for ICT skills and keep standards current with ongoing ICT development (Bunker 2010).
- Focus on sustainability by balancing investment with output, understanding roles and responsibilities and avoiding information politics and over-commitment (MFG Baden-Württemberg 2008).

Several scholars considered the European Union (EU) as having the most comprehensive strategies for addressing Digital Literacy. Europe i2020 Strategy's digital agenda is to maximize the social and economic potential of ICT by increasing Digital Literacy through a more accessible Internet and through more e-learning (Gerhard 2007). Examples of strategic processes cited in the literature were:

- The International European Computer Driving License (ICDL/ECDL) is the world's leading credential for competency in computer use (Bunker 2008).
- The Youth on the Move initiative promotes and supports flexible learning pathways, non-formal educational activities, lifelong learning and learning mobility (European Commission 2010).
- The SPreaD (Strategic Project Management Tool Kit for Creating Digital Literacy Initiatives) is a European collaboration that provides a conceptual design to evaluate, plan and manage large-scale Digital Literacy programs (MFG Baden-Württemberg 2008).

Significant obstacles the European Commission proposes to address are:

- Fragmented digital markets
- Lack of interoperability
- Rising cybercrime and risk of low trust in networks
- Lack of investment in networks
- Insufficient research and innovation efforts
- Lack of Digital Literacy and skills
- Missed opportunities in addressing societal challenges (European Commission 2010)

Non-European nations, including Canada, Australia and New Zealand, are developing Digital Literacy standards and are studying the academic and industrial benefits and costs of accelerating ICT adoption and use for all citizens.

Training, Leadership and Education

Digital Literacy impacts education from kindergarten through college and into adult education and workforce training. Technological literacy is mandated by the Obama Administration to be part of the assessment of education progress of pre-college level students and will become part of the National Assessment Educational Progress (NAEP) in 2014. The Knight Commission 2009 report recommended the integration of "digital and media literacy as critical elements for education at all levels through collaboration among federal, state, and local education officials" (Knight Commission 2009). Universities are integrating Digital Literacy into programming, curriculum, instruction and community outreach and many in the U.S. have created Digital Literacy centers.

The ability to use digital technology is important, but academics do not consider it sufficient for acquiring a high level of cognitive proficiencies that will help students critically evaluate information provided. For example, in his ongoing series in the *New York Times*, reporter Matt Richtel examined high school students' heavy digital diet and the impact on their ability to focus on school and priorities and the long-term benefits of education effort over short-term stimulus of digital interactivity. He noted a paradox in students who had deep proficiencies in computer skills, manipulation of data and creation of content, but who could not accomplish and perform standard education tasks because of distraction (Richtel 2010).

Academic and industry articles repeatedly stressed that online classes did not replace the classroom, but were an additional tool to teach certain subjects that did not require hands-on training.

In a report for the Federal Communication Commission, Dr. Horrigan noted a wide-range of digital skills among the American population and Digital Literacy was often cited as a barrier toward the level of an individual's participation or engagement, if at all, in communications and collaboration that require Information and Communication Technology (ICT). Self-assessments of skill levels were not likely to be reliable; therefore, organizations developing training programs to address effectively Digital Literacy will need to develop an accurate assessment of individual digital skills as well as their attitudes in order to develop and deploy appropriate training (Horrigan 2010).

In addition, as new devices and applications in ICT are introduced in rapid-fire fashion and with adoption of each varying across a wide-range of demographic factors, organizations will need to plan for changing technologies, find compatible interfaces and offer new ICT training on continuous basis (Horrigan 2010).

The Media Awareness Network focused on building digital skills and cited a connection between declining performance in the digital economy with the failure to develop a strategy that balances investments in technology and infrastructure with investments in skills and knowledge (Media Awareness Network 2010).

New technologies are learned and adopted in informal, personal environments before they are adopted in schools or the workplace. Digital Literacy training uses formats that are familiar with people who grew up with technology, such as video games, online or e-classes and interactive programs. For teens, young adults and older technology users, learning by doing is the norm (peer-to-peer emulations and tutorials). Even preschoolers learn ICT by doing. Children who have access to computers have mastered pointing and clicking with a mouse by the time they are 3½. They are also playing more games earlier in life. Sixty percent of the top-selling iPhone apps in the education store are made for toddlers and preschoolers (Corebett 2010).

As a result, multimedia literacy appeared to be growing beyond the control of the education system. Many academic institutions have been slow to react to the emergence of the new participatory culture. As digital tools transform reading and writing instruction, educators and students struggle with understanding their roles and responsibilities. One article raised the question of whether Digital Literacy should be taught through formal education or some other means (Harley et al 2008).

To address this development, educators are turning to different educational formats to engage their students. A Manhattan, N.Y., school offered "Quest to Learn," a program that provided students a place to practice new media literacy and learn technology and game design. It is organized specifically around the idea that digital games are central to the lives of children and can be powerful tools for intellectual exploration (Corbett 2010). In January 2011, George Washington University introduced an online high school in a first-of-its kind partnership with K^{12}, a provider of online education. Students enroll in a college preparatory curriculum leveraged with technology and personalized counseling (George Washington University 2011).

Characteristics identified in the literature common to vetted educational and workplace-training programs included*:*

- Personal relevance for individuals
- Integrated into everyday work and study contexts
- Collaborative, supportive environments where it is safe to make mistakes
- Learners allowed to "play" and explore
- Time allocated for face-to-face or small group learning opportunities that support diverse self-directed goals
- Targeted on skill needed and easy access
- Ongoing training as technology progresses

Bunker observed that higher levels of Digital Literacy skills led to innovation, improved creativity and increased productivity in the workplace (Bunker 2010). Bunker observed that digitally literate personnel were made more efficient through

ICT. She cited one report shows improved productivity at the organizational level and a 162 percent Return on Investment as a result of Digital Literacy training.

According to Bunker, there was a crucial balance in transitioning an entire workforce to increase ICT capabilities without marginalizing individuals (older workers or those without access to newer technologies) and losing critical expertise and experience. The first step required an accurate assessment of skill levels and it was clear that self-assessments allowed far too many discrepancies. It would be advantageous for organizations developing internal Digital Literacy programs to explore and possibly adopt one of the three international programs for Digital Literacy standards (Bunker 2010).

Bunker also stated that transition was never easy for an organization and transition that involves technology will often be even more difficult. Therefore, for Digital Literacy training to be effective, organizations need to demonstrate to employees the value the technology would bring to them in doing their jobs. The training should be targeted based on their skill needs and easy access when needed. It would also be helpful to condition employees to the idea that this type of training would be ongoing as technology continued to evolve and progress (Bunker 2010).

In addition:

- Organizational support costs are reduced because there is more efficient use of IT staff and fewer staff required to handle basic administrative functions.
- User satisfaction and utilization of IT systems are improved.
- Communication and social competence are improved.
- ICT often evolves from implementation of systems that replace routine work to building systems that re-engineer business processes (Media Awareness Network 2010).

Innovation can lead to non-traditional use of digital devices. An application for smartphones is being tested in France to locate parking places using electromagnetic sensors embedded in the roadway that can detect the exact time a car parks and leaves a space. As another example, Con Edison has developed a “do it right or die” video game to train new employees in safe practices around electricity.

A few industry and military articles cited disadvantages to greater ICT dependency. ICT is vulnerable to hackers and computer “viruses” or “worms” that can infect computer systems, disrupt or damage hardware that controls equipment systems and steal, alter or compromise information. Cyber weapons can have the same effect as a traditional bomb in terms of triggering explosions (McMillan 2007). Attacks on mobile phones are expected to intensify in 2011, putting both the user and corporate data at risk. As the use of social media increases (Facebook, Twitter), researchers expect personal data posted online will make it easier for cybercriminals to engage in identify theft (Alperovitch et al 2010). Service members already face the threat of

identity theft due to the continued use of their social security numbers as personal identifiers at home and abroad. The Department of Defense is addressing this problem (Richtel 2010).

