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THESIS

**USING MICROSOFT TEAMS FOR BUILDING
A COMMUNITY OF PRACTICE FOR COMMUNICATIONS
MARINES FOR CONTINUOUS LEARNING OPPORTUNITIES**

by

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September 2021

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PRACTICE FOR COMMUNICATIONS MARINES FOR CONTINUOUS
LEARNING OPPORTUNITIES**

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ABSTRACT

This research investigates how communications Marines use a learning management system to 1) complement military occupational specialties training and 2) create a community of practice (CoP) for knowledge sharing and problem-solving. Will communications Marines utilize a CoP to support the community with communications issues, and can it also support continuous learning? First, the researchers observed Marines using Microsoft Teams by prompting discussion questions to solicit responses to generate data for qualitative analysis. Then, the researchers administered a 15-question survey on the usefulness of Teams, the likeability of a community of practice, and the effectiveness of online learning, and completed a quantitative analysis of the results. The research found that participants favored using Teams to support a community of practice but not for training. Therefore, the researchers recommend continuing the development of the CoP for community knowledge sharing and problem-solving while developing future research on using a learning management system for distance learning to supplement formal training.

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LIST OF ACRONYMS AND ABBREVIATIONS

CDN	combat data network
CHE	common host environment
CMC	Commandant of the Marine Corps
CoI	community of interest
ConOps	concept of operations
COMMEX	communications exercise
CoP	community of practice
COTS	commercial off-the-shelf
CPG	Commandant's planning guide
CSCL	computer-supported collaborative learning
CTC	communications training center
CV	coefficient of variation
CWO	chief warrant officer
DL	distance learning
DOD	Department of Defense
ECP	engineer change proposals
FAQ	frequently asked questions
GOTS	government off-the-shelf
GMT	Greenwich meantime
GPL	general public license
IPT	integrated product team
IRB	institutional review board
KMS	knowledge management system
KME	knowledge management environment
MCCES	Marine Corps Communication-Electronics School
MCEN	Marine Corps enterprise network
MOS	military occupation specialty
NPS	Naval Postgraduate School
NSF	naval support facility
NTP	network time protocol

OJB	on-the-job training
PCA	principal component analysis
PME	professional military education
PoR	program of record
SIPRNet	secret internet protocol router network
STIG	security technical implementation guide
TECOM	training and education command
T&R	training and readiness

EXECUTIVE SUMMARY

The constant rate of technology change is challenging communications Marines with the sustainment of their skills. The changes implemented by the program office often precede formal training, creating a knowledge gap with field technologies, which can present vulnerabilities to a command's communications. General David H. Berger, the 38th Commandant of the Marine Corps (CMC), in his *Commandant's Planning Guide* (CPG), issued the directive for reformation at the training commands to include:

- Ensuring Marines who are waiting for a training seat are using their time as constructively as possible—to include additional educational opportunities
- Employing existing systems and tools, including commercial off-the-shelf (COTS), and government off-the-shelf (GOTS) for acquisitions
- Ensuring Marines are comfortable working in a distributed environment (Berger 2019)

We endeavored to research a solution to the reformation of training and education by answering the following questions: How will communications Marines use a learning management system to 1) complement MOS training and 2) create a community of practice for knowledge sharing and problem-solving? Will a learning management system (LMS) be an easy tool Marines will utilize to support each other with communications issues, and if so, can it also support continuous learning?

We developed a Microsoft Teams group to address the research questions, to serve as an LMS while also filling the requirements of a community of practice (CoP). Next, we engaged in scripted discussions to elicit member participation. Then we administered a survey on 1) the usefulness of Microsoft Teams, 2) the likeability of a CoP, and the effectiveness of online learning. Next, we performed qualitative analysis on the discussion responses to measure the speed and accuracy of the information and quantitative analysis on the survey results. A factor analysis of the survey results allowed us to accomplish our goal to answer the research questions using four scales of correlated questions with one

outlying question remaining. Finally, we concluded the research by answering the research questions:

How will communications Marines use a learning management system?

The participant's preference for using Teams for DL had the lowest approval rating on the survey, with 68.5% above a 4 (\bar{X} =3.89 on a 5-point scale). The research question is also addressed by an outlier of scale 3, Question 13. Only 47% above a 4 (\bar{X} =3.43 on a 5-point scale) of those surveyed (n=100) would prefer DL to in-person training.

The survey results tell that participants (n=100) believe Microsoft Teams is a helpful tool for sharing with and receiving knowledge from the community. However, our observations conflict with the survey results. We noted that only 78 of the 700 members (11%) logged on to Teams during the last 30 days of the research, while 85% (n=100) responded that they are confident using a COP and 87% (n=100) think Teams is a good tool for communication and collaboration.

What our system under design lacked in member participation also manifested deficiencies in the quality of content. The analysis of the discussion prompts during the four weeks of observation can be summarized as:

- Only 44.44% of requests for support could be confirmed as resolved
- The average participation was 4.66 comments per request for support
- The discussion for “tips and trips” only yielded one stored artifact during the observation period

Will an LMS be an easy tool Marines will Use?

When surveyed regarding the use of Teams, 84.5% of participants responded that they have confidence using Teams. When the Marine Corps implemented Microsoft O365 (including Teams), the program office provided a series of training classes presented on Teams with instruction on using the features. Learning how to use Teams and navigating the features has not shown cause for concerns.

We close out our research with recommendations to continue the CoP. While we observed participant utilization as low, some members are using it effectively. While operated at no cost, if the team in its current form supports one Marine with problem-solving, it should be considered a benefit to the Marine Corps. Recommendations for continued development include:

- Charge TECOM to facilitate the CoP. They have the expertise to present information and guide discussions.
- Continue to grow the membership. Solicit TECOM to enroll students as they go through the formal schools.

Berger, David H. 2019. Commandant's Planning Guide: 38th Commandant of the Marine Corps. Washington, DC: United States Headquarters Marine Corps.
<https://www.marines.mil/News/Publications/MCPPEL/Electronic-Library-Display/Article/1907265/38th-commandants-planning-guidance-cpg/>.

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To my cohort, you are the best! You made this process fun, and your support has made a difference.

To my undergrad kids, what are two more years?

Finally, to my partner in crime, my wife of 31 years: thank you for the encouragement, time, and space to get 'er done. Now I'll take you on that camping trip.

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I. INTRODUCTION

Communications Marines, responsible for installing and operating program of record (PoR) communication systems, such as the combat data network (CDN) system, face constant technology changes. These changes impact the communications Marine's ability to effectively apply the formal training provided at the Marine Corps Communication-Electronics School (MCCES) because change implementations precede formalized training on the latest technology.

A case in point is the new common hosting environment (CHE), a fielded PoR solution implemented without a formalized training program. As a result, Marines require immediate access to the system's training material, specification data sheets, technical manuals, configurations guides, and best practices for any advances in technology since they have left formalized training. An online learning management system (LMS) can provide access to these materials for the effective sustainment of the training already received in the form of continuous learning.

Marines train in functional groups and solve problems applying group decision-making processes with instructor feedback at the training commands. The Marines then receive orders and are sent to their new assignments. The USMC command structure separates the community of networkers, military occupation specialty (MOS), 063X, into small multidisciplinary teams supporting a command's unique mission. The newly trained Marines arrive with basic knowledge and skillset. Like most military jobs, there is the expectation for communications Marines to continue their training and skills-building through on-the-job training (OJT). A community of practice (CoP) can support this OJT while enhancing the learning of new technologies not covered in the formal training by bringing the network communicators back together for a common cause; shared learning. CoPs can recreate a place for functional teams by bringing people together to participate in community decision-making while still participating in the smaller multidisciplinary teams at the local commands (Webber 2016). Using a CoP may break up the smaller silos of communicators formed by Marine's access to their command.

Collaboration and communication platforms create environments for building an online CoP for sharing knowledge, providing training, and building a support network to help participants solve complicated communications-related issues. Multiple e-learning platforms furnish collaborative solutions such as instant messaging, audio and video calling, and file storage and sharing capabilities. Our research has examined the features of popular LMS platforms and how they would benefit the Marine Corps.

A formal distance learning (DL) IT training program for fielded systems is unavailable from the Marine Corps Training and Education Command (TECOM). Therefore, a multi-application LMS solution suited for distance learning may fill the void. Additionally, with an LMS platform implementation, TECOM can begin adding its curriculum to the solution for on-demand access, for continuous learning through self-study. In addition, an LMS solution with communications features may also provide around-the-clock support for troubleshooting communications problems, which could enhance the Warfighter Support Division (WSD) support center currently used by Marines, if they know about it. Therefore, the online learning platform merits consideration as a tool to be adopted by Marine communicators for immediate access to information, continuous learning, and problem-solving in the Marine Corps Enterprise Networks (MCEN).

General David H. Berger, the 38th Commandant of the Marine Corps (CMC), in his *Commandant's Planning Guide* (CPG), published July 17, 2019, outlines five priority focus areas. One of those focus areas is training and education. Specifically, the CPG calls attention to:

- Reform training and education to an information age model
- Make Marines comfortable working in a distributed environment
- Ensure Marines seek professional military education (PME) as part of self-improvement
- Practice problem-posing methodologies where Marines are challenged with problems worked as groups, to learn from each other (Berger 2019)

We have incorporated the CMC's directives into the design goals of our system under design. Specifically, one area to address the CMC's directive for training reform is with the in-person lectures currently used to present training. Additionally, tools exist to conduct training remotely with Marines at their command locations while they have access to the equipment they will be learning. This approach eliminates waiting for available seats at MCCES or the Communications Training Centers (CTC). Instead, Marines can train asynchronously, from remote locations, and at cost savings to the Marine Corps.

A collaboration and communication tool may allow faster implementation of new technologies and engineer change proposals (ECP), such as hardware and software upgrades and configuration updates while providing immediate access to training material supporting the changes. Collaboration and communication tools could also allow faster knowledge absorption and continuous learning to keep Marine's skillsets current with changing technologies.

The Coronavirus 19 (COVID-19) pandemic, and the follow-on restriction of movement, prompted the Marine Corps to experiment with a new training model. Students learned in a hybrid mix of self-study in the barracks using the PowerPoint presentations that MCCES presented at the in-person learning locations. Training with an online LMS platform would allow for the presentation of information by live or recorded video with immediate feedback from facilitators via the communication features. Additionally, knowledge assessments can be completed with polling or testing using third-party applets. Studies such as the ones presented by Alameri et al. (2020) and Wea and Kuki (2020) demonstrate that even as the Marine Corps lifts the restriction of movement orders, the research for remote learning is still relevant as a permanent tool in the USMC training framework. This model fits into the CMC's pre-pandemic planning guide, which calls for an information age solution to training. Furthermore, it meets the guidelines published in *NAVMAC 1553.1A, Marine Corps Instructional Systems Design/Systems Approach to Training and Education (MCISD/SATE) Handbook*, which establishes formalized curriculum development.

This thesis investigates the potential for an online CoP to complement formal training and support knowledge-sharing among Marines. The problems identified in this

introduction; 1) rapid changes in technology, 2) network administrators spread thin across the Marine Corps, 3) no DL options for formal communications training led us to the research questions.

A. RESEARCH QUESTIONS

How will communications Marines use a learning management system to 1) complement MOS training and 2) create a community of practice for knowledge sharing and problem-solving? Will an LMS be an easy tool Marines will utilize to support each other with communications issues, and if so, can it also support continuous learning?

B. TERMS AND DEFINITIONS

Many similar terms occur in the taxonomy of remote access to knowledge. We address these terms below. While some terms are not the focus of our research, they require definition to remove confusion from the systems our research covered.

We identify a CoP as a shared online workspace for communications Marines to collaborate and communicate to share knowledge. A CoP includes working collaboratively to further develop knowledge and skillsets through continuous interactions with the group (Community of Interest and/or Community of Practice n.d.). Benians and Terry (2020) define CoPs as “clusters of people who come together to exchange, enhance, and extend their knowledge in an area or discipline of shared interest or concern” (74). Wenger (1998) postulates that CoPs have three dimensions: 1) people with established working relationships interacting, 2) common cause, and 3) a repertoire of shared resources. Lave and Wenger (1991) introduce the theory that learning is a social event, a process referred to as legitimate peripheral participation, and is the foundation of a CoP.

An LMS is a “software application, which streamlines, automates, and transforms how your organization delivers employee training” (What Was the First LMS Platform? n.d.). For example, the University of California, Office of the President (n.d.), defines the university’s LMS as a software platform for supporting “the delivery, management, and tracking of learning events” (Learning Management Systems (LMS) n.d.). We argue that

an LMS can also meet the requirements of an online CoP with many communication and collaboration features.

A community of interest (CoI) is considered a community of people with shared interests or experiences. A CoI is often a tool for a government organizational approach for forming a workspace for employees who desire to share information within their community. For example, we used a Microsoft Teams group (existing on the MCEN) called COI USMC Communicators for our research. This online CoI brought together Marines of the 06 occupational fields MOSs who work on communications equipment. The online group allowed us to observe discussion interactions among the participants. For this research, we call the group a CoP.

Institutions use LMSs for both online learning and DL. Staffer (2020) adds that online learning, also called e-learning, can be real-time learning that provides an online workspace for a teacher-led classroom. DL is asynchronous learning used at any time and place at the learner's convenience. Distance learning started as early as the 1840s when the postal service made it possible to learn by correspondence. The University of Phoenix was considered a pioneer in the DL space when it became the first educational institution to launch DL college degree programs in 1989 (The History of Online Schooling n.d.).

Suthers (2012) defines computer-supported collaboration learning (CSCL) as the interaction of the community to learn via information and communications technologies (ICT). Pratt (2019) refers to ICT as communications technologies required to converge audio-video with computer networks. E-learning is formalized instruction over electronic sources, usually over the internet (Lexico n.d.). Davis (2020) defines digital learning as technology-enhanced education. Digital learning can be in the classroom or remote locations adopting digital tools for access to learning material. Birkett (n.d.) defines a knowledge management system (KMS) as “an IT system that stores and retrieves knowledge to improve understanding, collaboration, and process alignment” (Under What is a knowledge management system?). Bereiter (2003) describes a knowledge-building environment as a place for creating, testing, and improving knowledge artifacts.

C. THESIS ORGANIZATION

The thesis format encompasses a literature review of previous work in Chapter II. Chapter III comprises the procedures of the research and the system under design. Chapter IV reports the investigation findings, and finally, Chapter V draws conclusions of the study and provides future recommendations.

D. SUMMARY

The introduction and background provide the purpose for our research and the implications for the USMC communications Marines. Training is one of the five focus areas on the *Commandant's Planning Guide*. An online LMS and CoP can supplement a formal training curriculum provided by TECOM and extend learning opportunities using a distributed model with remote asynchronous learning.

II. REVIEW OF LITERATURE

Online learning has experienced rapid growth since the COVID-19 pandemic sent learners of all ages and locales out of the classroom and into remote learning locations. As a result, academic institutions that did not have an online presence needed to implement a solution to continue training and education. As the restrictions are lifted, organizations may likely continue to blend remote learning into a hybrid model. This review starts with an examination of the USMC training regulations.

A. USMC TRAINING

NAVMAC 1553.1A, Marine Corps Instructional Systems Design/Systems Approach to Training and Education (MCISD/SATE) Handbook, establishes formalized curriculum development and unit training processes. While initially published for training to a desired level of performance, the handbook is now recognized for guidelines for course development and methods, including training sustainment. In NAVMAC 1553.1A are the guidelines for course development, referred to as training and readiness (T&R) events. We identified the guidelines appropriate to our research.

Guidelines that conform to an LMS: 1) courses developed with support from the Operational forces, 2) learning locations that are effective and efficient, 3) instruction for the skills required for continuous training in a managed on-the-job training (OJT) program.

Guidelines applicable to a CoP: 1) faculty expected to engage in continuous learning by participating in a CoP and PME, 2) Faculty should contribute to building the collective body of instructional knowledge, 3) Faculty should participate in the COI sponsored by TECOM for those individuals assigned to the Cyberspace career field.

NAVMAC 3500.56D, Communications Training and Readiness Manual, lists all the training events on which communications Marines receive formal training. Additionally, the manual details the requirements for the sustainment and evaluation of training. Paragraph 1003 comments, “Marines are expected to maintain their proficiency in their MOS appropriate to their rank” (1–3). The assessment of proficiency is continuous and an integral part of training (Lukeman 2016). NAVMAC 3500.56D directs proficiency

assessments to be a continuous process administered by the local commands. The only venue for maintaining proficiency through continuous learning is formalized training through TECOM. However, this opportunity only happens when Marines reach milestone ranks that require continued professional development. These courses include the Supervisors course for NOCs, the Chief's course for SNCOs, and the Communications Chief course for Master Sergeants.

Underwood (2021), reporting on the 2021 TechNet Augusta Virtual Solution Series, informs, "The U.S. Navy and Marines Corps are harnessing virtual platforms and advanced methods to teach cyber and communications skills." Underwood adds, "technical training should be realistic and use high-fidelity cyber training ranges with access to training daily and accessible from any location." (first paragraph). Decentralized training conforms to the ideas expressed in the CPG. This research argues that remote training is only possible with a DL model, which allows Marines access to information and training material from any location. The tech conference addressed innovative approaches to the training model. Chief Warrant Officer 4 Daniel Belew, USMC, academics officer, MCCES, acknowledged two leading causes of deficiencies within the current teaching environment: prolonged standard processes and a standard curriculum update plan once every three years. The slow pace of curriculum updates creates disparities in technology adoption (Underwood 2021). MCCES believes a contemporary approach can advance the curriculum updates down to three months. While a great solution to keep the curriculum updated, the current training framework has no methods for distributing the updated curriculum to Marines who already passed through the schoolhouse. This research contends that an LMS platform can be the instrument for distributing curriculum updates.

