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2021

Mobile Learning Technology: Assessment of Distribution Options and Recommendations

Aten, Kathryn J.; Tick, Simona L.; Sadagic, Amela

Monterey, California: Naval Postgraduate School

http://hdl.handle.net/10945/69851

NAVAL RESEARCH PROGRAM
NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MOBILE LEARNING TECHNOLOGY: ASSESSMENT AND RECOMMENDATIONS

EXECUTIVE SUMMARY

Principal Investigator (PI): Dr. Kathryn Aten, Department of Defense Management (DDM)

Additional Researcher(s): Dr. Simona, Department of Defense Management (DDM); Anita Salem, Department of Defense Management (DDM); and Dr. Amela Sadagic, Graduate School of Operational and Informational Sciences, Computer Science (CS)

Student Participation: MAJ Shawn Mosley, USA, Department of Defense Management (DDM); LT Russhell Evans, USN, Information Sciences (IS); LTJG Jennifer Kaylor, USN, Information Sciences (IS); LT Mila Quan, Information Sciences (IS); LT Jason Lemma, USN, Department of Defense Management (DDM); and LCDR Samuel Mendoza, USN, Department of Defense Management (DDM)

Prepared for:
Topic Sponsor Lead Organization: N1 - Manpower, Personnel, Training & Education
Topic Sponsor Name(s): Mrs. Michele Harrison, NETC N51
Topic Sponsor Contact Information: michele.harrison@navy.mil, 850-452-4994

Project Summary

The Chief of Naval Operations (CNO) envisions an environment of continuous learning behaviors to broaden and deepen warfighting knowledge and allow the U.S. Navy to out-think and out-fight any adversary (CNO, 2019). To maintain a ready, relevant, and competitive force, the Navy must evolve and leverage mobile technologies in training. To do this, Navy leaders require a better understanding of how to offer mobile learning environments that create value for the Navy and its students (CNO, 2019). This study investigates under what conditions will implementing mobile learning technologies provide the most value, what are the requirements for delivering educational value to Navy users of mobile learning, and what are the pros and cons for Navy users of personal versus government issued mobile learning devices. We conducted three phases of analysis: we investigated users' perceptions of the costs and benefits of mobile technologies, identified accepted best practices of cyber management for mobile technology implementations, and conducted a value (cost benefit) analysis. Our analysis suggests that to implement mobile learning technologies, Navy leaders should incorporate the context of use into decision making, standardize and secure hardware and software, and institute a design system.

Keywords: *mobile learning, technology, training, cyber-security, internet, cloud based, technology adoption*

Background

This study supports the Navy's ability to meet requirements outlined in both the CNO's Design 2.0 and FRAGO 01/2019 documents related to the delivery of modern training content anytime and anywhere and will support the Navy's Ready, Relevant Learning (RRL) initiative. RRL is transitioning the Navy from outdated training delivery practices to the delivery of training content at the point of need. RRL requires a true anytime, anywhere capability for locations around the world and in the continental United States' learning centers and schoolhouses.

While new technologies that can be leveraged to meet this end-state exist, the Navy needs to ensure that Sailors have access to mobile devices capable of supporting training practices and content that reside outside the schoolhouse; those training resources are increasingly made available; and they can be reached by means of the global and local computer networks, both wired and wireless. Sailors are currently not issued Wi-Fi-enabled mobile devices capable of loading and presenting the training content and practices via networked solutions. Information assurance policies prohibit commercial Wi-Fi on the Navy-owned and issued mobile devices (iPads, e-readers, smartphones). While the cybersecurity measures are created to protect computer infrastructure, they also act as a barrier to adopting new training and education applications. The Navy needs means and solutions that will provide learners with unimpeded access to mobile learning technologies.

This study identified and assessed options for providing sailors access training content and practices— resident, on-line, or "in the cloud"—such that students could study and review those resources outside the classroom. The study addresses the following questions:
- Under what conditions will implementing mobile learning technologies provide the most value?
- What are the requirements for delivering educational value to Navy users of mobile learning?

- What are the pros and cons for Navy users of personal vs. government-issued mobile learning devices?

To answer the research questions, we conducted three phases of analysis: the research team investigated users' perceptions of the costs and benefits of mobile technologies, identified accepted best practices of cyber management for mobile technology implementations, and conducted a value (cost benefit) analysis. The team conducted interviews with 19 users of Navy training and 11 Navy cyber personnel and then coded interview transcriptions. To investigate users' perceptions, we drew on the technology acceptance model, which purports that technology use is predicted by "perceived usefulness" and "perceived ease of use," which predict peoples' attitude towards use, which in turn predicts behavioral intention, and actual use (or not) (Alsharida et al., 2021; Buabeng-Andoh, 2018).

Findings and Conclusions

The analysis identified respondents' perceptions of the costs and benefits of adopting mobile learning technologies and the factors that influence the likelihood that they will adopt.

Respondents indicated that productivity, career information management, and skill development influence their perceptions of usefulness. However, the importance of these factors was highly dependent on the context of use: ashore versus afloat and during active versus reserve duty. While existing research suggests that mobile learning technology self-efficacy influences perceptions of usefulness, this was critical to respondents in this study. The ability to readily understand the technology, the efficiency with which it helps them accomplish tasks, and their overall satisfaction influence their perceptions of how easy the technology is to use. Additionally organizational factors that influence the likelihood of adoption include coordination of effort and developing a training culture.

- RQ1 Under what conditions will implementing mobile learning technologies provide the most value? Responses suggest that mobile learning technologies are likely to provide the most value when sailors can associate the training and technology with improved performance and promotion; perceived value is dependent on the perceived benefits of better performance and career advancement outweighing the costs of mobile technology use.

- RQ2 What are the technology requirements for delivering value to Navy users of mobile learning? Users' responses suggest four critical requirements influence perceived ease-of-use: effectiveness, efficiency, learnability, and satisfaction. Respondent's assessments of technology requirements vary depending on the context of use.

- RQ3 What are the pros and cons of bring your own device versus command issued devices? Decisions regarding which mobile learning technology to use depend on the type of training, the work environment, and the accessibility of resources. Some respondents expressed the need to separate their personal life from work and thus have separate devices. Those who prefer to use their own devices want to maintain privacy and avoid responsibility for an extra item. For government-issued devices, respondents expressed the concern that users have shouldered the burden of accountability for lost or damaged government issued equipment and lost productivity due to unavailable features or downtime for maintenance.

When selecting, designing and, implementing, mobile learning technologies Navy designers should create an integrated design system to manage design across the enterprise and integrate key stakeholders into the development process. Design systems create standards and consistency across different modalities and are an emerging best practice in industry. The study provides a roadmap to guide the development of a design system, mobile learning technology guideline checklist, and summary of relevant policies.

Recommendations for Further Research
When the Navy identifies potential sites for mobile learning implementation, future research should use the tools developed in this study to assess specific alternatives in the context of use, prior to implementation.

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Acronyms
CNO   Chief of Naval Operations
RRL   Ready, Relevant Learning