The emergence of electronic cyber warfighting capabilities is the most important military development in decades, but legal experts are not sure how existing treaties and conventions apply to this domain.

Other concerns on how interconnectivity affects human brain activities and social interactions appeared in several articles. One side of the scientific argument contended that e-mails, phone calls, text messages and other bursts of incoming information create a false sense of urgency and could undermine a person's ability to focus. The "ping" sound for incoming information stimulated the brain to provoke excitement, releasing dopamine – and that could become addictive. Even when devices were turned off, fractured thinking and lack of focus persisted. Younger people may have more trouble focusing on tasks because they grew up with technology that constantly shifted their attention (Shanker and Richtel 2010).

Also, excessive connectivity can interfere with personal relationships. As the brain evolves and shifts focus to ICT, it drifts away from fundamental social skills. For soldiers at every level the issue is critical because they face an overload of information to process – the amount of intelligence gathered by surveillance technologies has increased 1,600 percent since 9/11. Military studies are under way to determine how the human brain can cope with technology without being overwhelmed by it – a critical factor in combat (Shanker and Richtel 2010).

The other side of the debate argued that ICT benefited the brain. Imaging studies show Internet users' brains are more efficient at finding information. Internet users show more brain activity than nonusers. Video games can improve reaction time and the ability to pick out details amid clutter. ICT use enhances the brain's capacity to be stimulated. Internet reading activates more brain regions than printed words. Users of ICT possess a greater working memory, are more adept at perceptual learning and have better motor skills. A 2005 Kaiser study found that young people who spend the most time engaged with ICT also spend the most time interacting face-to-face with friends and family.

Annex E – Study Survey Analytics

Analytic Approach

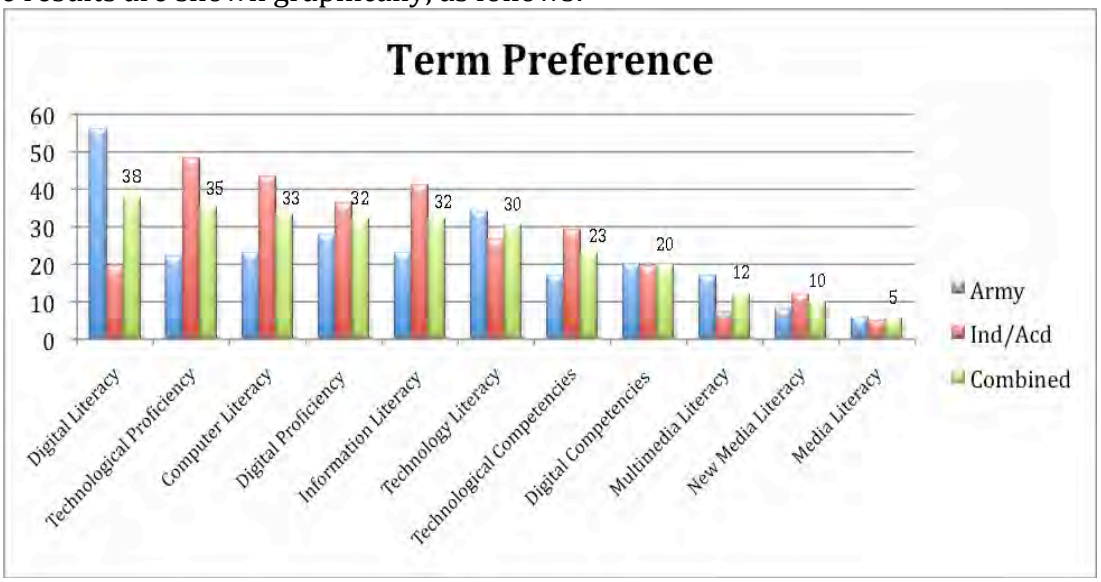
The report, as of January 6, 2011, includes analysis of 30 Army surveys, 7 academic surveys, and 5 surveys from private industry. All subjects surveyed were considered knowledgeable on the topics of the study. Analysis was done by comparing the Army results to combined industry and academia results. Weight was given to the industry/academia results to offset a smaller population of industry and academic respondents. Weight was only used when conducting direct side-by-side comparison. Weighting was determined as a function of the number of respondents for each question. Despite a relatively small sample size, the survey results generally corroborated the findings from the interviews conducted.

Term Applicability for the Given Definition:

Respondents were presented with the following definition, asked to select the terms they found to best resonate with the given definition, and then rank their top 3 choices:

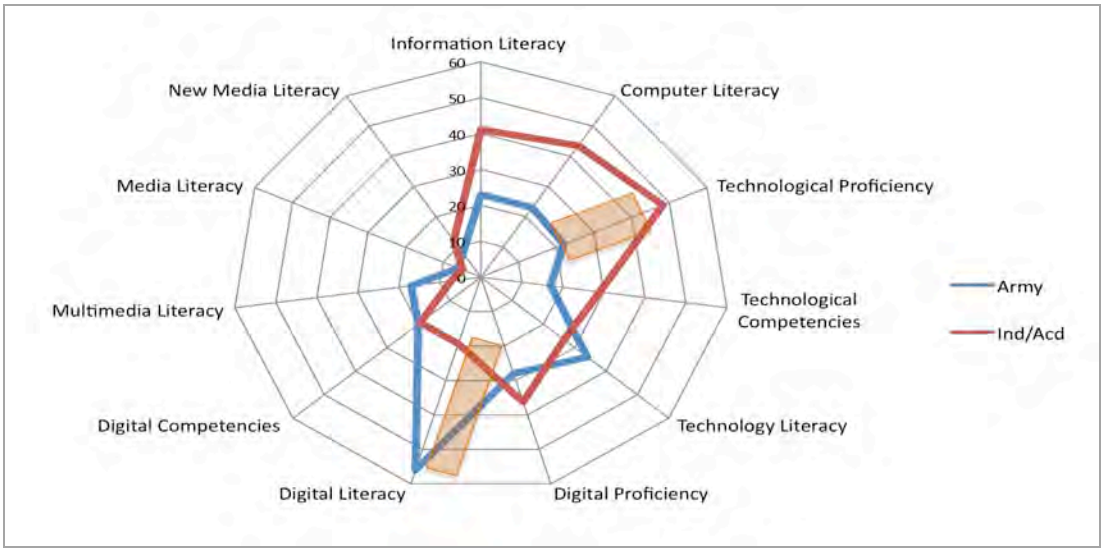
1. *The ability to communicate, locate, transform and share ideas and information through "new" or traditional media or skills and competencies necessary to use new and emerging technologies.*

The results are shown graphically, as follows:



Aggregate Scoring Method:

- 3 points if term was ranked 1st
- 2 points if term was ranked 2nd
- 1 point if term was ranked 3rd
- 1 additional point if term was selected as applicable