At the same conference, Navy Chief Warrant Officer 2 Clayton Henry discusses an instructor model changing from anyone being taken out of their billet to teach to a model that uses cyber professionals in an adjunct role. This model could allow sailors [and Marines] to balance time between their MOS duties and teaching. Standards for assessing the skill sets of the instructors would be required to ensure the best instructors are presenting the material. The article falls short of the details on how MCCES will execute this plan. An LMS platform would fit these ideas well. Adjunct instructors can record

training sessions and store them in a MOS-related classroom to make them accessible to learners on demand. In this model, the DOD services can combine training efforts for similar MOSs and use the best instructors from either the services or industry. The DOD may find cost savings in training dollars by combining training efforts, and joint training would be conducive to preparing Marines for supporting joint exercises.

B. COMMUNITY OF PRACTICE

Traditionally thought of as local communities meeting in person, collaboration and communication technologies have led CoPs to become virtual. Dubé, Bourhis, and Jacob (2005) add that asynchronous or online CoPs “rely primarily on modern information and communication technologies (ICT) and internet capabilities” (146). Peers can use these tools to start CoPs when they desire to expand their craft knowledge. Likewise, companies can designate a CoP as a tool of the organization with forced participation. Xing, Kim, and Goggins (2015) completed studies on CSCL and concluded that the immediate impact on learning was social interactions. Davenport and Prusak (1998) emphasize that “knowledge may be a company’s greatest competitive advantage in a global economy.” (13). Wagman, Gardner, and Mortensen (2012) assert that as the workforce evolves, so does the nature of communication and collaboration. New platforms are affording LMSs opportunities to be a one-stop-shop to provide all the tools required to keep the workforce engaged with a CoP.

Stahl (2006) suggests using CSCL systems for building a knowledge-building environment. He models the interactions of an individual’s knowledge with community knowledge showing the reciprocal interactions (known as mutual constitution) of the individual and the community. Stahl’s model represents knowledge as a social process, with a given example of the importance of a shared language. The instance of shared language is also identified in the knowledge management process section of the *INCOSE Systems Engineering Handbook* (2015, 160) to “establish a taxonomy for the replication of knowledge.” As an illustration, an individual may have a personal understanding of a definition. Still, while sharing it and receiving feedback from the community, a community definition may develop, changing the unique understanding. In this way, shared knowledge then shapes the individual with different ways of thinking gained from the diverse

influences of the community (Stahl 2006). This study did not go into the workings of those processes. However, our research focuses on the benefits of a community (of practice), knowledge sharing, and continuous learning tools. Knowledge of Stahl's processes provides a conceptual framework for designing CSCL platforms that can serve multiple functions to support the Marine Corps. Our research intended to investigate the strengths and weaknesses of networking Marines using a CoP to supplement formal MOS training while also serving as a community workspace for problem-solving. Rapid technology changes necessitate a communications Marine to be in a constant state of learning. After formal schooling, continued learning depends on on-the-job training (OJT) and support from teammates. A CoP could broaden the size of a team by creating a workspace for all communications Marines, regardless of location, to support each other.

Garavan, Carbery, and Murphy (2007), in their research on intentionally created CoPs, employ qualitative research methods involving data collected from observations of the CoP, interviews with the CoP managers, and an analysis of document artifacts. In addition, the study includes findings for managing a CoP. The themes relevant to this research include:

- The CoP managers reported learning by doing with how to adjust from mistakes and by listening and talking to members.
- Managers had to “think out loud” and solicit feedback to ensure the team understood the context of the CoP.
- The CoP managers' methods to build trust with the members included identifying members' skills, building synergy within the CoP, creating useable resources, and setting challenges for the team.
- Developing relational resources. (41–45)

The Garavan, Carbery, and Murphy study differs from our research in that the COI USMC Communicators CoP was not intentionally created. It came together on its own, going from word of mouth, and is all voluntary. The administrative owners of the team currently do not facilitate the group, and no charter exists. It is just an idea of the members that coming together for knowledge sharing could benefit them.

C. LEARNING MANAGEMENT SYSTEMS (LMS)

We performed a comparison of LMS platforms based on the literature review of popular products in operation today. The LMS platforms come in two styles: commercial and open source. The difference between the styles is that the open-source LMS systems are developed under the GNU general public license (GPL). The GPL grants permission for modifying the source code to fit the user's requirements (GNU Operating System 2020). In contrast, the commercial LMS platforms are not modifiable and require licensing fees for employing the system. Several comparisons of the different LMS products exist that delineates products by features and benefits. At the same time, many comparisons leave the conclusions of the best solution to the reader. Our research investigated which LMS platform would be the best system for communications Marines by matching a systems approach to training, outlined in *NAVMAC 1553.1A* and the current requirements for training improvements called out in the CPG. SoftwareAdvice.com lists 553 products on their website of LMS-related information, which they offer for LMS solutions. Standard features of LMS platforms include:

- Virtual classrooms
- Course library
- Proficiency testing and reporting
- Content development
- Mobility access
- Social learning (Software Advice Buyer's Guide 2021)

Many comparisons, forums, and market share reports identify Moodle, Sakai, and Blackboard as leaders for LMS solutions. For example, Hill (2021), in his annual report, "*State of Higher Ed LMS Market*," lists the market share leaders highlighting the market over more than 20 years. Hill concludes that Canvas tops the market share with 32% of higher education institutions in the U.S. and Canada, followed by Blackboard and Moodle, at about 22% each.

We collected LMS platform features from reviews of the 2100 independent, verified reviewers of TrustRadius, on the most popular LMS platforms and published Table 1. For this research, we investigated features that allow for seamless collaboration and communications and file-sharing capabilities. Like the conclusion of numerous LMS product comparisons, we determine no firm outcome for the best LMS system based on features. One of our goals was to identify and use platforms that offer free versions. This requirement led us to eliminate Canvas and Blackboard as these are not open-source platforms and have licensing costs. In addition, Sakai does not have the desirable features that would make it useful for a CoP, leaving Moodle and MS Teams the two most viable candidates.

Table 1. TrustRadius Reviews. Adapted from Learning Management Systems [LMS] (n.d.)

	Canvas	Moodle	Sakai	Blackboard	Microsoft Teams
# Reviewers	187	188	22	190	1593
Overall Score	8.9	8.3	9.2	7.2	8.4
Feature Score Card	8.9	8.3	8.3	7.2	8.4
Useability	9.1	9.3	7.4	10	7.2
Performance	n/a	10	n/a	n/a	n/a
Likelihood to renew	9.3	10	10	4.6	10
LMS	8.8	7.6	8.3	7.2	n/a
Open Source	No	Yes	Yes	No	No
Core Function	Higher Edu	Academia	Higher Edu	Academia	Business
Chat/Messages	Yes	Yes	Yes	Yes	Yes
Video Conferencing	Yes	No	No	Yes	Yes
Collaboration Workspace	Yes	Yes	No	Yes	Yes
Document Management	Yes	Yes	Yes	Yes	Yes
LMS	Yes	Yes	Yes	Yes	No
Mobile App	Yes	Yes	Yes	Yes	Yes

In their research on e-learning, Alameri et al. (2020), study 450 students on perceptions of e-learning during the COVID-19 pandemic. The students were surveyed on

multiple e-learning platforms (Moodle, Teams, and Zoom) on how the media contributed to self-study and academic performance. The Alameri research has similar goals to our study, but Alameri et al. only studied an LMS as a learning platform and did not include research on a CoP.

Alameri's study finds that surveyed students were optimistic and found e-learning to be efficient. The students voted with consistently high marks, above 80% in agreement, in the form of a positive experience. Alameri's team concluded that the students are comfortable with e-learning platforms and see the benefits of online training as an alternate learning tool. The students also agreed by 84% that the demand for online learning would extend beyond the COVID-19 pandemic and become an essential educational process. Likewise, DL should not be thought of as a last resort in the Marine Corps for a temporary fix for continuing education while under COVID-19 restrictions but also serve as another tool in the educational process framework. In addition, the survey results found that e-learning platforms offer increased opportunities for communication with teachers, aided in developing students' self-study habits and time management skills (Alameri 2020). Perhaps the most trenchant survey result for applying our research of a continuous learning platform for communications Marines is that 82.2% of surveyed students thought e-learning could replace laboratory and practical applications. The application of this could see Marines carry out training on their command's assets.

D. MICROSOFT TEAMS

After reviewing the leading LMS platforms, we selected Microsoft Teams as an LMS platform because the USMC actively uses teams. Using Teams in education and training is a relatively new option since Microsoft only introduced Teams as part of the O365 family of products in 2017. Teams is conspicuously absent from Hill's annual LMS report, mentioned above, and many other platform comparisons. While the writers of the "Phil on EdTech" blog may not refer to Teams as an LMS, our research suggests that Teams is a communication and collaboration tool that can serve as an LMS operated by TECOM to supplement formal training and continuous skillset development.

Lansmann, Schallenmuller, and Rigby (2019) are currently researching an unnamed systems integrator on the technology appropriation rate using Microsoft Teams for a KMS. In the initial study, they interviewed management personnel on Teams' effectiveness. They received positive feedback that "Teams is making their work easier and less time-consuming for creating client proposals, which previously causes stress on the workforce" (2019, 3). However, the Lansmann, Schallenmuller, and Rigby research fell short on the details of how Teams is making proposals easier. As a result, they planned follow-on research to study how Teams is being consumed by the workforce and measure the benefits of its usage.

Buchal and Songsore (2019), in their research published for the *2019 Proceedings of the Canadian Engineering Education Association (CEEA) Conference*, study the deployment of Teams as a knowledge-building system. The Buchal and Songsore research conducts surveys on the usage of Teams for collaboration, the student's comfort level of working on Teams, the public nature of the open forums in the channel postings, and if Teams was the preferred collaboration and communications tool. Our research supports the usefulness of a CoP for producing knowledge and a file-sharing tool like Teams to store the knowledge.

Buchal and Songsore (2019) explain that Teams extends the functionality of Microsoft SharePoint with a simplified user interface that is also available for mobile devices. In addition, the Teams platform contains a default set of collaboration and communications applications, such as chat and online meetings. Teams also includes an extensive heterogeneous collection of third-party applications. The features provided by Teams are essential components for facilitating collaboration with a CoP. For example, Buchal and Songsore's (2019) research, required students to use Teams to collaborate on a school project, after which they administered an online survey with the following results:

- Students are less comfortable with the visibility of their work to the instructors and teaching assistants than they are with peers
- Most students (81.25%) found Teams better than other tools they have used

- Some noted the benefits of having a single integrated platform for communication, file sharing, and collaborative authoring, with a single login account

The Buchal and Songsore research conclusion provides evidence that Teams is an effective platform for collaborative knowledge building. Students found Teams easy to use and are comfortable having contributions visible to members of the team.

Similar to Alameri's research, Wea and Kuki (2020) capture student perceptions of Teams for online learning during the COVID-19 outbreak. Also, similar to Alameri et al., the data collection methods used a survey for polling 176 students on the useability and likeability of Teams and analyzed the data using the Likert scale. The Wea and Kuki research conclusions also assert that the students positively perceived Teams and expressed the hope of continued usage.

- Student enthusiasm with working with Microsoft Teams for online learning – 86%
- Students' agreements, with accepting Teams for online learning – 75%
- The students desire to continue using Teams for online learning – 81%

E. CONCLUSION

As a result of 1) the examination of the literature on CoPs and the tools required for successful implementation, and 2) the comparisons of the features of LMSs, and 3) the consideration that the Marine Corps uses Microsoft Teams through its subscription of O365 (Microsoft Office 365™), we determined to continue with this research by adopting Microsoft Teams as the system under design. Teams meets the Commandant's directive to leverage existing tools and use COTS programs where such usage makes sense (Berger 2019). A CoP, known as the COI USMC Communicators, has been formed using Microsoft Teams to collaborate and communicate amongst self-registered communications Marines. The literature review also led us to conclude:

1. A CoP leads to the sharing of knowledge and skills benefitting the individual as well as the community.
2. The Marine Corps requires a modern approach to training that produces accelerated changes to the curriculum and implementation; an LMS can support the effort.
3. Microsoft Teams shares communication and collaboration features common to most LMS brands.
4. Online learning is the new normal, and adult students are ready for it.

III. DESIGN AND METHODOLOGY

A. PURPOSE

The design of this research was to answer the question: How will communications Marines use a learning management system to 1) complement MOS training and 2) create a community of practice for knowledge sharing and problem-solving? Will an LMS be an easy tool Marines will utilize to support each other with communications issues, and if so, can it also support continuous learning? Specifically, can Microsoft Teams be used to create a CoP where peers can support the problem-solving and continuous learning efforts with the collective knowledge and experience of the membership? Towards this end, we performed qualitative analysis on the observations of knowledge sharing, problem-solving, and planned discussion topics. Furthermore, to collect data for quantitative analysis, we administered a survey on the likability and useability of Teams as an LMS platform for continuous learning and problem-solving.

B. SYSTEM UNDER DESIGN

Our research requires a system that can be used for a CoP and has LMS features to support knowledge sharing and continuous learning. Another requirement is Real-time and asynchronous communications for soliciting and sharing membership knowledge and experience. The requirement for storing the communication transactions for future references will allow communications to be asynchronous and aid in building frequently asked questions (FAQ) documentation to support knowledge on common issues. In addition, the system under design will have file retention capabilities to house training material that the membership can use. The training material can be videos and document artifacts downloaded or checked out on-demand. Finally, the system under design will have a feature for collaboration among members. Collaboration takes many forms, from audio or written communications to contribution on a shared document or the ability for members to share their computer desktops for sharing a problem with which they are trying to receive help.

We selected Microsoft Teams for the system under design based on our literature review, a review of the requirements, and because the Marine Corps has deployed Teams on the MCEN, giving access to the application to personnel with a Microsoft enterprise account. The existing COI USMC Communicators Team will serve as the system under design. Further development of the Team included growing the membership, reconfiguring the subchannels, adding document resources, and implementing discussion prompts. Additionally, having a team workspace for the CoP was necessary for collaborating and communicating with one another, especially considering that the Marine Corps is a dispersed organization. This distribution of personnel makes Teams well suited for the Marine Corps.

Martin and Tapp (2019) remarked that Microsoft is not marketing Teams as an LMS. Still, Teams has many LMS-type applications, including chat and video conferencing for communication and desktop sharing for collaboration. These applications support a social constructivist focus on learning due to the member’s participation with the team. Woo and Reeves (2007) express that these tools immerse learners in more varied and frequent interactions among peers. Figure 1 shows the context of Teams in the Marine Corps with the interactions of participating sources.

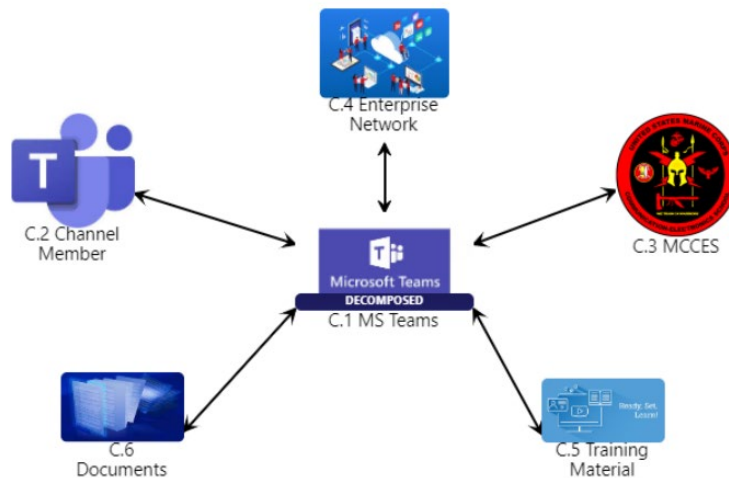


Figure 1. System Under Design Context View

1. System Requirements

MS Teams contains several default applications as part of the Teams construct, offering seamless integration with the O365 applications. In addition, as revealed in the literature review, Teams has many of the features of today's most popular LMS platforms. For the Marine Corps, Table 2 lists the requirements for the system under design taken from the CPG.

Table 2. System Requirements. Adapted from Berger (2019).