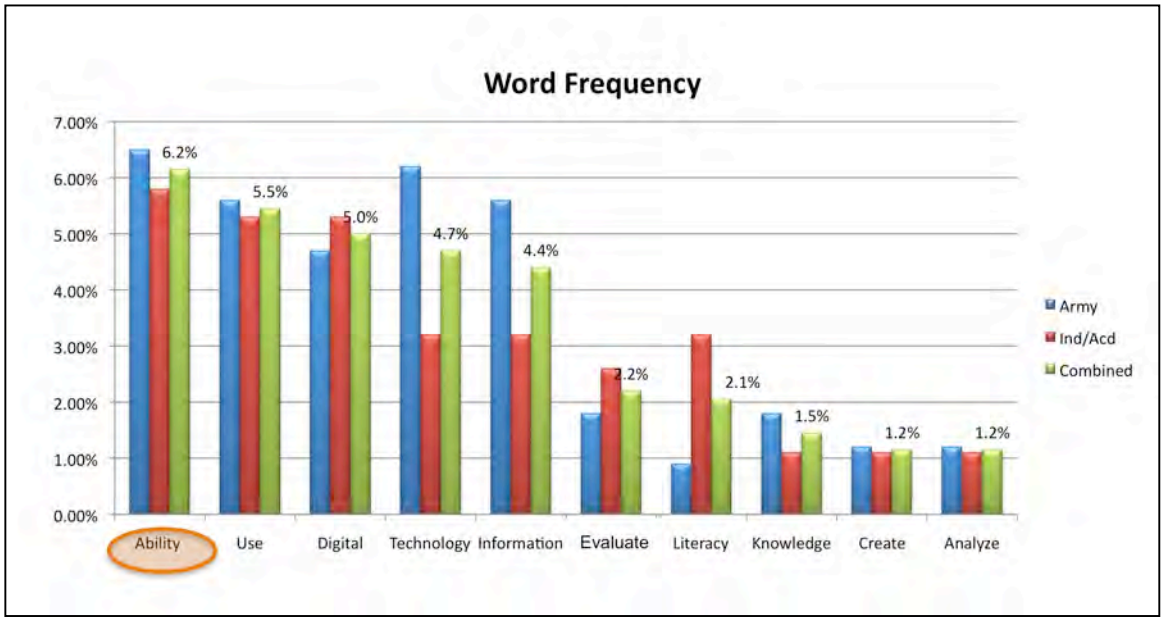


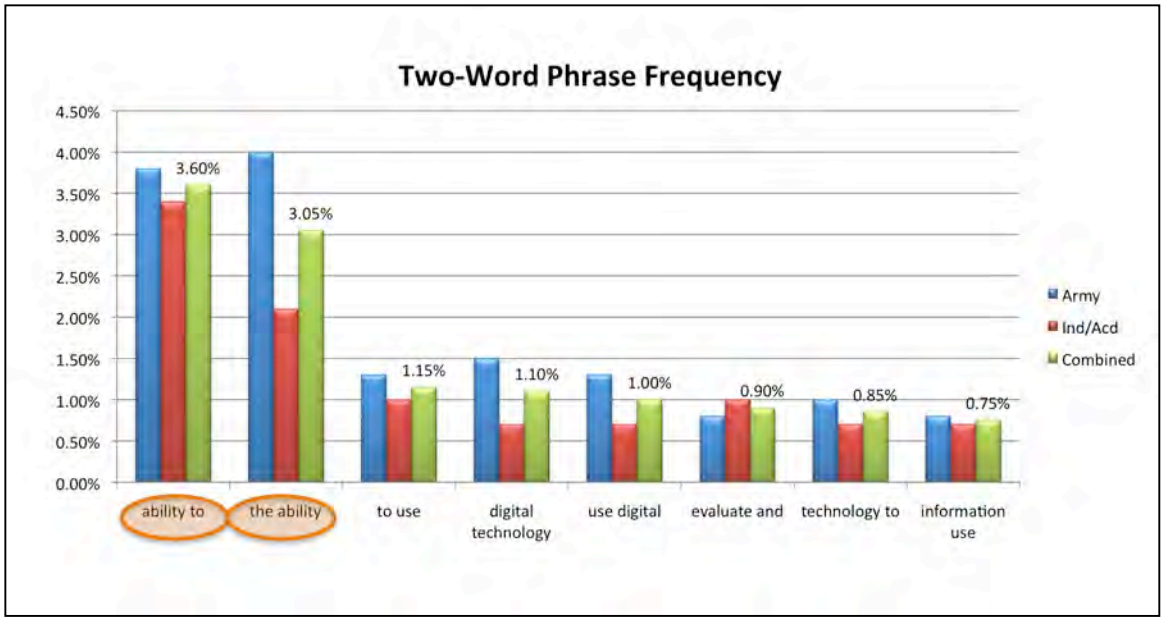
Analysis:

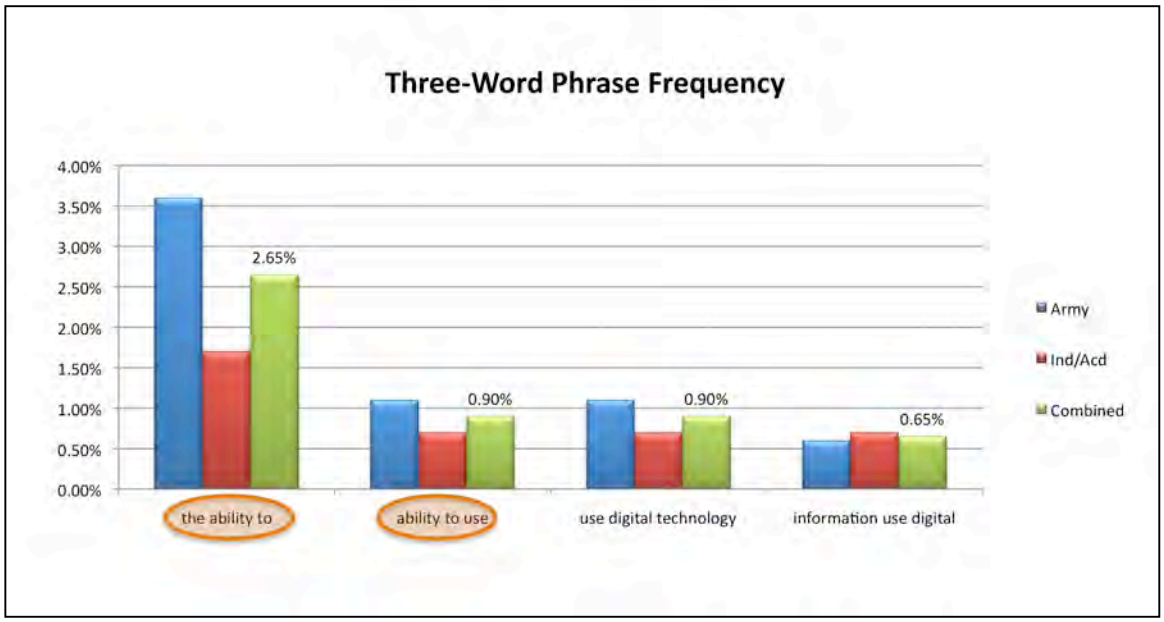
The data revealed significant disparity in terms being used by the Army and industry/academia to correspond to the given definition. More specifically, although the two most prevalent combined terms were "Digital Literacy" and "technological proficiency," the term "Digital Literacy" was more than twice as prevalent amongst the Army, while "technological proficiency" was more than twice as prevalent amongst industry/academia. The "radar chart" was built from the same data source as the bar chart and visually demonstrates the conflicting language use from the Army and industry/academia. There were likely two factors behind the disparity: 1) that the Army had informally propagated the term "Digital Literacy" as a way of characterizing the study issue at hand, which caused a bias toward that term, and 2) preference of the specific and deliberate use of the terms "literacy," "competencies," or "proficiency," for which further examination can be found in interview analysis. Lastly, analysis of the combined values of the six top-rated terms revealed little statistical difference between term usage.

Respondent's Personal Definition:

Respondents were asked to provide their own personal or organizational definition for the "Digital Literacy" concept conveyed throughout the study. Results were assessed using word factor analysis, with the words having the most occurrences from Army and industry/academia definitions reported as follows:





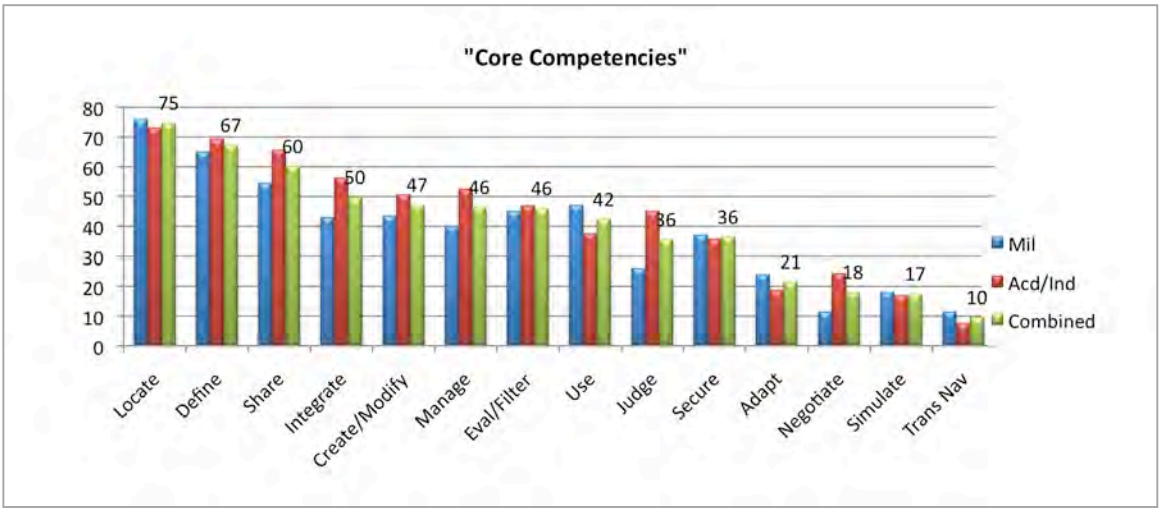


Analysis:

Although the data from each individual chart above was not particularly revealing by itself, an examination across all three charts revealed that the common theme across all definitions was the word "ability." The deliberate and repeated use of the word "ability" across all survey populations required an understanding that "ability," is intended to convey a "proficiency that is acquired and developed through training or experience and connotes a competency and power to perform." The wording used to define what the Army called "Digital Literacy" was generally consistent across the Army and industry/academia. However, as noted previously, there was significant disparity in the selection of terms used to represent the actual phenomenology that the army calls "Digital Literacy."

"Core" Competencies

Respondents were given a list of competencies and asked to select which ones were considered to be "core" within their organization with regard to Digital Literacy. They were then asked to rank their top five competencies.



Aggregate Scoring Method:

- 3 points if competency was ranked 1st
- 2.5 points if competency was ranked 2nd
- 2 points if competency was ranked 3rd
- 1.5 points if competency was ranked 4th
- 1 point if competency was ranked 5th
- 1 additional point if competency was selected as "core"

Analysis:

The competencies, or "abilities," represented within the Army, industry and academia were generally consistent across all populations. Further analysis of departmental functions is needed to determine which competencies would be essential for all soldiers and which would be specific to organizations or duty positions.

Study Research Question Applicability:

"How are the baseline and advancing levels of Digital Literacy defined?"

- It is essential that competencies considered to be of high value be integrated into baseline level "Digital Literacy" training.

"Are there universal ('common core') Digital Literacy requirements across all cohorts?"

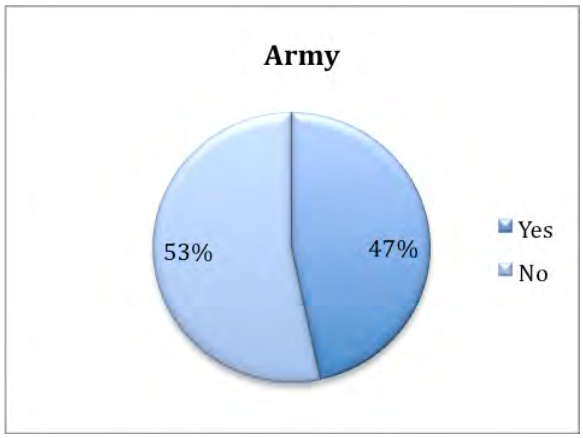
- Common core requirements must include selected highly valued competencies as indicated.

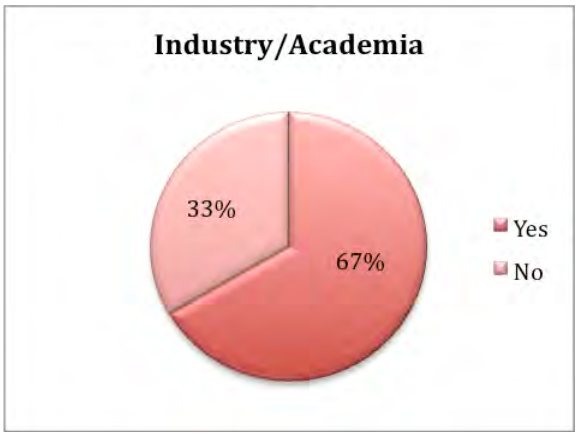
"How well does the Army Training, Leadership and Education structure align/keep up with technology development pace and trends?"

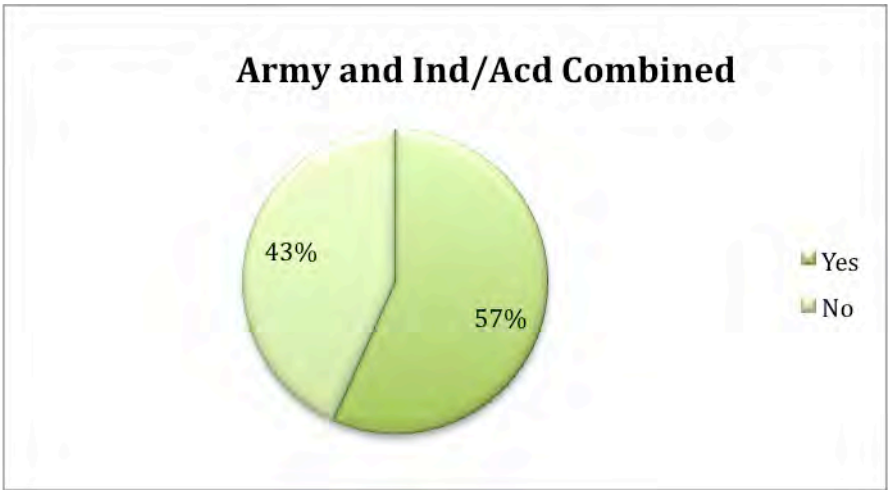
- Data suggested that required core competencies were consistent across all survey populations; therefore, Army digital training should also be aligned with existing industry/academic training.

Digital Literacy Gaps Across Demographics

Respondents were asked if demographics were a contributor to so-called Digital Literacy gaps that may exist within their organization.



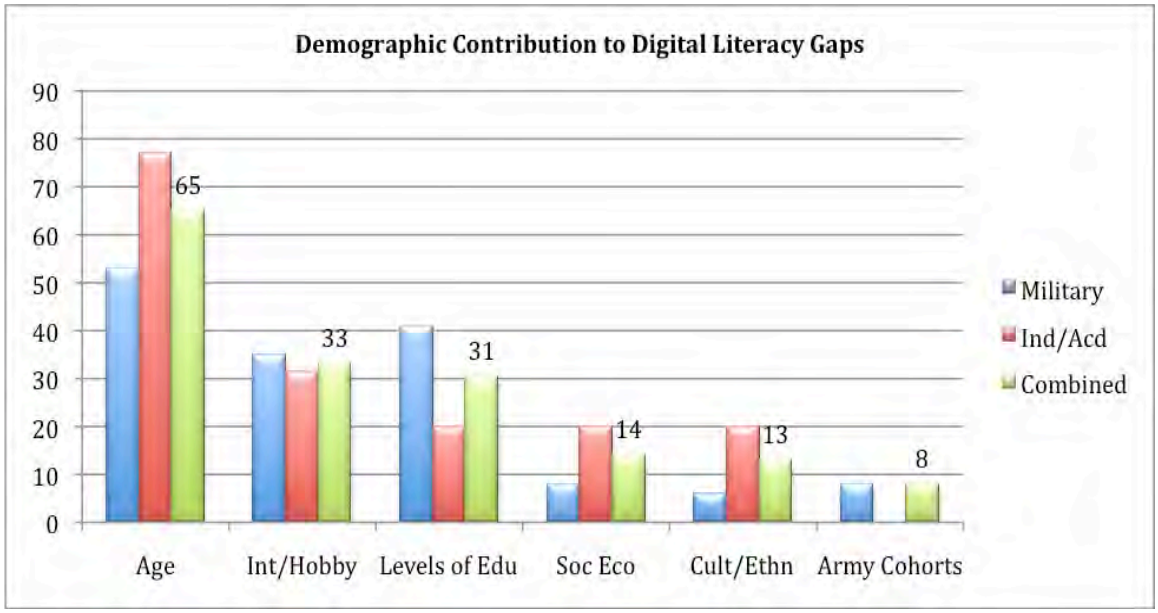




Analysis:

First, we must mention that most organizations represented through this study have a strong background and emphasis in evolving technology. As such, organizations whose regular responsibilities involve frequent use of digital technology might be expected to be less likely to perceive "Digital Literacy gaps" throughout their organization. Nevertheless, the data indicated that approximately two-thirds of respondents from industry and academia believed that demographics were contributing factors in "Digital Literacy gaps" in their workforce. By contrast, less than half of the Army respondents believed that there was a demographics-induced Digital Literacy gap. Interview results indicated that the difference was likely due to the Army's institutionalized and highly structured career training system, which establishes a skills baseline and serves as an equalizer of soldier's abilities.