Requirement	Satisfied by
Must reform training and education to an information age model	<ul style="list-style-type: none"> • The training commands can add a distance learning model to the repertoire • 24/7 access • Accessible from any location • Remote access to instructors
Regular optimization of MOS production management	<ul style="list-style-type: none"> • Document management
Additional educational opportunities while a Marine is waiting for a training seat	<ul style="list-style-type: none"> • Document management • Collaboration on projects
Use existing systems and tools	<ul style="list-style-type: none"> • The Marine Corps is already using Microsoft O365 • Including a license to use Teams
Support comfort level working in a distributed environment	<ul style="list-style-type: none"> • 24/7 access • Accessible from any location • Access to peers • Access to instructors
It is a Marine's responsibility to seek PME as part of self-improvement	<ul style="list-style-type: none"> • Teams can be a tool for supplemental learning through ongoing skills development with updated training material • Marines can refresh essential skills through annual block training opportunities
A problem-posing methodology where students are challenged with problems worked as groups to learn from each other	<ul style="list-style-type: none"> • CoP • Knowledge sharing • Team exercises (virtual COMMEX) • employing command assets for training

2. Use Cases

The use cases are written descriptions from a user's point of view to describe how the system responds to requests. The scenarios are a sequence of steps taken to transition the user's goal into fulfillment. The goals then become requirements. The goals of our system under design are to communicate with the CoP for knowledge sharing, work with the CoP for troubleshooting issues, and use the system for continuous learning.

a. Communication

A Marine seeks a consensus from the members of the CoP on how to implement the latest router *Security Technical Implementation Guide* (STIG) for updating the security on networking equipment. The Marine logs into the CIO USMC Communicators CoP and posts the situation in the 063x – Network channel. The Marine then waits for replies or comes back later to check responses. Once the response is received, the Marine can use the knowledge gained for implementing the STIG.

b. Problem Solving

A deployed Marine assigned to a communications exercise (COMMEX) in the desert has problems with network time protocol (NTP). He is the only network administrator onsite and requires support to troubleshoot the issue. The Marine logs into the CIO USMC Communicators CoP and posts the situation in the 063x – Network channel. The Marine waits for replies. There is a prompt response to the request for support, but the members supporting the request are unclear about the situation of the deployed Marine. The deployed Marine uses a webcam video to capture the output from the NTP appliance, and the CoP members get visual evidence of the issue. The CoP responds to the request by directing the deployed Marines to the file-share location for a solution used at another deployed location. The deployed Marine applies the recommended fix, and the problem is solved.

c. Learning

A Marine with an 0631 network administrator MOS stationed at the naval support facility (NSF) Diego Garcia, in the middle of the Indian Ocean, has no access to a local

CTC to enroll in a class on advanced Cisco routing. The network administrator logs into the team, screens the course catalog and finds a suitable course offering. The training material includes the KSAs, instructor videos, documentation, and knowledge assessments. The network administrator uses the videos and training material during downtime after work and learns a new skill. When the training is complete, the network administrator takes a test and submits the results to TECOM for credit towards continuous learning.

3. Building a Community of Practice

We used Microsoft Teams to build a CoP for the Marine Corps communications MOSs. The Marine Corps has licensed all enterprise users for access to Teams, making them eligible to create a new team or join any number of the 19,000 teams currently in the USMC domain. A few members of the COI USMC Communicators team had been elevated to administrators to manage the team. These team champions started spreading the information about the team in their respective regions. Locations of administrators include the Pentagon, MCB Quantico, MCAS Yuma, Camp Pendleton, and MCB Hawaii. Of the two original teams, one group started as a networking COI, while another was a broader communications COI. As the team grew, members requested adding other communications MOSs (see Figure 2). The development of the CoP continues today as the word continues to propagate throughout the Marine Corps. When new members joined the team, they had immediate access to the general channel and could participate in all channels on the team. The team owners (administrators) set up channel permissions for the kind of access members will have in the channel.

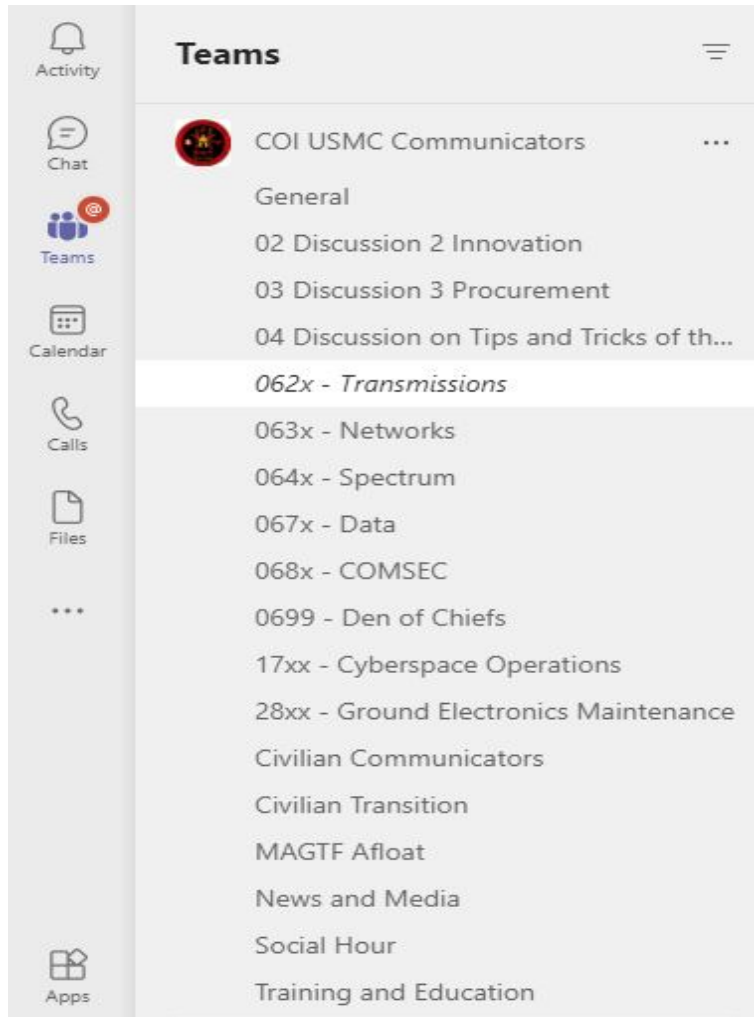


Figure 2. COI USMC Communicators' Channels

4. Default Applications

Teams contains several default applications as part of the Teams construct. Most notable are the Chat and Calendar applications. Members can use the Chat application for text messaging or video calls to any licensed Teams user across the enterprise network. Additionally, each channel supports a file-sharing structure and a posting application viewable to the entire channel membership.

5. Channel Selection

The COI USMC Communicators team owners subdivided the team into separate channels for each MOS and several special interest channels. The requirement was evident

as the team grew in membership to include Marines from several other communications-related MOSs. Members began asking for MOS-specific channels but also indicated an interest in additional channels covering broader areas of interest. Figure 2 lists the channels that were available during the observation period for which members could participate. Team owners can create and delete channels in response to membership requests. Each channel provides a unique set of applications and file-sharing locations for the members participating in that channel. For the qualitative analysis of our research, we set up discussion channels following NPS IRB protocols for temporary data collection of member participation.

C. PARTICIPANTS

We focused our study on the Marine Corps networking-related MOSs as research subjects on the usefulness of Teams for hosting a CoP to meet their continuous learning and problem-solving demands. Additionally, the career field comprises several networking-related billets detailed by *NAVMAC 1200.1F Military Occupational Specialties Manual*. See Appendix D: USMC Communications MOSs for information on the MOS field.

D. METHODS

The methods used in our research included qualitative research with a descriptive-analytical approach and quantitative analysis of survey responses. The study wished to know Marines' perception of using Teams to communicate with a CoP and as an LMS to supplement learning for skills development. Because our research included observing Marines using the Teams group, the human subject research protocols were employed. Working with both the NPS and USMC Institutional Review Boards (IRB), the interactions in Appendix A were approved for the use of this study. The IRB has determined that this study meets the exemption category 2ii per 32 CFR 2019.101(b). Additionally, because of the nature of public forums, IRB waived consent forms in place of a formalized intervention script used as prompts for discussion.

1. Procedures

The IRB had approved five user interventions for the use of our study. The first four interventions were discussion topics to generate data used for a qualitative analysis on the speed and accuracy of problem-solving solutions and knowledge sharing. Each discussion began with an intervention script (see Appendix A) which we posted in the General channel. These scripts asked willing participants to move to a unique time-constrained channel for that discussion. At the end of four weeks for each discussion, we analyzed the data and deleted the channel. Appendix B provides the USMC Survey Office approved survey in its entirety. The threefold goal of the survey was to solicit feedback on:

- The usefulness of Microsoft Teams
- Participating in a community of practice
- Online learning

2. Data Collection

Data collection begins with defining the requirements (Data Requirements Definition n.d.). Our thesis started with two research questions:

- How will communications Marines use a learning management system to 1) complement MOS training and 2) create a community of practice for knowledge sharing and problem-solving?
- Will an LMS be an easy tool Marines will utilize to support each other with communications issues, and if so, can it also support continuous learning?

To address the first question, the data requirements for measuring qualitative responses regarding training and continuous learning opportunities included participant inputs to discussion questions and general usage of the team for knowledge sharing.

For the second research question, the data requirements shifted to quantitatively measuring responses to the survey on the usefulness of the CoP. We created the survey employing the Forms application on Teams. The application created a form in a survey

format on our SharePoint location. Invitations were posted in the general channel asking team members to complete the survey. One week later, we sent an email to the team members to remind those who had not yet completed the survey.

E. DATA ANALYSIS PROCEDURES

Once we collected the data, the next step was to preprocess the data into a readable format. Frankenfield (2021) calls data analytics “the science of analyzing raw data to make conclusions about the information.” Data analytics can help stakeholders make decisions based on the trends of participation of the Teams channels and the quality of the involvement. We selected a descriptive type of data analysis with the focus of our research designed to investigate if Teams is an appropriate tool for creating a CoP and describe what we observed over the research period. We used standard statistical tests to determine relations among variables in the survey data.

1. Analysis Tools

Our research team used the following tools for data collection and analysis.

a. Statistical Package for Social Sciences (SPSS)

IBM SPSS Statistics software allows for conclusions on a factor analysis of the survey data to group questions and responses into contextual groupings.

b. SharePoint Forms Survey Feature

SharePoint is the backend application of Teams. The forms application allows for creating surveys and collection of response statistics that are exportable to Microsoft Excel.

c. Microsoft Teams Posting Application

We observed the responses to the discussion questions formulated for our research using the Teams posting features. Posts were collected and analyzed from this feature.

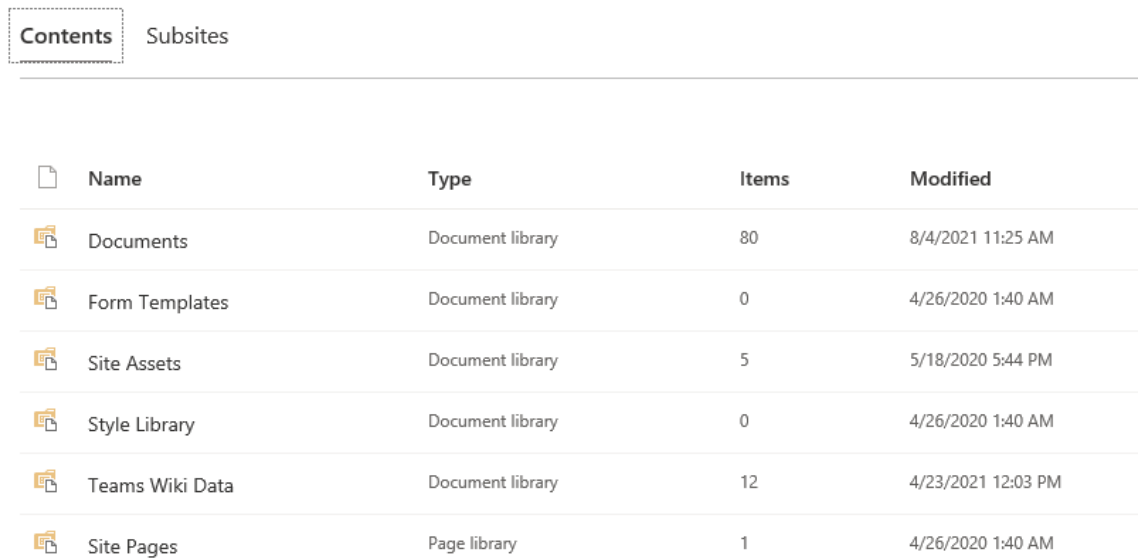
d. Real Statistics Resource Pack

We continued statistical tests on the survey results using an Excel add-in by Real Statistics. This tool allowed us to compute t-tests on the data collected to compare variance in demographics.

2. Content Analysis

Figure 3 Site Content lists the quantities of artifacts created or uploaded to the team. The figure shows the number of artifacts for the whole team and is not specific to any channel. The document artifacts include:

- Training flyers
- USMC Directives
- How-to guides
- Tips and Tricks



Name	Type	Items	Modified
Documents	Document library	80	8/4/2021 11:25 AM
Form Templates	Document library	0	4/26/2020 1:40 AM
Site Assets	Document library	5	5/18/2020 5:44 PM
Style Library	Document library	0	4/26/2020 1:40 AM
Teams Wiki Data	Document library	12	4/23/2021 12:03 PM
Site Pages	Page library	1	4/26/2020 1:40 AM

Figure 3. Site Contents

3. Organization of Collected Data

Data collection for the qualitative analysis came from collecting the postings in the discussion channels. We administered these discussions employing the posting feature unique to each channel. Finally, we analyzed the responses, and a narrative was reported in Chapter IV of this research. For the quantitative analysis of the survey results, we used Forms to aggregate the answers, provide the data in pie charts, and export the data to an Excel file. Again, this data was analyzed and reported in Chapter IV of this research.

4. Data Cleanup

Data collected included responses to discussion interactions and a survey on the useability of Team for a CoP. We administered the discussion interactions on new channels formed for the sole purpose of data collection. Figure 2, COI USMC Communicators Channels, identifies the names of the new channels. After the response period of four weeks, the discussion channels were deleted per IRB protocols, leaving no trace of the data. Therefore, we disposed of the survey and recorded data at the close of the study.

F. RESEARCH SCOPE

1. Limitations

We are limited in our research by participants' willingness to engage in interactive discussions and responding to the survey used for measuring the validity of the CoP. Unfortunately, interaction discussions and the survey were limited to preapproved interactions with the NPS and USMC institutional review boards (IRB), leaving no allowance for adjusting the discussions. As a result, data collection was limited to scripted interactions and may not have provided as comprehensive a picture as initially envisioned of using the system under design.

2. Delimitations

We set the scope of our research to the Marine Corps communications MOSs in the networking field (063x). These are dynamic fields with continual changes in the operations of USMC communications equipment. The study was carried out on the MCEN and was limited to Marines and civilians with an active enterprise account. We capped the sample

size for the survey and discussions at 500 participants. The discussion topics were limited to four interactions not to burden the membership with continual requests for support. The survey was limited to 15 questions on the usefulness of Microsoft Teams, online learning, and participating in a CoP. While the literature review set no boundaries on the type and number of products, the system under design was limited to one product. We decided to limit the number of platforms participants would be required to join for the research.

3. Assumptions

The first assumption was that a single system that supports the features of a learning management platform, traditionally used by educational institutions, could also serve as a collaboration and communications system for a CoP. The second assumption was that TECOM would receive a CoP after the study and provide oversight to add training material and facilitate problem-solving.

IV. FINDINGS

A. SYSTEM EVALUATION

1. Team Membership

An evaluation of the team membership shows a wide selection of Marine and civilian members. Table 3 shows a breakdown of the COI USMC Communicators team membership by rank groups. Tables 4 and 5 represent members from numerous Marine Corps commands and spanning different locations around the globe. Additionally, bases are represented from seven countries and 18 States and U. S. Territories. The Marines' locations are on the other services' bases, including Navy, Army, and Air Force bases.

Table 3. Teams Membership by Rank Group

Rank	Quantity
Junior Marines	21
NCOs	198
SNCOs	248
WO/CWOs	57
Officers	122
Civilians	68

Table 4. Teams Membership Country Locations

Base	Country
Various	USA
Kabul	Afghanistan
Kandahar	Afghanistan
NSA Bahrain	Bahrain
American Embassy Brasilia	Brazil
Camp Butler	Japan
MCAS Futenma	Japan
MCAS Iwakuni	Japan
Camp Arifjan	Kuwait
Camp Humphreys	South Korea
Yongsan Army Base	South Korea

Table 5. Teams Membership Locations by State

Base	City	State
MCAS Yuma	Yuma	Arizona
YPG	Yuma	Arizona
MWTC Bridgeport	Bridgeport	California
NSA Monterey	Monterey	California
Camp Pendleton	Oceanside	California
MCAS Miramar	San Diego	California
MCRD San Diego	San Diego	California
NB San Diego	San Diego	California
MAGCC Twentynine Palms	Twentynine Palms	California
Peterson AFB	Colorado Springs	Colorado
Ft. Carson	Fort Carson	Colorado
NAS Pensacola	Pensacola	Florida
MacDill AFB	Tampa	Florida
MCLB Albany	Albany	Georgia
Camp Smith	Halawa	Hawaii
MCB Hawaii	Kaneohe	Hawaii
Chicago	Chicago	Illinois
Scott AFB	Scott AFB	Illinois
NS Great Lakes	Great Lakes	Illinois
NAS JRB New Orleans	New Orleans	Louisiana
Ft. Meade	Fort Meade	Maryland
Ft. Devens	Fort Devens	Massachusetts
Minn-St Paul ARS	Minn-St Paul	Minnesota
Bannister Fed Complex	Kansas City	Missouri
MCAS Cherry Point	Cherry Point	North Carolina
Camp Lejeune	Jacksonville	North Carolina
MCAS New River	Jacksonville	North Carolina
MCAS Beaufort	Beaufort	South Carolina
Joint Base Charleston	Charleston	South Carolina
MCRD Parris Island	Parris Island	South Carolina
Ft. Worth	Fort Worth	Texas
NAS JRB Ft Worth	Fort Worth	Texas
Pentagon	Arlington	Virginia
NSA South Potomac	King George	Virginia
NS Norfolk	Norfolk	Virginia
NSA HR	Norfolk	Virginia
MCB Quantico	Quantico	Virginia
NWS Yorktown	Yorktown	Virginia
Ft. McNair	Washington, D.C.	Washington, D.C.

Base	City	State
Washington Barracks	Washington, D.C.	Washington, D.C.
Andersen AFB	Guam	U.S. Territory

2. Channel Analysis

We performed an analysis of the number of unique posts for each channel. Table 6 records the observed posts of interest to our research. The General channel is a catch-all location that members can post to when they are unsure which channel best fits the request. Members can publish posts and announcements across multiple channels, and when used, often includes the General channel. Posting in this way is an appropriate technique as the General channel is viewable by everyone. In contrast, the remaining channels can be hidden from a member's view depending on screen size or frequency of use.