Respondents were then asked to select specific demographic areas where the "Digital Literacy gaps" were evident within their population, and then rank their top three areas.



Aggregate Scoring Method:

- 3 points if demographic group was ranked 1st
- 2 points if demographic group was ranked 2nd
- 1 point if demographic group was ranked 3rd
- 1 additional point if demographic group was selected

Analysis:

It is important to recognize that many of these demographic areas acted as dependant variables that might be influenced by other demographic areas. For example, an older person with high levels of education or interest/hobbies in technology could have high "Digital Literacy" capabilities. On the contrary, an advanced Digital Literacy training curriculum may efficiently eliminate demographics as a contributing factor to Digital Literacy gaps that would otherwise impede individual performance or mission objectives.

Data suggested that "age" was more of a factor across all survey populations in terms of its contribution Digital Literacy gaps, but more so in industry/academia than in the Army because rigorous Army career development and training served as an equalizer for soldiers' digital competencies.

"Interest/hobbies" as consistently rated across the Army, Industry, and Academia because someone who had an inherent interest in Digital Literacy was likely to have subsequently more experience with digital technology and was likely to display a higher digital technology aptitude or ability.

The area of "levels of education" did, in fact, appear to be a more influential factor when identifying Digital Literacy gaps within the Army than industry/academia, perhaps because the Army's point-of-need training style was focused on a specific digital competency verses a broader understanding and application of the technology to a career field at large. On the contrary, Digital Literacy or competency amongst the industry and academia populations were similar (associates degree, bachelor's degree, master's degrees, etc), regardless of a given level of education.

Data suggested that "socio economic," "culture/ethnicity," and "Army Cohorts" were not significant contributing demographic area to Digital Literacy gaps in the Army since the Army mitigated the impacts of these demographic groups through military assimilation and career training. Moreover, there was little indication of Digital Literacy gaps across Army cohorts.

Study Research Question Applicability:

"Is there is a "demographic gap" in Digital Literacy across the force?"

- This data directly addressed the research question of whether certain demographic groups currently contributed to some notion of Digital Literacy gaps. Although age was determined to be the greatest contributing factor to perceived Digital Literacy gaps in the Army, the interview results indicated that this can be mitigated through enhanced digital technology training.

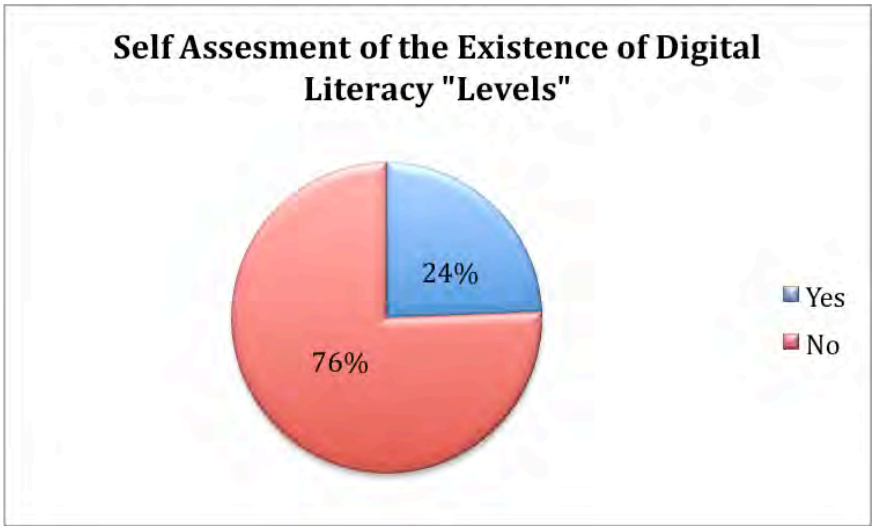
"Do Digital Literacy requirements differ across Army cohorts?"

- The data showed that different Army cohorts did not appear to be a contributing factor to demographics-induced Digital Literacy gaps.

Different "Levels" of Digital Literacy

Respondents were asked:

> ***"****Thinking about different 'levels' of Digital Literacy (Baseline, Mid-Grade, Intermediate, Strategic) do you characterize levels of Digital Literacy in your organization?****"***



Analysis:

The clear majority of respondents across all survey populations indicated that "advancing levels of Digital Literacy" did not exist, with the notable exception identified during the interviews of a "baseline level." Interviews indicated that some of the 25 percent who answered yes only thought there was a baseline level. Within the Army interviews and surveys, 73 percent of respondents said advancing levels of Digital Literacy did not exist within their organization. However, after further analysis of the Army interviews, 87 percent felt that advancing levels of Digital Literacy did not exist after a "baseline level." Beyond this baseline level, application-specific or point-of-need training was sufficient to address Digital Literacy needs.

Study Research Question Applicability:

"How are the baseline and advancing levels of Digital Literacy defined?"

- This data suggested that beyond a baseline level, Digital Literacy requirements were job function and organization specific.

"Do Digital Literacy requirements differ across Army cohorts?"

- Interview analysis showed that a baseline level would be equal across all cohorts, with a job or organization-specific need (not a universal need) for advancing levels of Digital Literacy.

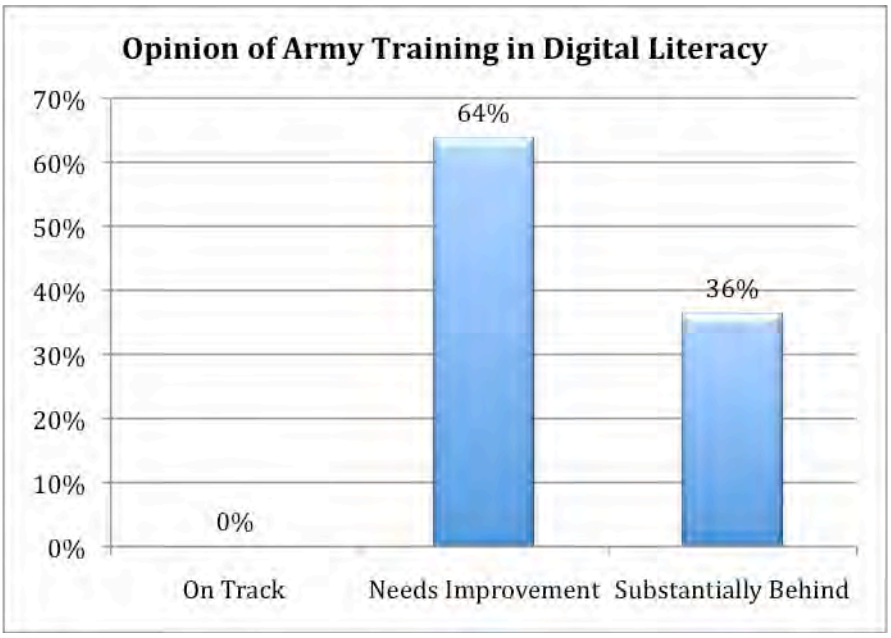
Army Training with Respect to Digital Literacy

Army respondents were asked:

How well does the Army Training, Leadership and Education structure align/keep up with technology development pace and trends given these choices:

- *On target: instruction is as close to up-to-date as rate of technology change permits.*
- *Needs improvement: the pace of technology development is well-ahead of what the Army provides as training, leadership development and education.*

- *<u>Substantially behind</u>: the Army is not keeping pace with technology training in other workplaces and/or with what individuals can learn themselves in the digital environment.*



Analysis and Study Research Question Applicability:

Although the Army appears to mitigate Digital Literacy gaps across and within cohorts, there was unanimous consensus among respondents that the current Army training, leadership, and education structure was not agile enough to adapt to the pace of technological change in order to maintain required competencies necessary for operational effectiveness in warfighting. Interview results indicated that the primary contributing factor was that technology changes occur faster than the Army's decision cycle to approve a specific technology, obtain funding, develop and implement a training program or field the technology to the force. Most organizations simply can't afford to "chase" technology in an effort to remain state-of-the-art. (Note: two of the 24 people who were asked this question felt that their position did not give them ready visibility into current training to confidently respond to this question.)

Annex F – Interview Commentary

How organizations define "Digital Literacy" (question 1)

- *There is really no top-down definition for this concept.*
- *Having a level of comfort with tools in the digital age.*
- *We wouldn't use the term 'Digital Literacy,' but we might say 'digitally proficient' and that would refer to the use of social networking or we might reference 'digitally strategic' and that would apply to a planning dimension.*
- *Any definition must include knowing how to navigate the Internet or other digital space, locating needed information, organizing that information and understanding what that information really means.*
- *For content contributors, they must be able to format in a way that digital tools (e.g., RSS) can consume in order to effectively get their message out to relevant audiences.*
- *To be digitally literate might mean a person knows how to browse the web, create content or use e-mail. But, it can also mean something incredibly sophisticated like writing code.*
- *We have not sought to define it – we are challenged by our changing organizational culture and a global consumer base with a diverse range of capabilities and available technologies.*
- *We like to think of Digital Literacy like 'education levels' – some people are literate at a first grade level and some at a Ph.D. level. It is a sliding scale of skill sets and understanding – some people have technical level understanding and others can see the broad picture at an enterprise level.*
- *Knowledge of the digital (automated) equivalent to analog (manual) processes.*
- *A person's ability to adapt to use different tools to more efficiently solve the same problems.*
- *Digital Literacy is part of managing information. We don't do that well. Every time I hear about a new database, I ask "is it interoperable with others?" If not, that's our downfall.*
- *It means the ability to function in the workplace and private environment given this technology required for work and that's available for private and leisure activities. For the Army, part of this is mandatory and part is voluntary.*
- *It means your level of comfort with information in the digital age.*
- *I never heard of this term. I looked it up on line when I was getting ready to talk to you today. I don't think it is a term that will be well understood in the Army. (DASA)*
- *This is not terminology common in the Army – the thinking just doesn't go this way. DL will be the acronym and people will says "Another DL? What is it?" Acronyms sort of stick and DL is "Distance Learning" and "Distributive Learning."*
- *DL has a negative connotation. When it comes to online education younger people see it as a flexible approach and older people see it as less desirable than schoolhouse learning. The thought is you "only do it after hours" so it less important. A DL acronym will carry that connotation too.*

- *The typical context for a concept like "Digital Literacy" would be recognition of dramatic shifts in the media landscape. It also refers to the needs for the organization to be able to respond, recognizing that employees are interacting on their own time on new media platforms*

Other terminology used to describe the ability to communicate, locate, transform and share ideas and information through "new media" or proficiency or competencies required to operate devices and equipment (question 1 – part b)

- *digital competency (1)*
- *digital proficiency (3)*
- *technology savvy (2)*
- *technology literacy (1)*
- *technological competency (3)*
- *technological proficiency (5)*
- *new media literacy (3)*
- *information literacy (1)*
- *computer literacy (1)*
- *social media (1)*
- *web 2.0 (2)*
- *virtual collaboration (2)*
- *"Competency" would represent average capability, "proficiency" is above average and "mastery" is a level of excellence.*
- *DL is heavily associated with distance learning – this is a term that is disparaged.*
- *Although not 'official' we use three buckets to describe our workforce:*
  - *'digitally competent' - they use it to do their job but are slow to warm to new technology;*
  - *'technically curious' - they like new technology and see its value and adopt it quickly;*
  - *'technically stubborn' - they see no value in technology for themselves and don't want the hassle of change to learn new technology.*
- *Digital Literacy, as a term, is meaningless, as no one would ever admit to being digitally illiterate.*
- *Literacy is not as descriptive as competency or proficiency*
- *Our shorthand is 'digital,' it can mean architecture or the cloud. Very often, we refer to the digital ecosystem or digital landscape.*
- *We are all about using proficiency and fluency – these terms designate an ability that is beyond competent. Competency is an adequate familiarity, fluent is 'bi or tri-lingual' and able to move from platform to platform. Judgment is the presumed absolute in all of this.*
- *Digital competency is the first word that comes to mind. Competency means: for me to do my job on a daily basis what do I need? How do I develop the digital pieces? What tools do I use to get what I need for my job?*

Identified universal or core Digital Literacy requirements across a work force (things everyone must know how to do – question 2)

- *Yes – the Army now has standards associated with software and hardware used; everyone has to have basic understanding of the Microsoft Suite, PC operation and Internet navigation.*
- *We are a large organization – we have 380 different job roles – digitally, requirements are broken out by job roles.*
- *Our requirements fall more into the category of 'policy' or what individuals are 'authorized' to do. We have policies for professional and personal use of technology and social media; rules around what employees or vendors can bring to the workplace; certain sites or Internet tools that are blocked; and cell phone or e-mail policies.*
- *It really depends on job function – in some functions, Digital Literacy or capability is really not needed.*
- *Being able to share/communicate via digital devices.*
- *Adapting by utilizing new technology and demonstrating self sufficiency.*
- *Having judgment to evaluate reliability and credibility of different sources.*
- *Identifying, locating and managing information (2).*
- *Ability to create and modify data and visual information; integrating information form various sources or collaborating with multiple creators of content.*
- *Locate, integrate and evaluate or filter information.*
- *It is the ability to see patterns and generate new perspectives from the same information everyone else sees that is at the heart of Digital Literacy – so the actual skills needed are not specifically tool related, but use of a good set of tools to facilitate secure organization, storage, retrieval and collaboration that is central.*
- *People really need an 'information strategy' that enables them to identify sources of information, determine if it is valid and know what to do with the information.*
- *Core requirements are 'tool based.' People must know which tools to use to achieve something, how to combine the tools and how to use the tools collaboratively with ease.*
- *Access information using digital tools, collaborate in the construction of knowledge (e.g., wiki or blog), formulate arguments and give feedback.*
- *Employees must develop a savvy understanding of the social media landscape. This includes an understanding of the trends in how tools are being used and the conversations that are taking place in the various digital marketplaces.*
- *The critical thinking piece really needs addressing .You have to take into consideration credibility and legitimacy – you can find a justification online for any thing. Credibility of the source is critical. What is going to be the military's source?*

- *I'm not sure "Digital Literacy" is that big a concern. Devices are so easy to learn that it's not about devices, it's about what you can do with them. . . it's about intuitive thinking about stuff you can apply or create or do using innovation and collaboration .*

How organizations assess/understand/measure the Digital Literacy of a workforce (question 3)

- *We might use a code test or design test, but a great deal of assessment is based on subjective things like has an individual published a blog or do they participate in the development of open source content?*
- *We have used some tests to define staffers' proficiency for what they need to do in their jobs – sometimes it is more device specific.*
- *We operate on an assumption that young people we are bringing in have necessary skills.*
- *I don't think the Army is doing any formal assessment – I've been in uniform or working as a civilian for more than 28 years and have had one assessment of my skills in this area and that was only because I was going to teach a course.*
- *No formal assessment of Digital Literacy capabilities exists for us – for every organization, you have to identify what is needed or what is the objective and then work back from that to determine what tools or capabilities can facilitate that.*
- *We don't really do tests before we hire – we look for experience, what is on a resume, education and probe for expertise an individual has.*
- *We do not assess or measure for specific skills.*
- *Assessment is determined by job role – as the job role becomes more technical, the skill requirements grow.*
- *It is really based on a combination of self-reporting and education or certification (4).*
- *People self-select who have an interest and aptitude. We let our employees define themselves; they do self-assessments. As an organization, everyone has access to the web. We don't even consider people not being able to communicate with us digitally; it is part of our industry. Our policy…everything is online.*
- *We have people at our organization who are familiar with all platforms. Part of the workshop this group (called "Social Media Ninjas") provides is raising awareness on other opportunities/venues. Then, if you want to go learn Twitter, we point you to Twitter…there's no better place to learn. We use Twitter's actual construct to establish the practices and lead the way.*
- *We evaluate someone post project – how did they do?*
- *We monitor from a bigger picture perspective. As a corporation, we make sure our employees are upholding our standards and policy. Our social media guidelines are a subset of Sprint's overall policies and code of conduct.*
- *We manage capturing social media usage through our formal monitoring program. We make sure the employees understand what is expected of them. We*

monitor everything and anything that is being said about Sprint. We are using monitoring services to see who is saying what.