Table 6. Unique Posts Per Channel

Channel Name	Number of Unique Posts
General	80
Civilian Communicators	21
063x Networks	11
Social	10
Den of Chiefs	8
Civilian Transition	5
News and Media	5
Training and Education	4

The subject of posts includes requests for support, requests for information, and various announcements for training, conferences, and news articles. Table 7 breaks down the topics of unique posts from the channel of interest to this research.

Table 7. Subjects of Posts

Subject	Unique Posts
Training announcements	20
Requests for support	11

Subject	Unique Posts
Membership solicitation	11
Requests for POCs or site locations	6
Awards solicitation	3
Conference announcements	2
Requests for speakers	2
IT related news	1

Figure 4 COI USMC Communicators Team Usage shows the number of unique viewers over the last 30 days and the number of visits. With 700 members, this chart indicates that only 11% of the membership has used the team in the past month.



Figure 4. COI USMC Communicators Team Usage

B. DISCUSSIONS ANALYSIS

We completed a qualitative analysis of the discussion topic responses used for participant interactions. We selected these topics as prompts to engage the membership and measure the responses' speed and accuracy.

1. Discussion 1: Ongoing Q&A

An analysis of the questions and answers discussions posted in the 063X Networks channel, used for the questions and answers discussions, reveals an average response time of 42 hours. Table 8 is a breakdown of the post subject, the response time, the number of

responses, and whether a member answered the post to the poster’s satisfaction. Of the eight questions asked during the observation period, we confirmed that members resolved four topics posts. In addition, two posts had a solution provided but were unconfirmed if it solved the problem, while one went unanswered. Thus, the average response time is over 42 hours, skewed by a single request that went unanswered for seven days.

Table 8. 063X Networks Channel Q&A

Post Subject	Response time	# Responses	Resolution status
Looking for the MCCOG IT Tiers for Trouble Tickets*	n/a	2	Not answered
Looking for the MCCOG IT Tiers for Trouble Tickets*	2d	7	Solution provided
SMART account for Cisco licensing	19h	2	Not resolved
Fiber connectivity support	2h	4	Resolved
Request for training support	2h	3	Resolved
Request for documentation	3d21h	10	Suggestions provided, resolution unknown
Request for documentation	6h	1	Resolved
Request for information: for GVS?	1h	9	Solution provided
Request for information on LinkedIn Learning?	7d3h	5	Resolved

*Posted in two channels

2. Discussion 2: Innovation

We recorded two discussions on innovation during the observation period. These responses listed in Table 9 are often open-ended discussions and not driven by a timeline.

Table 9. Discussion 2: Innovation

Post Subject	1 st Response time	# Responses	Resolution status
Is anyone doing Starlink testing for USMC?	10m	9	Open discussion
Why are we not using “big data”?	1d20h	6	Open discussion

3. Discussion 3: Procurement

We recorded no discussion responses for procurement. In hindsight, this is an ineffective research prompt since most Marines Corps commands do not procure communications assets, as PoR items are fielded from the Program Office.

4. Discussion 4: Tips and Tricks

This discussion topic aimed to generate artifacts that could be stored on the team and used for future support requests. For example, one posting was a tip about password recovery techniques on multiple infrastructure equipment. Those documents are now stored in the shared directory for future reference. In addition, occasionally, members used these discussions to pass news-related information, as shown in Table 10.

Table 10. Discussion 4: Tips and Tricks

Post Title Subjects
Reminder: It’s Mobile Server Clean-up Weekend
Password recovery techniques
06XX Opportunity position announcement
DOD Implementation of IPv6

C. SURVEY RESULTS ANALYSIS

1. Survey Results

The survey responses were analyzed applying the SharePoint Forms’ survey export feature and IBM’s SPSS Statistics software. The SharePoint export includes the counts for each answer to a survey question. See Appendix C: Survey Results. Next, we used the

SPSS software to perform a factor analysis to group common variables and provide a reliability score on the scales. The survey, listed in Appendix B, was administered in three test groups: Officers and civilians, SNCOs, and junior enlisted Marines. We provided each test group a unique link to the same survey. The particular link allowed for the responses to be collected separately to compare results between the different groups. The survey used a Likert scale (strongly disagree through strongly agree) for responses, then converted the scale into numeric values (1 – 5) for analysis.

Table 11 summarizes the agreeable responses to the survey questions. The results of questions 1–4 express that the member base is comfortable using Microsoft Teams. While questions 5–10 inform that the member base is comfortable adopting the COI USMC Communicators team as a CoP but less likely to recommend it to others. The responses to Q6 are concerning if the only means of growing the membership is by word of mouth. Questions 11–15 about online learning have mixed results for an agreeable response. That said, when removing the neutral responses, the disagreeable responses only significantly impact question 13, where 26% disagree with the preference to take online learning over in-person learning.

Table 11. Agreeable Responses to the Survey

Question	Agreeable Response
Questions on Teams	
Q1. I found Microsoft Teams easy to use	91%
Q2. I would like to use this kind of communication and collaboration platform frequently	94%
Q3. I found the various functions of Microsoft Teams well integrated with the tools I already use.	79%
Q4. I feel confident using Microsoft Teams as a knowledge sharing tool	90%
Questions on a CoP	
Q5. I am likely to recommend the COI USMC Communicators Team to a friend	70%
Q6. I am comfortable with the idea of sharing knowledge in a forum for Communications Marines	94%
Q7. I am comfortable with the idea of receiving knowledge in a forum for Communications Marines	97%

Question	Agreeable Response
Q8. The COI USMC Communicators Team is/could be a good tool for staying informed on USMC communications	86%
Q9. The COI USMC Communicators Team is/could be a good tool for continuous learning	78%
Q10. The COI USMC Communicators Team is/could be a good tool for collaborating on problem-solving	90%
Questions about online learning	
Q11. The online nature of e-learning makes learning easier	58%
Q12. Online learning will help me learn at my own pace	79%
Q13. I would prefer online learning to additional training at a training command	47%
Q14. I would prefer the interaction with facilitators and other learners on Teams than to self-study on MarineNet or TWMS type site	67%
Q15. Having an instructor available by video chat will help me learn better	90%

2. Factor Analysis

Survey items were analyzed employing the SPSS software. The objective of the factor analysis is to identify items that load together around a shared construct. The 15 questions in the survey were rated using a five-point Likert scale. We expected the questions to fall into three categories, the useability of Teams, the likeability of a CoP, and the effectiveness of online learning.

a. Descriptive Statistics

We imported all 100 cases (n=100) into SPSS. Table 12 records the mean and standard deviations of the data imported, representing the variable's data values.

Table 12. Descriptive Statistics

Descriptive Variables	N Cases	Min	Max	Mean	Std Dev
	Statistic	Statistic	Statistic	Statistic	Statistic
I find Microsoft Teams easy to use.	100	1	5	4.35	0.796
I would like to use this kind of communication and collaboration platform frequently.	99	1	5	4.39	0.767
I find the various functions of Microsoft Teams well integrated with the tools I already use.	100	1	5	3.98	0.738
I feel confident using Microsoft Teams as a knowledge-sharing tool.	99	2	5	4.32	0.726
I am likely to recommend the COI USMC Communicators Team to a friend.	99	2	5	3.88	0.773
I am comfortable with the idea of sharing knowledge in a forum for Communications Marines.	100	2	5	4.33	0.682
I am comfortable with the idea of receiving knowledge in a forum for Communications Marines.	99	3	5	4.45	0.558
The COI USMC Communicators Team is/could be a good tool for staying informed on USMC communications.	100	2	5	4.21	0.729
The COI USMC Communicators Team is/could be good tool for continuous learning.	100	1	5	4.02	0.841
The COI USMC Communicators Team is/could be a good tool for collaborating on problem-solving.	99	2	5	4.28	0.671
The online nature of e-learning makes learning easier.	100	1	5	3.66	1.027
Online learning will help me learn at my own pace.	100	2	5	4.11	0.751
I would prefer online learning to additional in-person training at a training command.	100	1	5	3.43	1.233
I would prefer to interact with facilitators and other learners on Teams than self-study on the MarineNet or TWMS type site.	100	1	5	3.84	1.070

Descriptive Variables	N Cases	Min	Max	Mean	Std Dev
	Statistic	Statistic	Statistic	Statistic	Statistic
Having an instructor available by video chat will help me learn better.	100	1	5	4.17	0.726
Valid N (listwise)	95				

b. Frequencies

The next step was to run the frequencies of data values for each variable. These statistics show case count (n=100), question response values (1-5), the count for each value, and the number of missing data. The SPSS output was consistent with the SharePoint statistics seen in Appendix C: Survey Results.

c. Factor Analysis

We used factor analysis to reduce the number of discrete items of the data analysis. Factor analysis is a process of correlating variables (questions) then looks at the patterns in the relationship of those variables. Table 13 shows the correlations matrix for this analysis. It reveals the correlation between questions in the survey. Brook (n.d.) looks for patterns in the table to search for underlying latent variables in the correlations. These latent variables underlie the scales used for condensing the variables.

The configuration in SPSS is under the Dimension Reductions feature. We configured the grouping method as rotation set to VARIMAX (maximizing the sharpest variables' separation).

Table 13. Correlation Matrix

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Q1		0.33	0.22	0.45	0.25	0.06	0.21	0.24	0.34	0.34	0.04	0.19	0.09	0.27	0.28
Q2	0.33		0.51	0.51	0.29	0.48	0.41	0.37	0.47	0.45	0.33	0.24	0.10	0.39	0.35
Q3	0.22	0.51		0.48	0.33	0.27	0.26	0.20	0.31	0.34	0.19	0.11	0.00	0.15	0.25
Q4	0.45	0.51	0.48		0.31	0.27	0.30	0.31	0.34	0.46	0.27	0.18	0.02	0.35	0.47
Q5	0.25	0.29	0.33	0.31		0.42	0.38	0.37	0.43	0.35	0.29	0.14	0.11	0.16	0.17
Q6	0.06	0.48	0.27	0.27	0.42		0.64	0.51	0.45	0.37	0.26	0.24	0.19	0.27	0.21
Q7	0.21	0.41	0.26	0.30	0.38	0.64		0.42	0.43	0.47	0.08	0.22	0.18	0.27	0.30
Q8	0.24	0.37	0.20	0.31	0.37	0.51	0.42		0.69	0.50	0.15	0.20	0.16	0.37	0.22
Q9	0.34	0.47	0.31	0.34	0.43	0.45	0.43	0.69		0.55	0.14	0.14	0.12	0.48	0.19
Q10	0.34	0.45	0.34	0.46	0.35	0.37	0.47	0.50	0.55		0.14	0.06	0.18	0.42	0.36
Q11	0.04	0.33	0.19	0.27	0.29	0.26	0.08	0.15	0.14	0.14		0.60	0.37	0.19	0.15
Q12	0.19	0.24	0.11	0.18	0.14	0.24	0.22	0.20	0.14	0.06	0.60		0.49	0.17	0.10
Q13	0.09	0.10	0.00	0.02	0.11	0.19	0.18	0.16	0.12	0.18	0.37	0.49		0.13	0.10
Q14	0.27	0.39	0.15	0.35	0.16	0.27	0.27	0.37	0.48	0.42	0.19	0.17	0.13		0.48
Q15	0.28	0.35	0.25	0.47	0.17	0.21	0.30	0.22	0.19	0.36	0.15	0.10	0.10	0.48	

This process aims to identify relationships in the questions, which reflect the latent factors in the component matrix in Table 14.

d. Principal Component Analysis (PCA)

The next step performed was the PCA to extract communalities within the variables. Ngo (2018) describes the PCA process as bringing out the patterns from complex datasets. In our research, we examine a 100x15 table (100 cases x 15 variables) of data. Then, PCA reduces the data to a smaller number of principal components, which will capture the most variation and define communality in the variables.

e. Scree Plot

We use the scree plot (Figure 5) to discover the correct number of principal components for the extraction process. The SPSS application plots the initial components with eigenvalues. The components on the steepest parts of the slope or with an eigenvalue threshold > 1 are used for extraction. Table 14 lists the first four components creating the most variability from the initial variables.

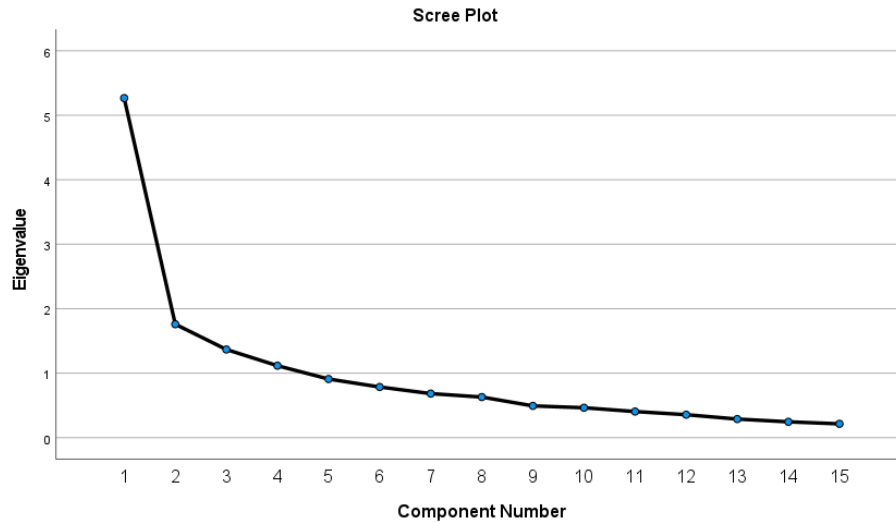


Figure 5. Scree Plot

f. Component Matrix

The rotated component matrix (Table 14) identified four components, or latent factors, which the variables correlate best. The rotation process provides a score of the variables most associated with each component. It was then our task to postulate what the hidden factors were for each component.

Table 14 advises us that variables Q5-Q10 make up factor1. Factor1 is an agreeable grouping of the questions regarding the likeability of CoPs. Variables Q1, Q4, Q14, and Q15 make up Factor2. Factor3 includes variables Q11-Q13 and is another nice grouping of variables that make up the questions regarding the effectiveness of online learning. Finally, factor4 correlates variables Q2-Q3 which is only a portion of the questions regarding Microsoft Teams. Variables Q4, Q5, and Q10 did not fit into any one component. Following the factor analysis, we analyzed the reliability of the four PC factors to decide if they formed an acceptable scale.

Factor1 = Likeability of a CoP

Factor2 = May relate to ease of use and having access to an instructor

Factor3 = Effectiveness of online learning

Factor4 = Usefulness of MS Teams

Table 14. Rotated Component Matrix

	Component			
	1	2	3	4
Q1. I find Microsoft Teams easy to use.		0.625		
Q2. I would like to use this kind of communication and collaboration platform frequently.				0.538
Q3. I find the various functions of Microsoft Teams well integrated with the tools I already use.				0.805
Q4. I feel confident using Microsoft Teams as a knowledge-sharing tool.		0.591		0.580
Q5. I am likely to recommend the COI USMC Communicators Team to a friend.	0.542			0.439
Q6. I am comfortable with the idea of sharing knowledge in a forum for Communications Marines.	0.767			
Q7. I am comfortable with the idea of receiving knowledge in a forum for Communications Marines.	0.719			
Q8. The COI USMC Communicators Team is/could be a good tool for staying informed on USMC communications.	0.773			
Q9. The COI USMC Communicators Team is/could be a good tool for continuous learning.	0.746			
Q10. The COI USMC Communicators Team is/could be a good tool for collaborating on problem-solving.	0.563	0.498		
Q11. The online nature of e-learning makes learning easier.			0.786	
Q12. Online learning will help me learn at my own pace.			0.857	
Q13. I would prefer online learning to additional in-person training at a training command.			0.742	
Q14. I would prefer to interact with facilitators and other learners on Teams than self-study on the MarineNet or TWMS type site.		0.718		
Q15. Having an instructor available by video chat will help me learn better.		0.718		

Rotation converged in 6 iterations.

g. Reliability Analysis

The last process in the factor analysis is checking the reliability of the four principal components scales. The statistic of interest is Cronbach's alpha, which follows a standard algorithm when working with multiple Likert scale questions from a survey. We performed

a reliability analysis for all four components listed in Table 14. The reliability statistics (Table 15) list the four scales, the Cronbach's alpha reliability score, and the number of variables in the scale. All four scales demonstrated acceptable levels of reliability, although scale 4 reliability was somewhat low ($\alpha = .676$).

Table 15. Reliability Statistics

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Scale 1	0.837	0.841	6
Scale 2	0.696	0.714	4
Scale 3	0.705	0.741	3
Scale 4	0.675	0.676	2

The reliability analysis in Tables 16 – 19 help compare the reliabilities in Table 15, which includes all variables for the scale, with scenarios for removing one or more variables from the scale. For example, in Table 16, if we removed Q5 from the component, the Cronbach's alpha would drop from 0.837 for all the variables (Table 15) to 0.833, a lower reliability score. Therefore, we do not want to drop any variables from scale 1.

Table 16. Item-Total Statistics for Scale 1

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q5. I am likely to recommend the COI USMC Communicators Team to a friend.	21.35	7.418	0.507	0.833
Q6. I am comfortable with the idea of sharing knowledge in a forum for Communications Marines.	20.90	7.364	0.619	0.809
Q7. I am comfortable with the idea of receiving knowledge in a forum for Communications Marines.	20.77	7.927	0.609	0.815

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q8. The COI USMC Communicators Team is/could be a good tool for staying informed on USMC communications.	21.03	6.926	0.697	0.793
Q9. The COI USMC Communicators Team is/could be a good tool for continuous learning.	21.21	6.478	0.688	0.795
Q10. The COI USMC Communicators Team is/could be a good tool for collaborating on problem-solving.	20.93	7.609	0.592	0.815

Scale 2 also looks appropriate as the score for all variables is 0.696 (Table 17), and dropping any of the four variables would only lower the reliability score.

Table 17. Item-Total Statistics for Scale 2

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1. I find Microsoft Teams easy to use.	12.33	4.020	0.410	0.673
Q4. I feel confident using Microsoft Teams as a knowledge-sharing tool.	12.36	3.866	0.553	0.597
Q14. I would prefer to interact with facilitators and other learners on Teams than self-study on the MarineNet or TWMS type site.	12.85	3.048	0.470	0.665
Q15 Having an instructor available by video chat will help me learn better.	12.52	3.865	0.550	0.598

Scale 3 (Table 18) is a scale of interest as the reliability score for all variables is 0.705; however, if we drop Q13, the score rises to 0.727. Therefore, we removed Q13 from the scale and reported it separately. Scale 4 represents only two variables; therefore, we do not track a result if a variable were removed, as this would leave an individual question.

Table 18. Item-Total Statistics for Scale 3

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q11. The online nature of e-learning makes learning easier.	7.54	2.998	0.525	0.610
Q12. Online learning will help me learn at my own pace.	7.09	3.517	0.653	0.536
Q13. I would prefer online learning to additional in-person training at a training command.	7.77	2.543	0.472	0.727

h. Results: Participant Satisfaction with Four Aspects of the CoP

The goal of the factor analysis was data reduction. As learned from the analysis, we could take 15 questions from a survey and narrow them down to four scales. The scales allowed us to report the scale score as the average score of the individual variables (questions) that make up the scale. We defined the scales and provided scores below.

We administered the survey to three test groups: Officer and civilians, SNCOs, and enlisted Marines. We calculated a mean score for every question for each test group. An aggregate mean was then calculated to conclude if any test group responses varied from the others. There are four record variances between the three test groups of greater than 0.25. The Officers and Civilians test group had no variances from the aggregate mean. We evaluated a t-test on questions that showed variance between groups to measure if the variance had statistical significance.

(1) Scale 1: The likeability of Adopting a CoP

Most participants reported that they liked the Community of Practice, with 85.83% above a 4 (\bar{X} =4.21 on a 5-point scale). Although we expected that the junior enlisted group (n=25) might be less favorable toward the use of a CoP than the other groups, the difference in means (Junior Enlisted \bar{X} =4.09, Others \bar{X} =4.23) was not significant (t=1.15, p=0.25, see Table 19).

Table 19. Comparison of Junior Enlisted versus Others' Responses on the Likeability of Adopting a CoP

T-TEST									
std err	t-stat	df	p-value	t-crit	lower	upper	sig	Cohen d	effect r
0.12	1.15	98.00	0.25	1.98	-0.10	0.38	no	0.26	0.11

(2) Scale 2: Confidence with Using Teams for Learning

Most participants reported that they feel comfortable using Teams and value the presence of a facilitator, with 84.5% above a 4 (\bar{X} =4.17 on a 5-point scale). While we did not expect as variance among the groups, the officer group (n=57) responded slightly lower than the other groups, however the difference in means (Officers \bar{X} =4.16, Others \bar{X} =4.18) was not significant (t=0.18, p=0.86, see Table 20).

Table 20. Comparison of Officers versus Others' Responses on the Confidence of Using Teams for Learning

T-TEST									
std err	t-stat	df	p-value	t-crit	lower	upper	sig	Cohen d	effect r
0.12	0.18	98.00	0.86	1.98	-0.22	0.27	no	0.04	0.02

(3) Scale 3: Online learning

Fewer participants reported that they feel confident with online learning, with 68.5% above a 4 (\bar{X} =3.89 on a 5-point scale). Although we expected that the SNCO group (n=18) might be less favorable toward online learning than the other groups, the difference in means (SNCOs \bar{X} =3.83, Others \bar{X} =3.90) was not significant (t=0.30, p=0.76, see Table 21).

Table 21. Comparison of SNCOs versus Others' Responses on Online Learning

T-TEST									
std err	t-stat	df	p-value	t-crit	lower	upper	sig	Cohen d	effect r
0.21	0.30	98.00	0.76	1.98	-0.35	0.48	no	0.08	0.03

(4) Scale 4 Teams Is a Good Communication and Collaboration Tool

Most participants reported that they believe Teams is a good communications and collaboration tool, with 86.5% above a 4 (\bar{X} =4.19 on a 5-point scale). We expected that the junior enlisted group (n=25) might be less favorable toward using Teams frequently than the other groups, and the difference in means (Junior Enlisted \bar{X} =3.94, Others \bar{X} =4.27) was significant (t=2.25, p=0.03, see Table 22).

Table 22. Comparison of Junior Enlisted versus Others' Responses on the Believe Teams Is a Good Tool

T-TEST									
std err	t-stat	df	p-value	t-crit	lower	upper	sig	Cohen d	effect r
0.15	2.25	98.00	0.03	1.98	0.04	0.63	yes	0.52	0.22

(5) Online Learning Versus Additional Training at A Training Command

Only 47% of participants responded with a value of 4 (\bar{X} =3.43 on a 5-point scale), indicating that they prefer DL to learning at a training command. As shown in Table 23, SNCOs (n=18) reported a lower preference with online learning to additional in-person training at a training command (\bar{X} =2.94), than the other groups (\bar{X} =3.54, t=1.87, p=0.06). Given the p-value of .06, this difference is marginally significant.

Table 23. Comparison of SNCOs versus Others' Responses on Online Learning versus Additional Training at A Training Command

T-TEST									
std err	t-stat	df	p-value	t-crit	lower	upper	sig	Cohen d	effect r
0.32	1.87	98.00	0.06	1.98	-0.04	1.22	no	0.49	0.19

D. FINDINGS SUMMARY

In this chapter, we discussed the analysis process used for our research. First, we analyzed the current environment of the COI USMC Communicators team. We evaluated the membership base to show the depth of the ranks participating in the group, including every grade up to Lt. Colonel. We also assessed the reach of the locations of members across the globe. We evaluated the environment with the channels and file contents to show the career fields and documentation types covered by separate channels. Next, we conducted qualitative analysis on the discussions observed to gauge the speed and accuracy of the responses. Then we performed quantitative analysis on the survey results. Next, we performed a factor analysis on the correlation of the questions. Through a component matrix, we identified four scales to consolidate data. Then we performed a reliability analysis on the scales, followed by a t-test to determine if there existed a significant difference between the means of the three test groups.

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V. CONCLUSIONS AND RECOMMENDATIONS

Our research objective was to understand how communications Marines would use a learning management system and whether an LMS would be an easy tool Marines will use to support each other with communications issues. We also wanted to determine if an LMS could support continuous learning. We used a Microsoft Teams group known as COI USMC Communicators as a case study to introduce the concept of a CoP. Then we observed the discussion responses and administered a survey to analyze the use of the team for learning and problem-solving. Our research started with the idea of bringing communications Marines together to share knowledge and experience in the 063X networking MOS. Throughout our study, the team under observation grew from 150 members to over 700. To that end, we successfully created for the Marine Corps a new tool that serves as a CoP for communications Marines to collaborate and communicate with a community of peers to solve problems. While the adoption rate has not reached full potential, we have observed the CoP being used to support Marines with problem-solving and sharing knowledge. Our research was limited to the 063X network Marines. However, we observed that the CoP has grown to include all of the MOSs of the 06-occupation field, the 17XX Cyberspace Operations, and the 28XX Data/Communications Maintenance MOSs. The conclusion of the research has left the CoP intact for continued use. This CoP can be used today for broadcasting technology changes and storing training material for implementing the technology. The CoP covers a full range of Marines from PFC to LtCol, from neophyte to at least one known Ph.D., spread across 49 bases in seven countries.

A. HOW WILL COMMUNICATIONS MARINES USE A LEARNING MANAGEMENT SYSTEM?

The participant's preference for using Teams for DL had the lowest approval rating on the survey, with 68.5% above a 4 ($\bar{X}=3.89$ on a 5-point scale). Only 47% above a 4 ($\bar{X}=3.43$ on a 5-point scale) of those surveyed ($n=100$) would prefer DL to in-person training. The DL culture is a change that many Marines may not have experienced before the COVID-19 pandemic. The culture may shift in the coming years as many are

experiencing DL for the first time. A future study should focus on delivering instructor-led material with an assessment to measure the effectiveness of DL.

The survey results tell that participants (n=100) believe Microsoft Teams is a helpful tool for sharing with and receiving knowledge from the community. We have observed Marines using the posting application for exchanging information and requesting support for problem-solving. We have observed Marines using the posting application to exchange information and request support for problem-solving, but the usage level was low. We noted that only 78 of the 700 members (11%) logged on to Teams during the last 30 days of the research, while 85% (n=100) responded that they are confident using a COP and 87% (n=100) think Teams is a good tool for communication and collaboration. We think it plausible to attribute the low utilization to the lack of available resources on the team workspace. We heard as much from a member that responded to the email request to participate in the survey. The Marine stated that he did not respond to the Team posting because he does not often log into the system due to the lack of resources.

What our system under design lacked in member participation also manifested deficiencies in the quality of content. The analysis of the discussion prompts during the four weeks of observation can be summarized as:

- Only 44.44% of requests for support could be confirmed as resolved
- The average participation was 4.66 comments per request for support
- The discussion for “tips and trips” only yielded one stored artifact during the observation period

While the team has several administrative owners, no party has taken the lead to manage the discussion topics, provide training material, or make sure posts receive responses. These are the necessary duties required for an LMS and CoP to be successful. With the Marine Corps being a substantial rank-driven organization, a CoP calls for support by senior leaders (Benians and Terry 2020). Buchal and Songsore (2019) note that students favor using collaborative tools (chat and postings) without intervention. However, the evidence shows that the same students do not engage in rich collective behaviors naturally.

Buchal and Songsore add that many “researchers agree that intentional training and support from a facilitator is needed for a rich and successful collaboration among learners” (2019, p. 1). Garavan, Carbery, and Murphy (2007) investigate the CoP manager’s role in the CoP and conclude that when CoPs began forming in organizations, the CoPs were informal with no organizational oversight. Still, as the CoPs evolved, there came the increased awareness that they required organizational management.

B. WILL AN LMS BE AN EASY TOOL MARINES WILL USE?

When surveyed regarding the use of Teams, 84.5% of participants responded that they have confidence using Teams. When the Marine Corps implemented Microsoft O365 (including Teams), the program office provided a series of training classes presented on Teams with instruction on using the features. Learning how to use Teams and navigating the features has not shown cause for concerns.

C. FUTURE RESEARCH

Lansmann (2019) identifies objectives for measuring the appropriation of the Teams technology to the knowledge workers. Lansmann planned to measure the adoption rate by tracking the time spent using the platform (recall our analysis identified only 11% of the COI USMC Communicators membership logged in during the last 30 days). However, Lansmann knew that time spent fails to measure how the platform is used in daily activities (Lansmann, Schallenmüller and Rigby 2019). The short-term findings of our research on the usage of the COI USMC Communicators team have shown the members use the platform for more of an informational type of communication and less as a CoP tool for supplying problem-solving solutions to real networking issues. The continuation for the Lansmann research team is to monitor the long-term appropriation of how the knowledge worker integrates Teams in their daily work (Lansmann, Schallenmüller and Rigby 2019).

A future study with a focus on training is necessary to determine how Teams can support online learning. For the Marine Corps to reap the benefits of adopting communication and collaboration tools, TECOM must champion the team with content for supplemental training. Based on our findings, we recommend establishing the CoP Team

managed by TECOM to include training documents, videos, and how-to instructions. In addition, training artifacts from TECOM could ensure the material is accurate and covers the KSAs to meet the user requirements for fielded communications solutions.

1. COP Facilitators

For Marines, especially junior enlisted Marines, there may exist a fear of asking for assistance for fear of retribution or public shaming and embarrassment by higher-ranking Marines. Ridicule is observed on public social media platforms like Facebook and Twitter. Groups intended for Marine communicators often vilify people for asking questions or providing a wide range of responses that may or may not be grounded in accurate knowledge. Therefore, using Teams as a CoP platform would necessitate facilitators from a training Command or a competency manager, who are already skilled in knowledge distribution and edifying the learner in a safe zone conducive to learning. The Garavan, Carbery, and Murphy study supports management facilitation on intentionally created CoPs. That study included findings on strategies used by a CoP manager as an oversight to the CoP. CoP managers “enabled the CoP to achieve shared meaning, share knowledge, develop learning space, challenge, support members, provide motivational inputs and foster creativity” (Garavan 2007, 46).

2. COI to COP

What is in a name? Shakespeare would have us believe that as long as it is a community, it is serving the purpose of sharing knowledge. However, the two terms serve different purposes. A CoI can be people who share an interest in a Harry Potter book club, come together to share knowledge on the stories and characters, or leak secrets of the next book. However, there is no commitment to create nor deliver anything.

In contrast, a CoP shares experiences and is committed to developing knowledge and skills in that profession. The members are driven to work and learn to solve problems together (JFA Purple Orange 2018). With this understanding, our recommendation is for the team administrators to formalize a CoP on Teams.

3. Expedite Problem-Solving Posts

The channel assignments listed in Figure 2 call for a charter statement posted in the top menu bar for each channel, describing the channel's purpose. Currently, each MOS has a designated channel, and also there are shared channels related to topics. For example, only two of the eight problem-solving discussions in the questions and answers channel solved an issue, while the others were requests for information. To improve the response times of problem-solving efforts, members should only post problem related discussions in the respective MOS channels. A second recommendation to expedite support for problem-solving is to email the channel members a link to the post. Emailing the membership may have a broader range than the Teams posting application, evident by the statistic that only 11% of the COI USMC Communicators team logged into teams last month. When soliciting participation for our survey through a post in the General channel, we only received five responses in 4 days from the 700 members of the Team. When the strategy shifted to emailing the request to the membership, we received 100 responses in a matter of days.

4. Incentivize Participation

Suppose the Marine Corps sees the benefits of Marines using the CoP for training. In that case, TECOM can incentivize participation in the CoP with certification vouchers and tuition assistance, prioritizing individuals showing interest in self-improvement and better Marine Corps communications by actively participating in a CoP.

5. Growing the Membership

To date, the Team membership has been all voluntary and has grown from word-of-mouth communications from the membership. Several informal pitches have been proposed to personnel from the training commands to add students that pass through the formal training courses to the membership. However, suppose a CoP is seen as a value proposition and membership continues growing. In that case, we recommend that a formal process be implemented at the training commands to enroll the student base into the CoP. Adding students to the team members would serve multiple purposes:

- Introduce the CoP to new communications Marines
- Maintain functional teams while in dispersed locations
- Encourage participation in knowledge sharing
- Build camaraderie
- Provide an outlet for innovation
- Add more junior enlisted to the team, as they could reap the most benefit.

6. Repeat on the Secret Network

Applying Teams in secret enclaves, already approved to classified activities, can help remove the remoteness of work completed in those controlled areas. The Joint Integrated SATCOM Tool (JIST) is a case in point, only accessible on the secret internet protocol router network (SIPRNet). There is no formal training for this tool used for requesting satellite access time. Marines unfamiliar with the system learn by trial and error, which comes at the price of resubmissions and delayed start times. The system administrators require a significant lead time with an approved submission. Employing Teams to video chat or message the administration team can lead to requests completed on the first try.

APPENDIX A. PARTICIPANT INTERACTION SCRIPTS

The following are the IRB-approved interaction topics for this research. The scripts were posts on new time-constrained channels set up for the specific purpose of the subject discussion.

A. INTERACTION #1 SCRIPT: ONGOING Q&A

Intervention #1 Ongoing Q&A: “I’m a student at NPS researching using Teams for continuous learning. I would like to ask you to participate in your respective MOS channels on items that matter to you most. Participation is completely voluntary, and you may leave any time. The purpose of observing the discussion is to see if interactions among peers on Teams can help solve problems. I will be observing these discussions for approximately four weeks. I will send a follow-up post in the middle of that period to ask for additional participation or comments. Please let me know if you are willing to participate and support my study.

B. INTERACTION #2 SCRIPT: INNOVATION

Intervention #2 Innovation: “I’m a student at NPS researching using Teams for continuous learning. I would like to ask you to participate in a discussion on “subject X.” Participation is completely voluntary, and you may leave any time. The purpose of observing the discussion is to see if interactions among peers on Teams can lead to ideas for program changes on new technologies. This discussion will be in the new channel titled “subject x” for approximately four weeks. I will send a follow-up post in the middle of that period to ask for additional participation or comments. Please let me know if you are willing to participate and support my study.

C. INTERACTION #3 SCRIPT: PROCUREMENT

“I’m a student at NPS researching using Teams for continuous learning. I would like to ask you to participate in discussions on procurement in the USMC. Participation is completely voluntary, and you may leave any time. The purpose of observing the discussion is to see if interactions among peers can help navigate the challenges of

procurement of IT solutions. This discussion will be in the new channel titled “Procurement” for approximately four weeks. I will send a follow-up post in the middle of that period to ask for additional participation or comments. Please let me know if you are willing to participate and support my study.