- *Testing is unnecessary. No testing on the civilian side. People pick up what they need as they go along. Some value to diagnostic testing on the military side – should we add digital capability to the ASVAB, not as a barrier but to determine the best fit for a job?*

Assessing/understanding/measuring and the identified Digital Literacy demographic gaps in the workforce (e.g., differences in proficiency between older and younger workers or workers with differing levels of education) (question 3a)

- *We definitely see gaps in skill level between age groups – older workers or cohorts tend to have a lower skill level (almost universal finding among respondents).*
- *Army senior leaders and the key pipeline for Army civilians (40+ retirees) are definitely lacking in skills needed.*
- *We see some gaps among certain cultural or ethnic groups and between different socio-economic levels – some people just don't have resources that allow access.*
- *We caution against sweeping generalizations, clearly young people who have never known anything different have an affinity, but it shouldn't be completely generalized.*
- *We aren't necessarily proactively making our own assessments. We ask them to tell us what they want to know.*
- *We start with a general bias that the most effective approach to social media is one that is not concentrated in the hands of a single person or small set of specialists.*
- *We find that employees from all aspects of the business recognize the value of social media in their professional goals. We help those employees meet those goals by setting them up with the necessary resources. Best practices and guidelines. While empowering employees to meet their goals by using tools like social media, Sprint will hold them accountable for specific performance objectives associated with their job function in performance reviews. In this way, Sprint looks at outcome rather than the means.*
- *For the Civilian workforce, our big pipeline is retired military; if 80 percent of new hires are 45-year-old E-7s and E-8s, they are probably not as digitally literate as employees you would find in other executive agencies.*
- *On the green suit side, we bring in 18-19 year olds and they are fairly capable already – you put them in front of a screen, they feel comfortable. They are reporting to people who don't feel as comfortable as they do, very often. If I were them, I wouldn't be able to make sense of it.*
- *Socio-economic background doesn't matter. It is interest that is the real building block.*

- *There is simply a different way of thinking among young people. How much do we want to limit their thought processes?... They are ready to share everything. Sharing of information that is factual is good. If it's not factual, that's negative.*

How organizations assess/determine the capabilities of customers, stakeholders or target audiences (question 4)

- *This was an issue for Flickr – as it was a forerunner to Web 2.0. Users struggled with features because it was an early social media tool. Users taught each other – that was critical as organic learning is really what works best with new media.*
- *Determining customer capabilities is literally 'baked into our values and core competencies.' We have client partnering that helps us work within the realm of business acumen and look deep at skill sets needed.*
- *In higher education, students are our customers. The concept of 'e-portfolios' is a way that student proficiency can be assessed over time.*
- *We assess customers in terms of how much they spend, how computer savvy they appear to be and how comfortable they are with technology. We find younger customers are more comfortable (people in their 20s and 30s).*
- *We have seen growth in consumers engaging in the social media space and they pay close attention to the analytical tools associated with Information and Communications Technology (ICT), including hit rates, unique individual hits and overall monitoring of activity. The real challenge is the volume of information necessary to decipher trends and changes and passing that information to appropriate staff.*
- *Our customers are our stakeholders – we cannot achieve our goals unless we have the customer assessment because it helps us understand how we can communicate and make decisions. Our customers are bringing an increasing level of digital expectation to everything we do – when they don't have it in house, they hire it.*
- *The skill level of our clients is very important as it feeds into the level to which they will consider credible some of the ways we seek out information in the digital world. They also need to be comfortable with how we manage the security of information.*
- *As a journalism school, we consider students, employers and newsrooms our customers. We help a newsroom use crowd sourcing to generate reporting sources and we help an advertising department generate leads via internal databases and social media.*

Training process for Digital Literacy or digital competency (Systematized? Required? Monitored? – questions 5 and 6)

- *Very little training actually goes on in industry; people tend to be more self-taught.*
- *IBM spends $600 million annually on training, which includes e-learning and virtual classrooms. For core roles (e.g,, managers of IT architecture) the*

specialty training happens on the job. All e-learning is free and open to everyone while some local classroom training may require a fee. Every month, 60,000-70,000 employees search our learning catalog.

- *We train on tools and resources; this training needs to be constantly updated.*
- *To be truly literate, formal training cannot fully support – need to be passionate about obtaining content.*
- *We have a serious commitment to keep the level of digital competency and proficiency growing – new devices, solutions, software, etc. We want our people to be up to date on the most important tools, so training is a continual need. We have found 'communities of practice' to be successful as learning happens faster and goes to higher levels than when people learn individually – there is a desire for the collective group to get better.*
- *We assess for pre-training proficiencies and follow-up with post-training measurement of improvement.*
- *In addressing digital competencies, we focus on designing ICT programs and applications that are intuitive and easy to use with little instruction. We have analytical reports to help determine how effectively various applications are being used.*
- *We see a greater need for breaking through attitude barriers than for skills training. We try to allow staff to play with new technology during a trial period, when they may use it at their leisure before actually using it on the job – this can help with adoption rates as people often find a new technology easier than anticipated.*
- *We use optional seminars and online courses for employee training/self-study courses (3).*
- *We train early adopters and embed them in teams as key personnel to be the person who leads the adoption of either new software or technology or advanced versions of technology. We also train the trainers and have that migrate in a viral way through our organization.*
- *There needs to be some standardization across the Army in the way of training, but function-specific training should be left to the Proponent.*
- *There is not way of enforcing Army policy as it relates to Civilian training; training is definitely available, but most people have to do it on their own time. There is a growing resentment of this.*
- *…there is a point where the digital skills aren't applicable. At my rank, if I need something technical or specific, I go to a SME who knows the answer, or who's been trained to work the software and hardware.*
- *The Army has so many overlapping initiatives… we are providing toolkits and many people don't have to use the tools to do their jobs.*
- *Training is not something that's " o-by-the-way" -- it's something that if you want it done, that means that when we are not conducting operations, we are training.*
- *Army has standards and consistency is so important. There must be training. Digital use has to be standardized. If Army doesn't maintain standards we will*

have communication problems. How will we talk if some use Mac and others used PCs?