D. INTERACTION #4 TIPS AND TRICKS

“I’m a student at NPS researching using Teams for continuous learning. I would like to ask you to participate in discussions on tips and tricks you use in the installation and maintenance of communications networks. Participation is completely voluntary, and you may leave any time. The purpose of observing the discussion is to capture interactions among peers on Teams that can help solve problems with the installation and maintenance of communications networks. This discussion will be in the new channel titled “Tips and Tricks” for approximately four weeks. I will send a follow-up post in the middle of that period to ask for additional participation or comments. The tips and tricks will be

E. INTERACTION #5 SURVEY

“I’m a student at NPS researching using Teams for continuous learning. I would like to ask you to participate in a 1–5-minute survey on MS Teams and a community of practice. Participation is completely voluntary. The purpose of the survey is to see if communications Marines can use Teams to build a community of practice for problem-solving and continuous learning. Each submission is anonymous. If you are willing to participate, please click on the following link.

APPENDIX B. PARTICIPANT SURVEY

A note on privacy

This survey is anonymous.

The record of your survey responses does not contain any identifying information about you.

1. I found Microsoft Teams easy to use.
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree

2. I would like to use this kind of communication and collaboration platform frequently.
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree

3. I found the various functions of Microsoft Teams well integrated with the tools I already use.
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree

4. I feel confident using Microsoft Teams as a knowledge-sharing tool.
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree

5. I am likely to recommend the COI USMC Communicators Team to a friend.
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree

6. I am comfortable with the idea of sharing knowledge in a forum for Communications Marines.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

7. I am comfortable with the idea of receiving knowledge in a forum for Communications Marines.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

8. The COI USMC Communicators Team is a good tool for staying informed on USMC communications.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

9. The COI USMC Communicators Team could be a good tool for continuous learning.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. The COI USMC Communicators Team is a good tool for collaborating on problem-solving.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

11. The online nature of e-learning makes learning easier.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

12. Online learning will help me learn at my own pace.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

13. I would prefer online learning to additional training at MCCES or CTC.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

14. I would prefer the interaction with facilitators and other learners on Teams than self-study on MarineNet.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

15. Having an instructor available by video chat will help me learn better.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

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APPENDIX C. SURVEY RESULTS

The following is the SharePoint response analysis of each question on the survey. We used the aggregate responses to the questions to form a basis of understanding of the useability of Microsoft Teams, the likeability of a CoP, and the effectiveness of online learning.

The histograms are a visual graph of the distribution of the frequencies of responses. Normal distributions are the desired outcomes and express a balance in the answers and point to the right questions. The histograms also report the mean and standard deviations of the response distributions. The question/histogram pairs have a coefficient of variations (CV), the standard deviation divided by the mean. The desired value is $CV < 1$, meaning there is a slight variation in the responses.

A. ABOUT THE TOOL (TEAMS)

We formed questions 1–5 to gauge if the Marines like using Team for a communications tool.

Q1. I find Microsoft Teams easy to use.

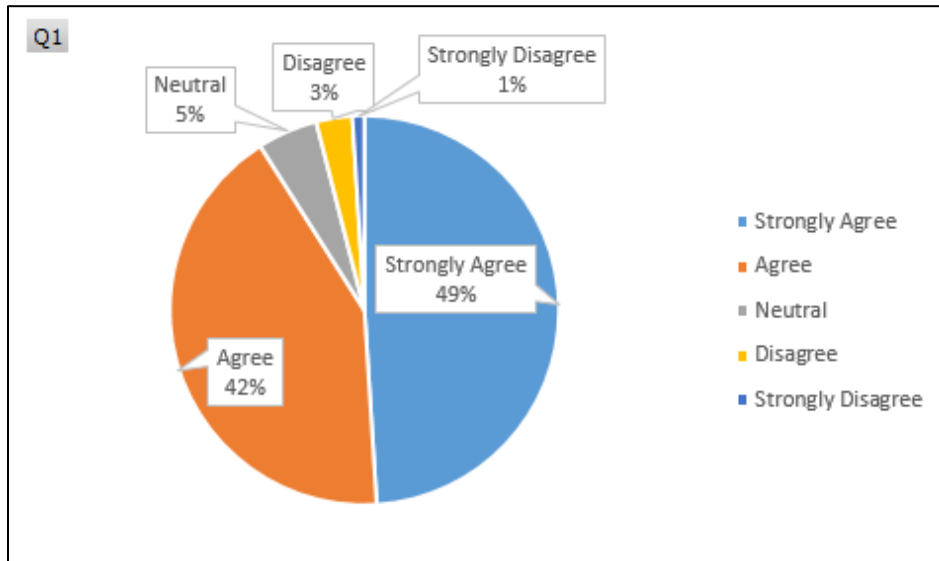


Figure 6. Q1 Responses

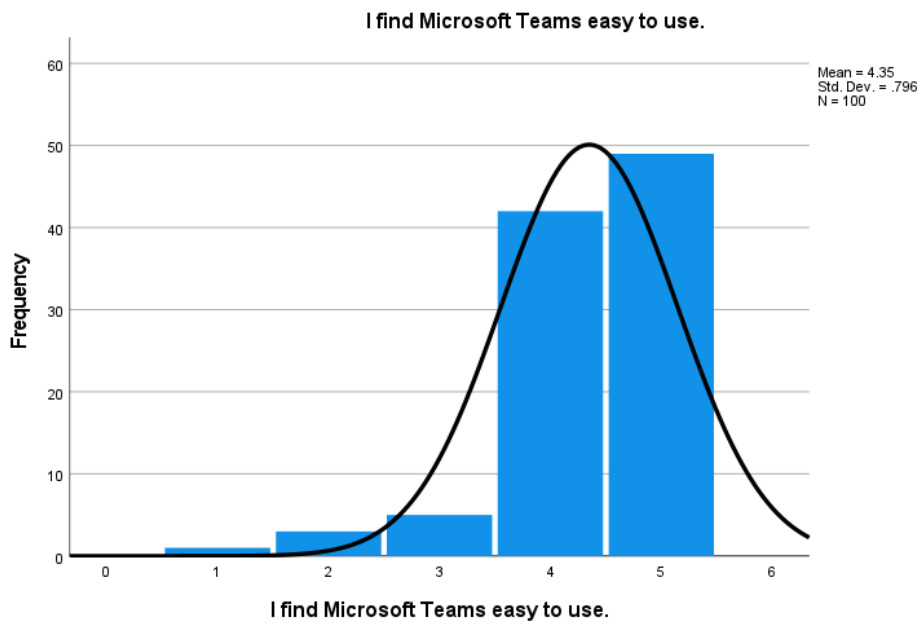


Figure 7. Q1 Histogram

Q2. I would like to use this kind of communication and collaboration platform frequently.

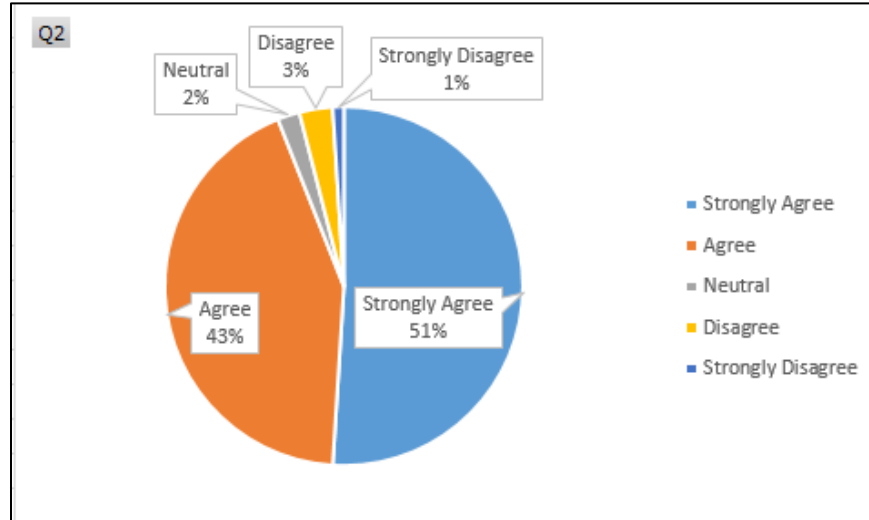


Figure 8. Q2 Responses

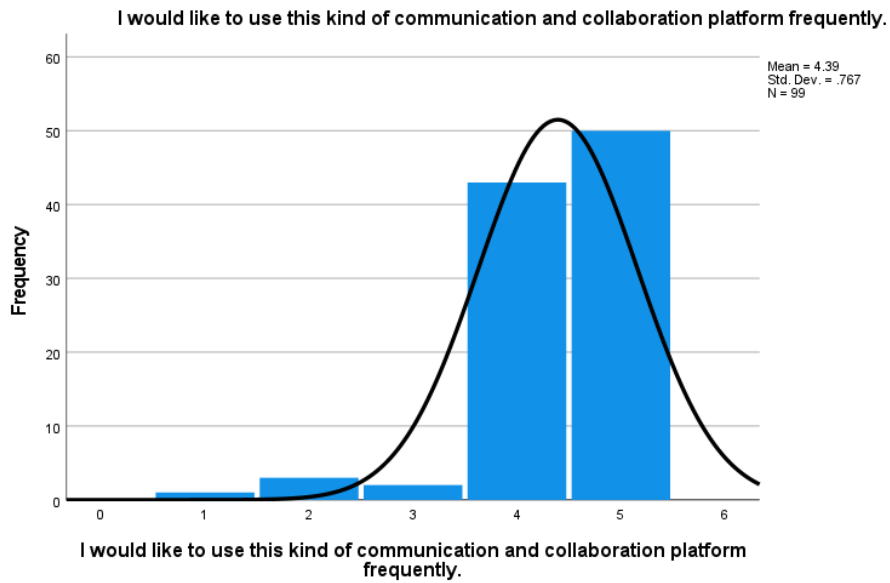


Figure 9. Q2 Histogram

Q3. I find the various functions of Microsoft Teams well integrated with the tools I already use.

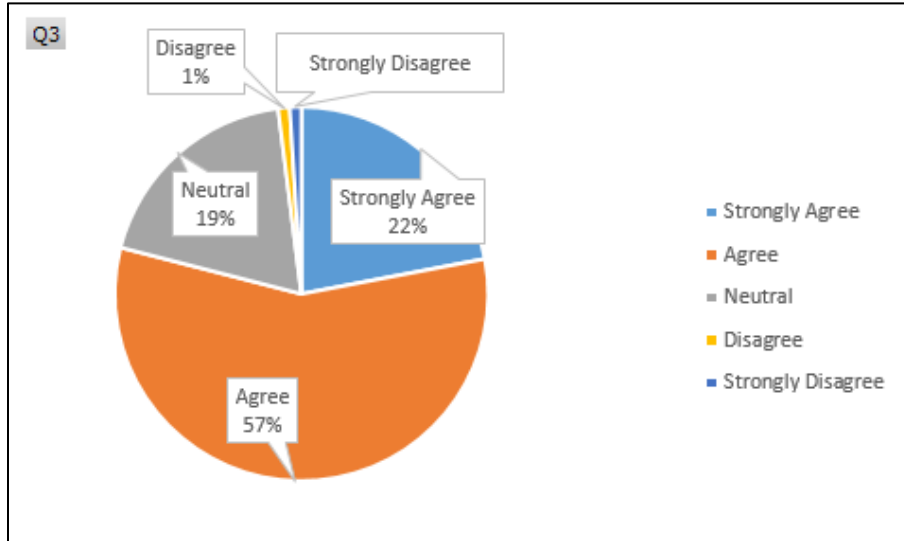


Figure 10. Q3 Responses

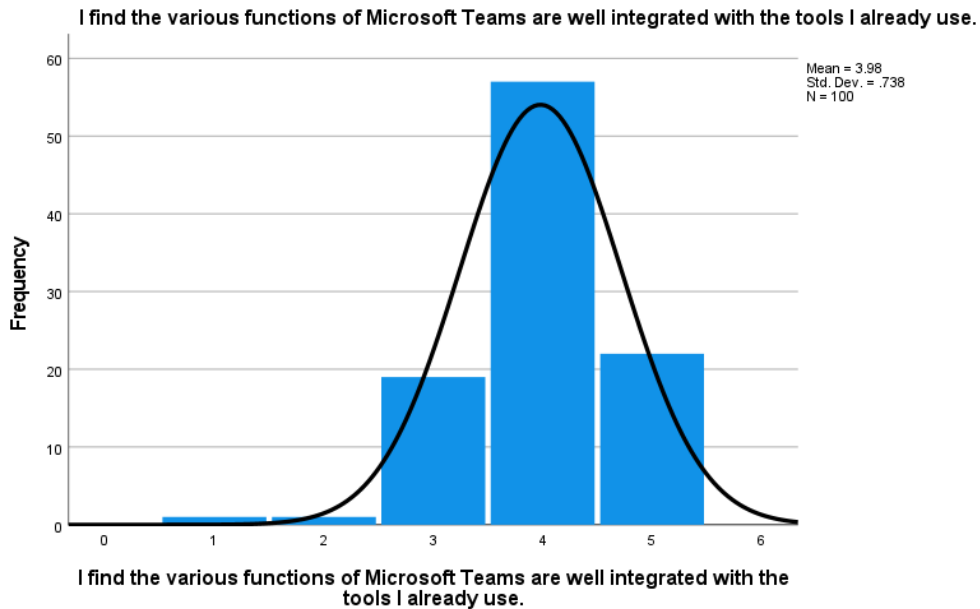


Figure 11. Q3 Histogram

Q4. I feel confident using Microsoft Teams as a knowledge-sharing tool.

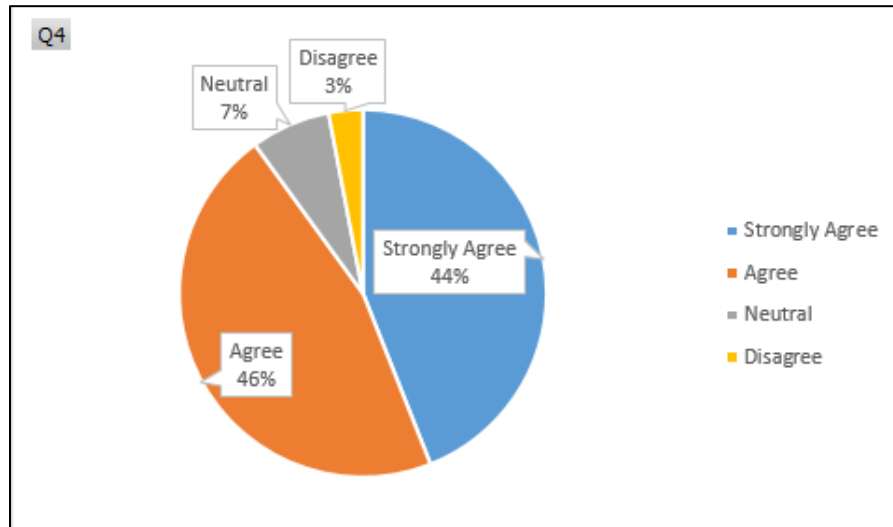


Figure 12. Q4 Responses

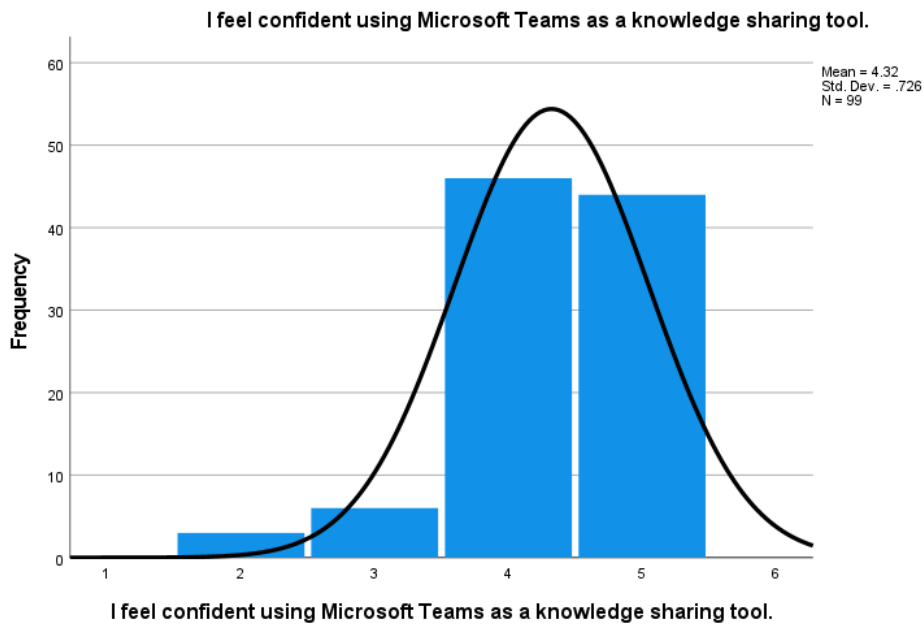


Figure 13. Q4 Histogram

Q5. I am likely to recommend the COI USMC Communicators Team to a friend.

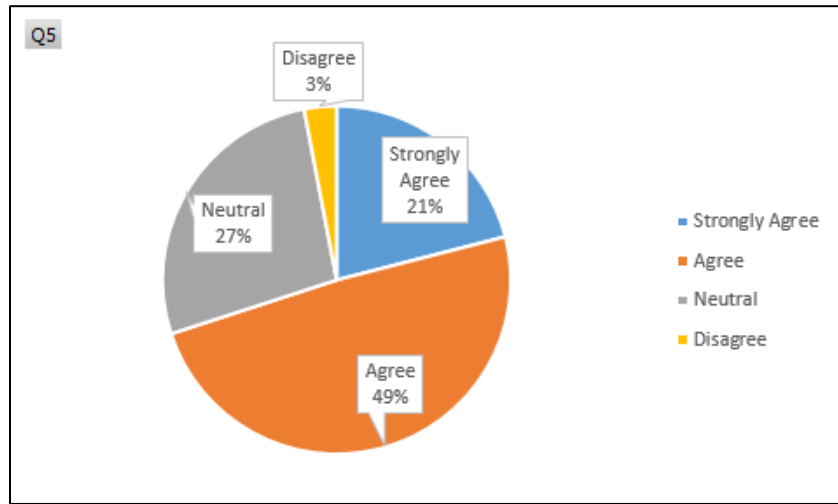


Figure 14. Q5 Responses

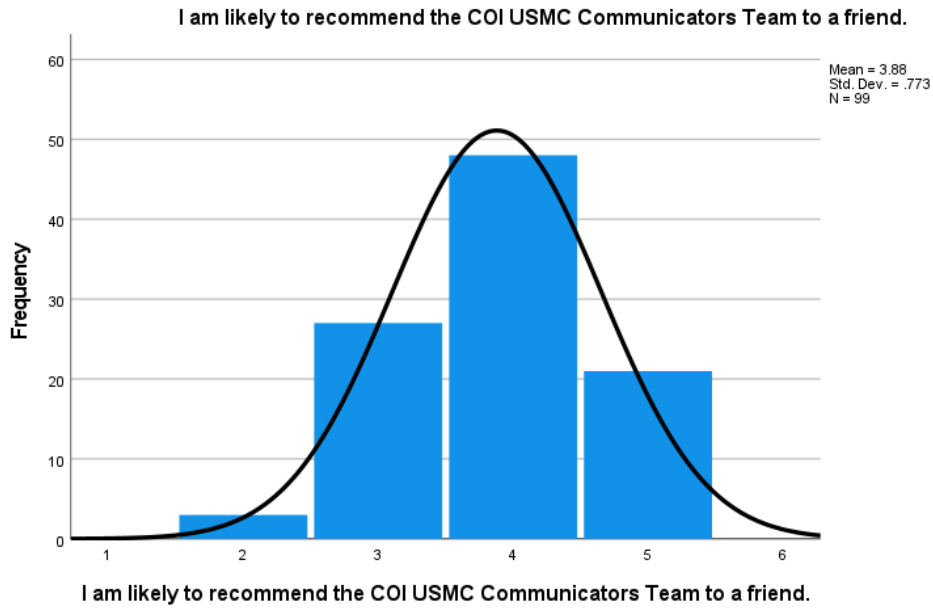


Figure 15. Q5 Histogram

B. ABOUT THE COMMUNITY OF PRACTICE

Q6. I am comfortable with the idea of sharing knowledge in a forum for Communications Marines.

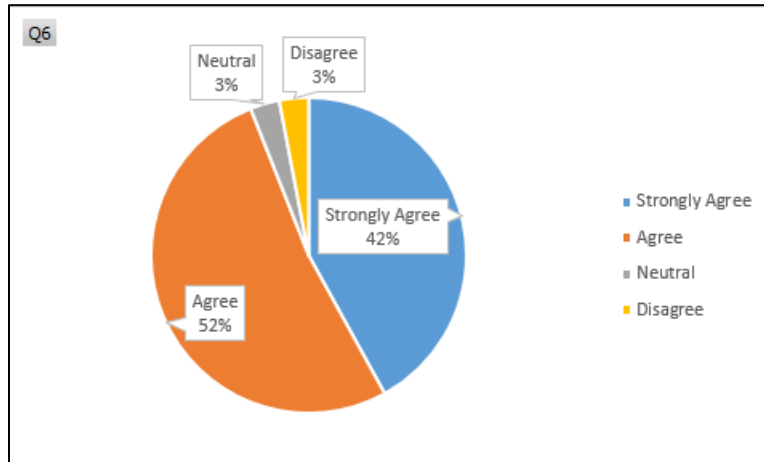


Figure 16. Q6 Responses

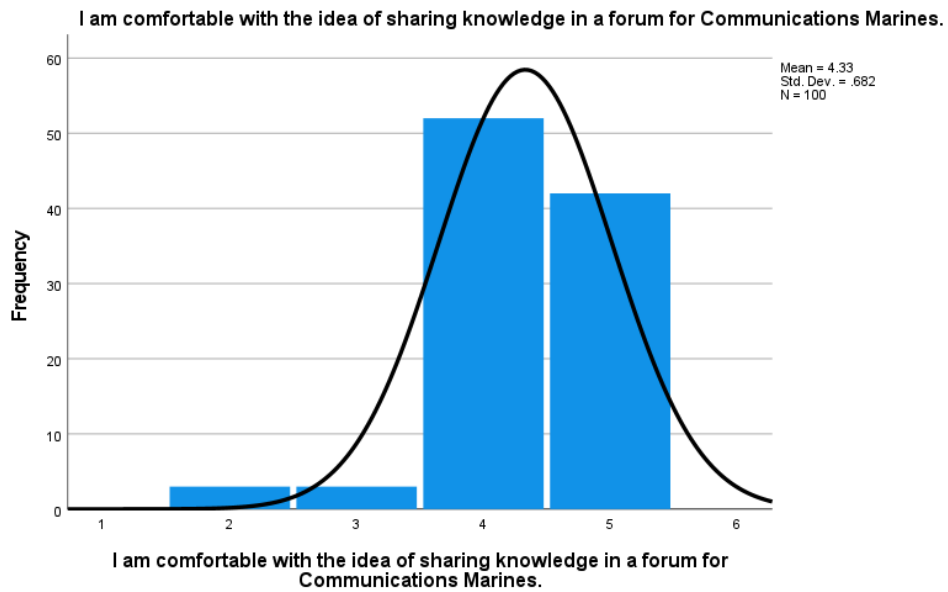


Figure 17. Q6 Histogram

Q7. I am comfortable with the idea of receiving knowledge in a forum for Communications Marines.

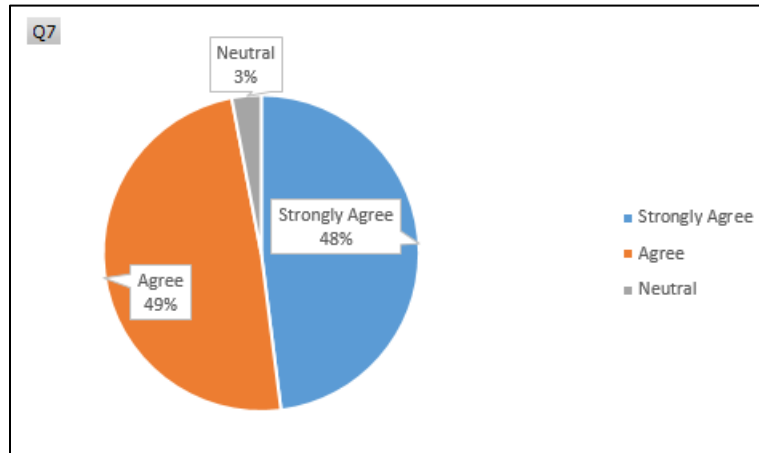


Figure 18. Q7 Responses

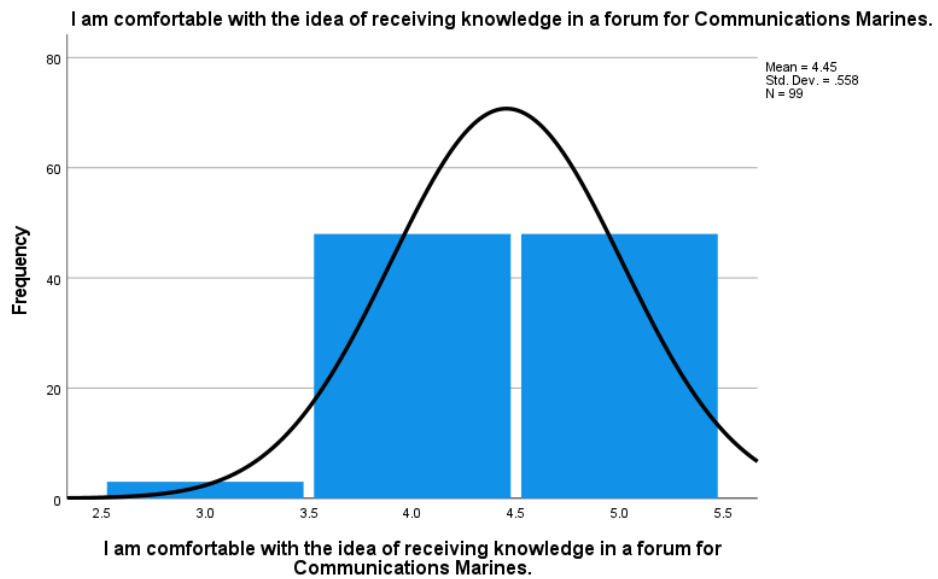


Figure 19. Q7 Histogram

Q8. The COI USMC Communicators Team is/could be a good tool for staying informed on USMC communications.

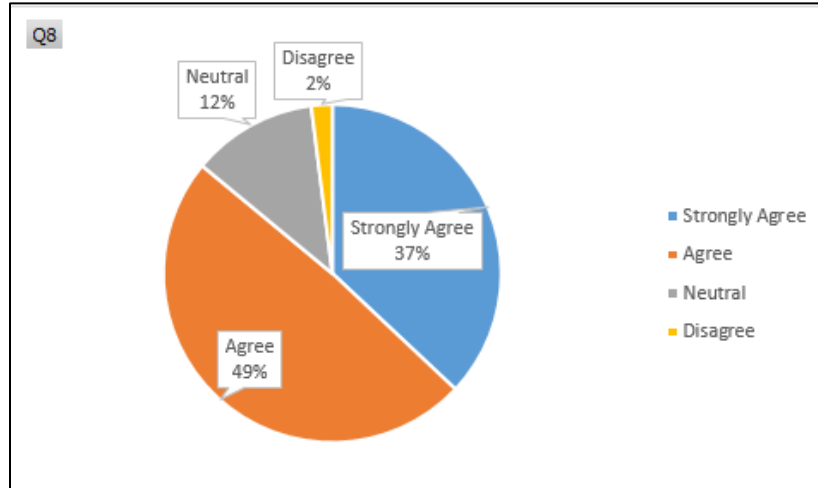


Figure 20. Q8 Responses

The COI USMC Communicators Team is/could be a good tool for staying informed on USMC communications.

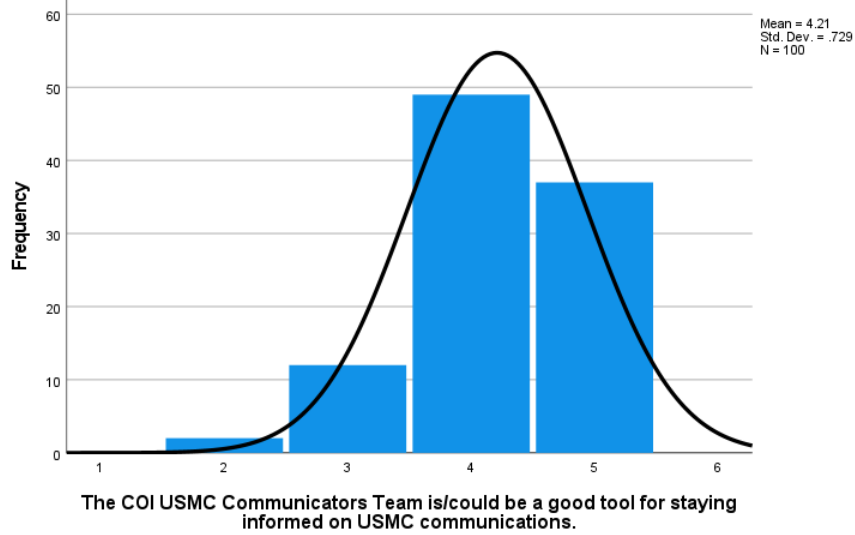


Figure 21. Q8 Histogram

Q9. The COI USMC Communicators Team is/could be a good tool for continuous learning.

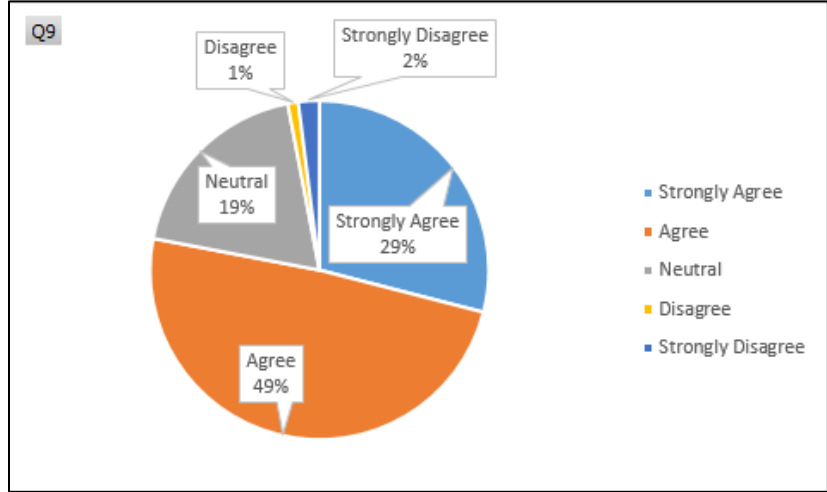


Figure 22. Q9 Responses

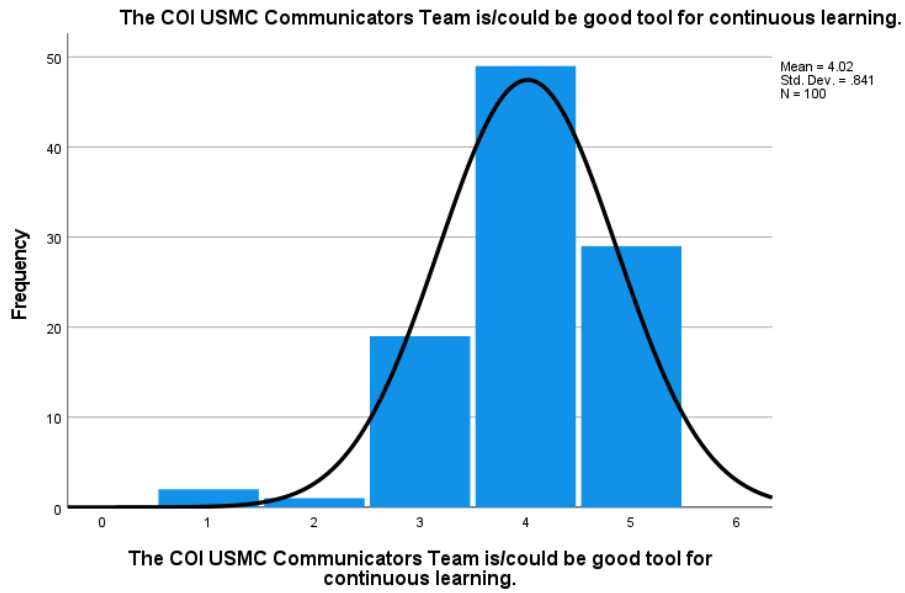


Figure 23. Q9 Histogram

Q10 The COI USMC Communicators Team is/could be a good tool for collaborating on problem-solving.

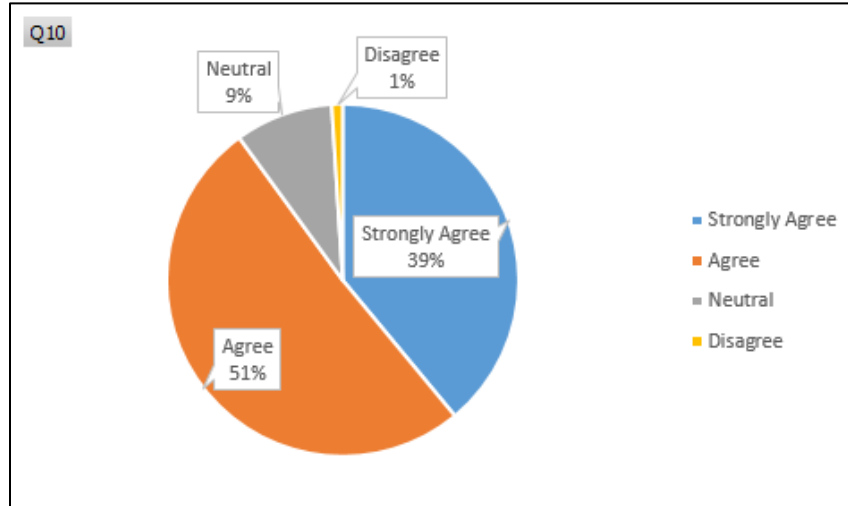


Figure 24. Q10 Responses

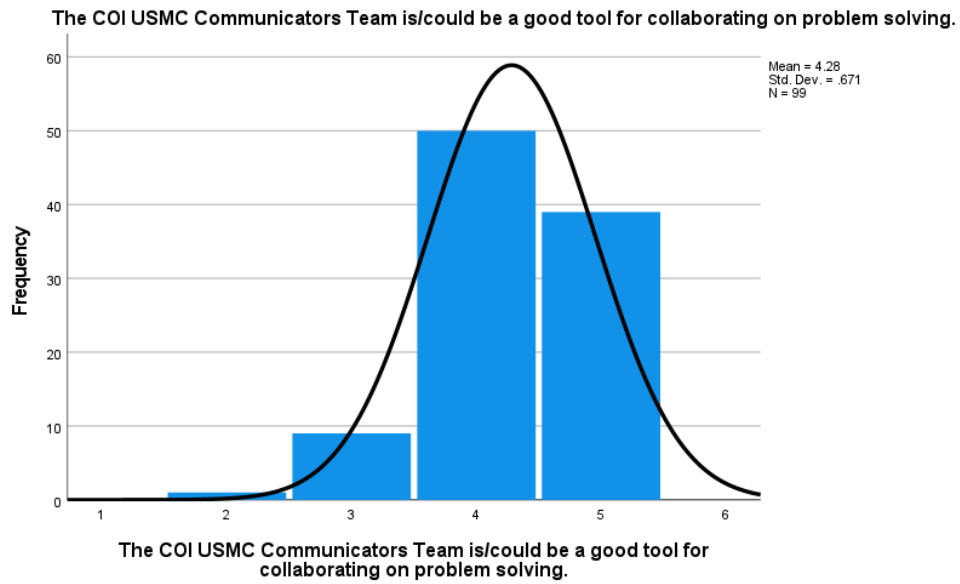


Figure 25. Q10 Histogram

C. ABOUT ONLINE LEARNING

Q11. The online nature of e-learning makes learning easier.