- *Training is about getting a Soldier or Civilian employee prepared to perform a task to a standard: what is the task you are requiring someone to perform, under what conditions and to what standards? If that's the model we are using, digital proficiency should be akin to this.*
- *I am concerned about the idea that we will fill up all a Soldier's time either with operations or training. A person can't be on all the time.*
- *We have to have standardized content, but that is probably best left to the Proponent. The Digital Literacy a gunner needs is different from what a cook needs.*
- *Online delivery works for some people. For some it can be used as a reinforcement. And for some it is not a good method of instruction at all.*

How training content is developed (inside vs. outside vendors – question 7)

- *Some is custom-designed by teams and some is professionally designed (e.g., contracting with Skillsoft for employees learning to use Microsoft products). IBM also has a 'media library' where we share videos, podcasts, etc.*
- *Internally by training department and staff.*
- *Outside subject matter experts.*
- *Both inside and outside – we customize to what we do, who we are, how we are organized. We monitor and track.*
- *We use online training options of our vendors. A favorite online learning center for tools is 'Lynda.com' (mentioned by two industry respondents)*
- *Our organization has a group called 'Social Media Ninjas' – a focused support team that provides tactical support when needed by our organization's employees. Each team member has subject matter expertise (i.e. Twitter) and can provide 'Just in Time' mentoring support in an operational situation. Ninja show the tools and how to use them and then we point them to additional resources where they can get information when they need it. The Ninja team also provides support around the overall landscape of social media, including media, guidelines, roles and responsibilities.*

Projections of the 2015 "landscape" (question 8)

- *Things will become increasingly more mobile and the web will become more personal.*
- *Being able to work collaboratively with more people and find people more easily.*
- *I foresee large-scale learning interventions that are effective and not just listening or awareness events. It takes a lot of energy to get major learning events going, so I see changes coming that motivate you to learn more.*
- *Learning will likely become more informal, more social. I see us doing more training than ever before. The virtual classroom is enhancing the formal training needed, however, traditional learning from the expert and the core curriculum still has its place.*

- *The mindset of the employee, the mindset of the organization is key. Command and control is Sprint's current perspective. Currently, our brand is what we say it is. With the social media space, your brand is not just what you say it is. Individuals will be empowered to shape (and reshape) the brand. We will need to empower our employees to be our advocate.*
- *We need to re-engineer the social organization. Organizations will have to change how they're structured, immediately see a problem and fix it for you. Our current focus on taking time to create codified process; this will be replaced with fast, light and flexible processes which are constantly evolving.*
- *We're setting out to equip our employees to make good decisions and do the right thing. In the future our employees are not going to be satisfied with a thorough understanding of why the company chooses to do things, they're going to demand to be in integral part of the decision-making process.*
- *We must make smart decisions that are aligned with your goals as an organization. Transparency is the key - everybody needs to know; the organization will need to hold its employees to that standard and make sure they understand what they should be doing with that information. You need to strengthen your management culture to emphasize doing the right thing (what is information that is okay to share publicly).*
- *A framework that provides wise decision making at all levels. Sprint needs to ensure that its workforce at all levels is aligned – every person knows the right things they need to do in order for Sprint to achieve its corporate objectives. Further, they must truly believe that their self-interest is intertwined with Sprint's interest and visa-versa.*
- *I think we will see a testing standard to correlate the digital needs to competence.*
- *Much of what we consider 'Digital Literacy' today will become second nature – the concept of digital versus non-digital will blur.*
- *The challenge will be forecasting – I would have to know what the software and hardware developers have in their research channels right now – the way this industry thrives is they release change and I will have to buy it.*
- *Younger generations will have grown up with gaming and mobile devices and will hunger for new technology at a rapid pace.*
- *Companies will have to adjust to the idea of buying and upgrading technology more rapidly – technology will take on a transaction approach.*
- *Messaging will be extremely important – content will be abbreviated or reduced to bullet points and it is being flooded into a sea of information where key messages are easily lost. Communicators will have to be able to craft poignant messages that hit the target and then provide more detailed information in other easily accessible forums.*
- *Concern that grammar skills will be lost and people will lose the art of communicating and developing inter-personal skills – skills important to conducting business and functioning in society.*
- *Right now we are capitalizing on spit and papier maché – we need to figure out how to harness digital without constricting it. How much latitude do we give*

Soldier-Leaders to be innovative? We need to be learning to leverage the creative abilities of employees.

- *Let's talk in terms of competency. There is so much difference across the Force. We can put 19 year olds in tanks with Blue Force Tracker and they are right at home. Their skill sets are incredible. Actually, it's incredible what we ask Soldiers to do every day in terms of digital competencies. And there are different operating levels, absolutely different.*
- *Funding for civilian education has been for brick-and-mortar engagement. We need to change that business process to be successful. We have to change the idea that if your course work wasn't resident it wasn't good enough – but with retired Army coming into the civilian corps, they are bringing that perception with them.*
- *There is no point to train everyone to do something if only some people need it. Everybody doesn't need to know everything and the day of the generalist has passed. We recognize the value of specialists. But across the whole, there will be a common competency and it will arise out of collaboration.*

Key Army-specific Comments:

- *We believe GEN Dempsy is more focused on 'just-in-time' information that a soldier needs – an assist.*
- *Important to remember that these devices are just tools – there is a place for the digital exchange of information but it CANNOT replace the human element.*
- *Sage on the stage needs to shift to the sage on the side.*
- *There needs to be a much closer look at the type of content appropriate for different types of learning, especially digital learning. ACU is very engaged in this right now – not sure if it is happening in Brigades or Units for Soldiers.*
- *It is critical for the Army to look at the OUTCOME desired – what is the objective of training?*
- *There is a growing concern that we are trying to use digital tools to solve an economic challenge and time challenge of sending a soldier to school.*

Key Quotes:

- *"A comfort level is different than being skilled and proficient. Many digital natives are very comfortable jumping on a device, social networking – that's why you see a lot of people doing somewhat stupid things – they don't really understand the implications" (Hallmark).*
- *"There is an expression that says the leading edge is where you can get cut and bleed to death – if you adopt too early, there is no one with you – people don't have what they need to run with you because most of the partners are still with the middle. You have to be able to interact with your partners" (Populous Architecture).*
- *"The ability to assess second and third order effects is not in the young" (ACU).*

Annex G – TIGER Team Members

- Ms. Marta Bailey – TRADOC G-3/5/7 Advanced Concepts Directorate
- MSG Penny Bell – TRADOC Institute for NCO Professional Development
- Mr. James Berg – Sustainment Center of Excellence
- Mr. Mitch Bonnett – TRADOC G-3/5/7 Advanced Concepts Directorate
- Mr. Jim Bradley – TRADOC Chief Knowledge Officer
- MAJ James Brinson – Aviation Center of Excellence
- Mr. Roy Elam, Jr. – Maneuver Center of Excellence
- Mr. Dan Goff – Maneuver Support Center of Excellence
- Mr. Michael Haith – TRADOC Deputy Commanding General for Initial Military Training
- Mr. David Kintner – Signal Center of Excellence
- Mr. Clifford Lindstrom – CAC National Simulations Center
- Mr. Billy Lodes – Fires Center of Excellence
- Ms. Amy Loughran – TRADOC G-3/5/7 Generating Force Training Directorate
- Mr. Ed Mazzanti – TRADOC ARCIC Connecting Soldiers to Digital Applications
- Mr. Todd Miller – C3T milSuite Military Web 2.0
- LTC Andrew Mortensen – Mission Command Center of Excellence
- LTC Gregory Motes – Signal Center of Excellence
- COL Thomas Murphy – CALL/CAC-Knowledge
- COL Earl Noble – Army/Defense Knowledge Online
- Mr. John Pinter – U.S. Army Accessions Command
- Mr. Gary Rauchfuss – TRADOC Institute for NCO Professional Development
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- Mr. James Berg – Sustainment Center of Excellence
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- Ms. Elizabeth Phillips – Army Civilian University
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- Mr. Ronald Sutton – Sustainment Center of Excellence, Distributed Learning Support Branch
- COL Harry Tunnell – Accessions Command
- Ms. Vivian Williams – Sustainment Center of Excellence, Training Support Directorate

Industry

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- Mr. Darrell Briggs – Intel
- Mr. Ron Brown, CIO – PepsiCo, Inc.
- Mr. Joe Ciliberto – Northrop Grumman Corporation
- Ms. Elissa Darnell – eBay Inc.
- Defense Advanced Research Projects Agency
- Dr. Laura Elnitski – National Institutes of Health
- Ms. Caterina Fake – FLICKR, Hunch.com
- Ms. Sarah Folkerts – Sprint Nextel
- Mr. Jason Gertzen – Sprint Nextel
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- Ms. Aisha Rasul – Navy Federal Credit Union
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Academia

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