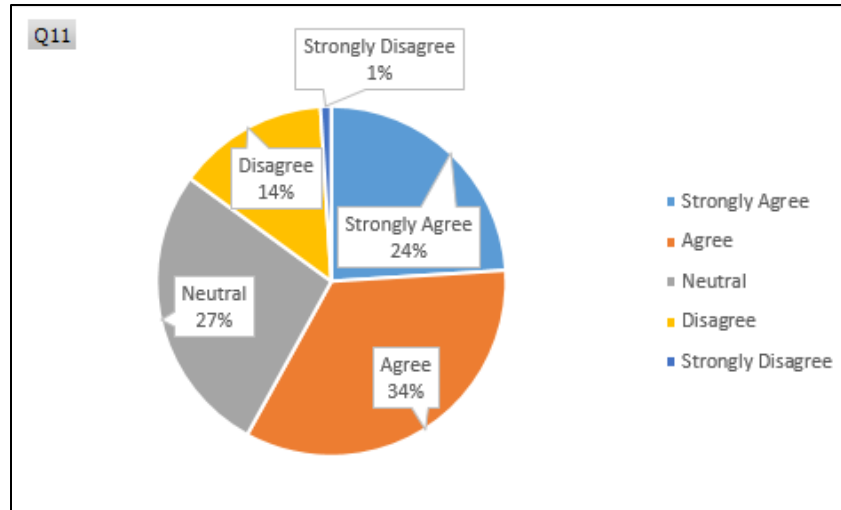


Figure 26. Q11 Responses

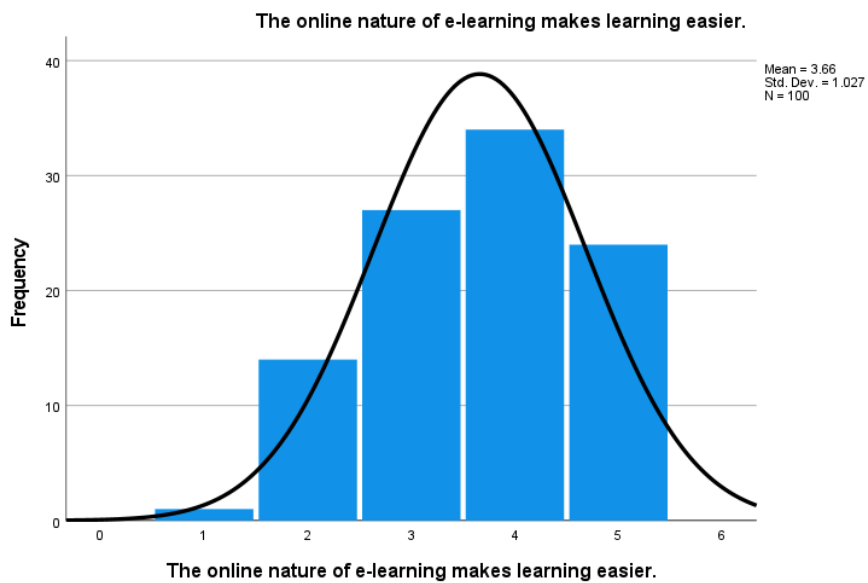


Figure 27. Q11 Histogram

Q12. Online learning will help me learn at my own pace.

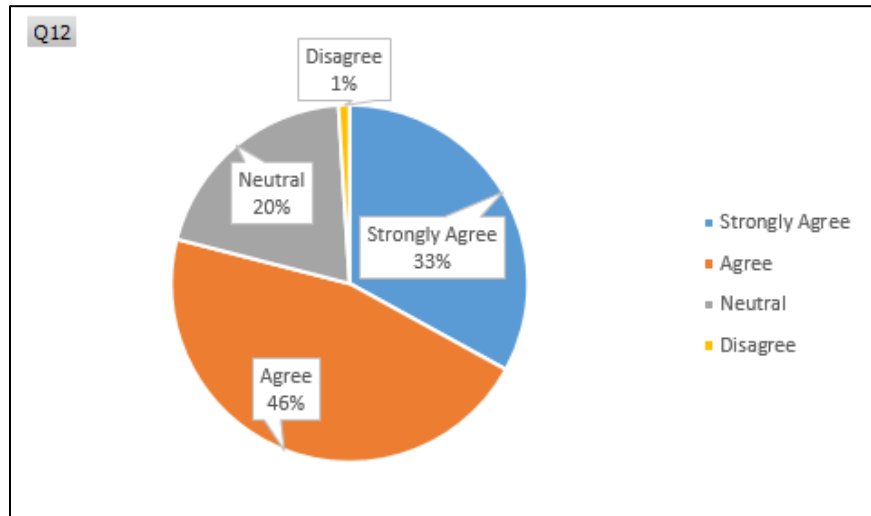


Figure 28. Q12 Responses

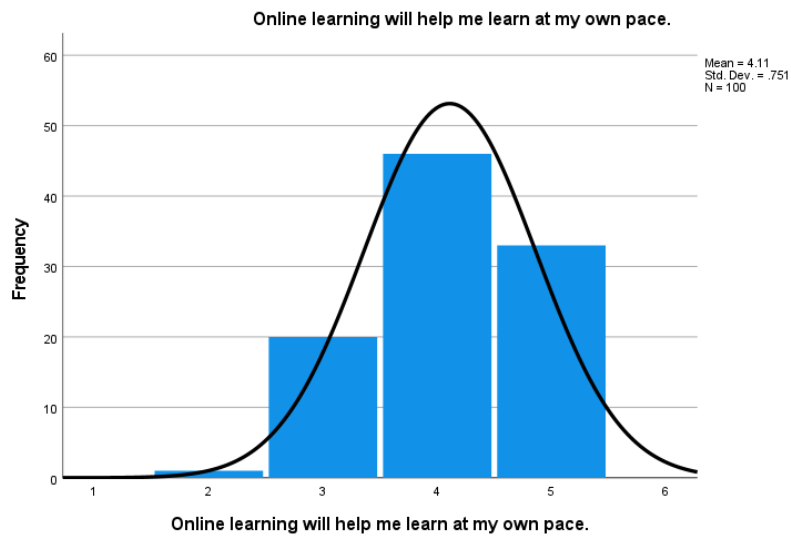


Figure 29. Q12 Histogram

Q13. I would prefer online learning to additional training at a training command.

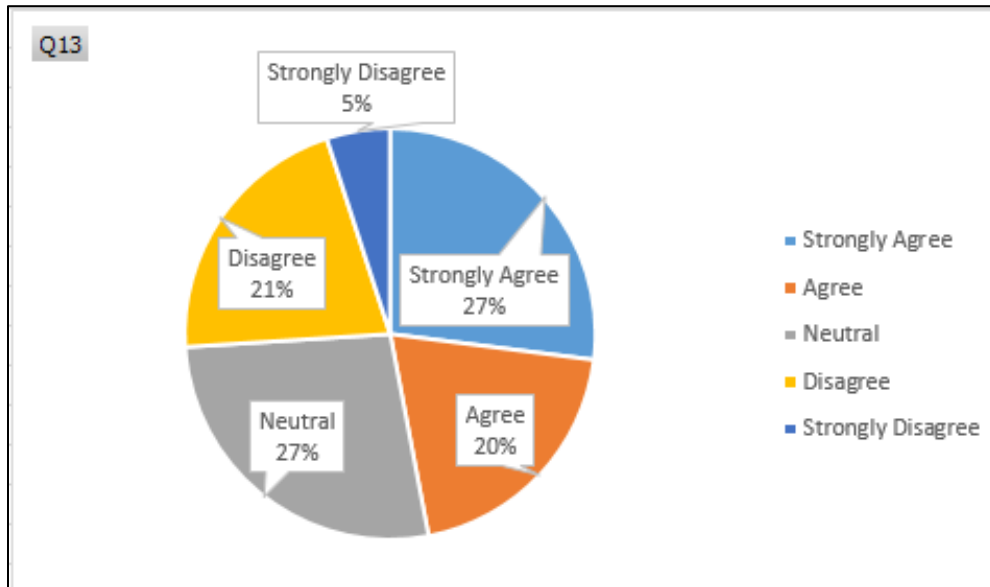


Figure 30. Q13 Responses

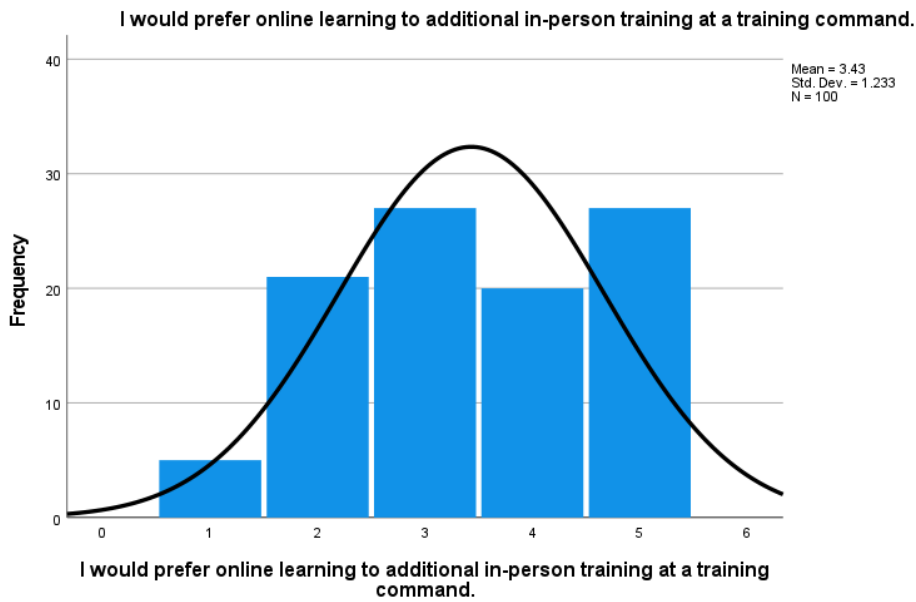


Figure 31. Q13 Histogram

Q14. I would prefer to interact with facilitators and other learners on Teams than self-study on the MarineNet or TWMS type site.

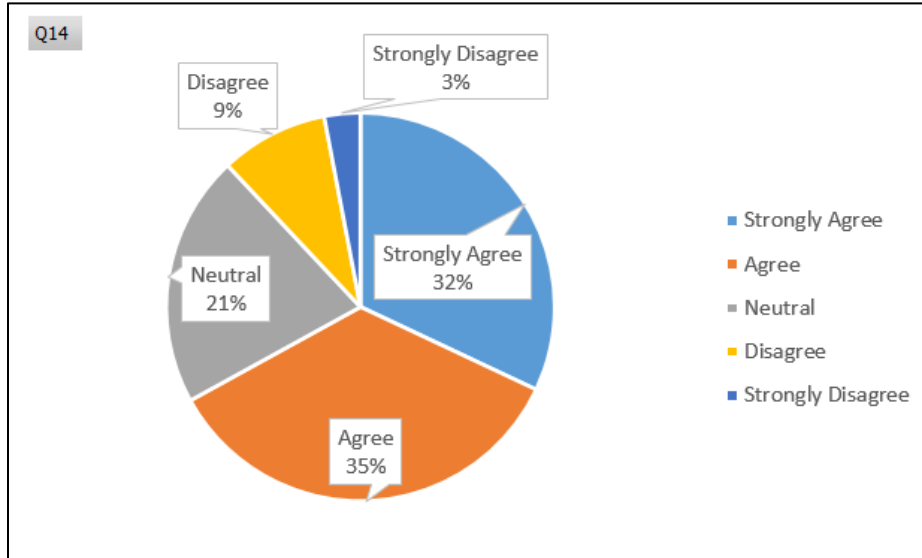


Figure 32. Q14 Responses

I would prefer the interaction with facilitators and other learners on Teams than to self-study on MarineNet or TWMS type site.

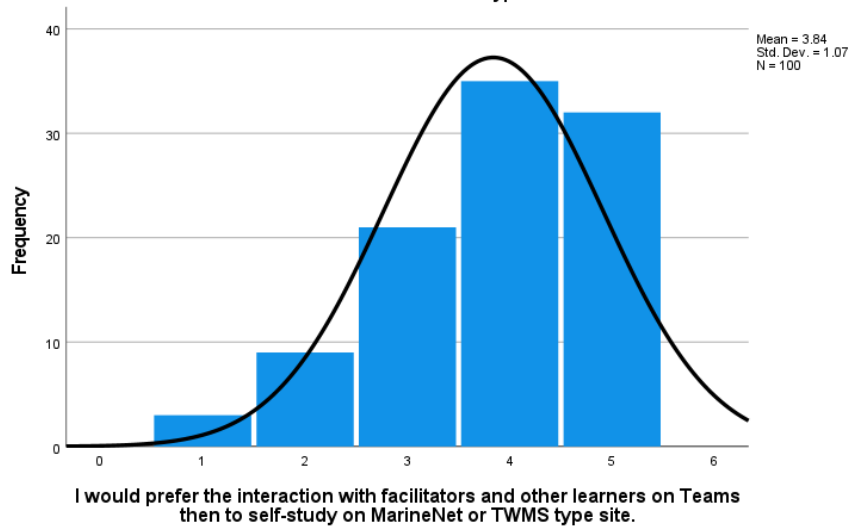


Figure 33. Q14 Histogram

Q15. Having an instructor available by video chat will help me learn better.

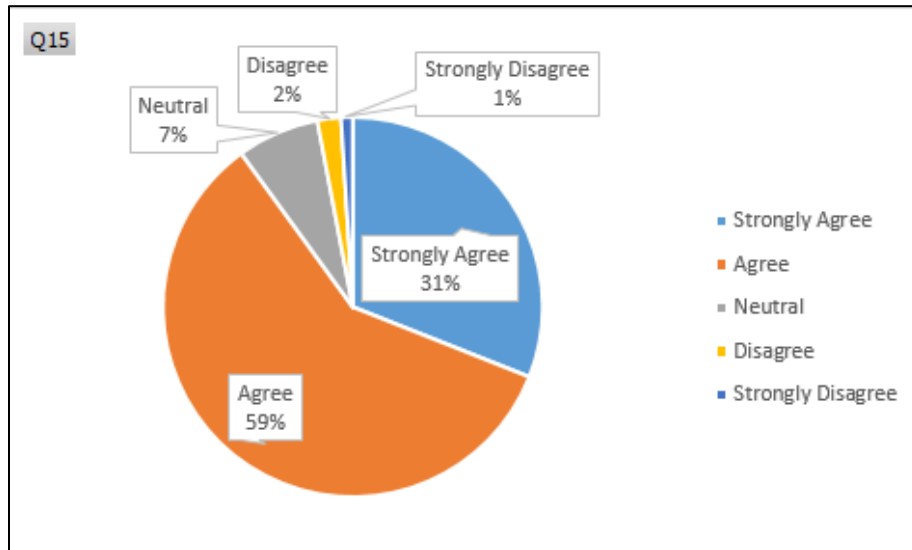


Figure 34. Q15 Responses



Figure 35. Q15 Histogram

APPENDIX D. USMC COMMUNICATIONS MOSS

We designed this study with the Marine Corps networking-related MOSs as research subjects on the usefulness of Teams for hosting a CoP to meet continuous learning and problem-solving demands. The career field consists of several networking-related billets as outlined by *NAVMAC 1200.1F Military Occupational Specialties Manual*

A. 0602 COMMUNICATIONS OFFICER

The communications officer oversees all aspects of the planning, operation, and maintenance of all communications systems which support the command and control of Marine Corps enterprise networks (Mullen III 2020).

B. 0639 NETWORK CHIEF

Network Chiefs are responsible for the advanced concepts of networking. The chiefs come through the ranks from the 0631 network administrator MOS. In addition to operating and maintaining networks, the network chief supervises personnel and is responsible for troop welfare. The network chief duties can bleed into other communications duties, including security, budgeting, and administrative (Mullen III 2020)

C. 0699 COMMUNICATIONS CHIEF

An MSgt and MGySgt fills the Communications Chief position. The communications chiefs have a thorough understanding of all communications related to MOSs, including networking, data systems, and cybersecurity. Their additional duties include personnel management and budgeting (Mullen III 2020).

D. 0631 NETWORK ADMINISTRATOR

The network administrator is the Marine Corps' entry-level position in the network-related MOSs. They are involved with the install, operation, and maintain Marine Corps enterprise networks. Additionally, duties may include cabling, switch and router configurations, and troubleshooting (Mullen III 2020).

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