

Innovation in the Information Environment

An educational perspective
by the Staff, Marine Corps University

“The information space is global, instant, persistent, and inclusive of all domains.”¹

In 2014, amidst the carnage of war in Ukraine’s Donbass region, one particularly gruesome story stood out—Russian television reported that Ukrainian forces had tortured and crucified a three-year old child. The following year, another Russian news outlet claimed that Ukrainian artillery bombardments had killed a ten-year-old girl. These stories were sufficiently horrifying that international news groups sent their own reporters to learn more about this apparently casual cruelty on the part of one of the combatants. Instead, they learned that both stories were false. When pressed on why Russian media had spread the story about the murdered girl, a Russian reporter simply replied, “We had to broadcast it.” Similarly, the Russian outlet that first spread the story about the crucified child eventually gave a half-hearted retraction—though it also claimed that if the story were indeed false, it was still the fault of Ukraine for shattering the psyche of the (not)-dead child’s mother with its unremitting military violence.² These two incidents made clear the contours of the information space: global, instant, persistent, encompassing, and increasingly a field of contest.

The information space has indeed gained increasing importance. The *2018 National Defense Strategy (NDS)*

charged that “the Joint Force must gain and maintain information superiority.” A year later, Gen David H. Berger noted in his *Commandant’s Planning Guidance (CPG)* that the Marine Corps had “yet to fully develop a robust capability necessary to maintain advantages in the information environment across all seven warfighting functions.”³ This operating environment—complex, ever-changing, and increasingly contested—required

a “highly educated force” to deter bad actors or, failing that, to support naval and joint force operations inside the adversary’s weapons engagement zone.⁴

Education Command takes its role in developing that highly educated force very seriously. Just as the information environment encompasses all others, so too does the professional military education (PME) continuum provided under Marine Corps University (MCU) weave operations in the information environment (OIE) through every element of the student learning experience. This article will highlight a few of the many efforts undertaken in this regard as well as illustrate the myriad educational tools



The colleges and schools of MCU are designed to conduct PME across a continuum of student requirements from multiple officer and enlisted grades. (Photo: From video by Cpl Kaitlynn Hendricks, Cpl Quinn Hurt, Sgt Kristiana Montanez, Charles Wolf, and Sgt David Diggs.)

leveraged to accomplish this. It will also discuss educational enhancement programs provided by MCU's Krulak Center that bring OIE instruction to all of MCU's resident and non-resident PME programs. While each school's approach is different, tailored to the learning outcomes for each student body, the endgame is the same: that the Marine leaving their PME school and returning to the FMF is indeed a highly educated warfighter, approaching the information environment with "a competition mandate, but a conflict mentality."⁵

OIE and PME

Defining the information environment is a challenge in itself, though Lt-Gen Lori Reynolds, Deputy Commandant for Information, (DC-I) offered a comprehensive description in a speech this spring. She defined the *information environment* as the aggregate of individuals, organizations, and systems that collect, process, disseminate, or act on information.⁶ In this space, adversaries were "seeking to sow disinformation, probing cyber defenses, stealing intellectual property, [and] conducting reconnaissance in places we wouldn't even consider part of the battlefield."⁷ Verbally or electronically, encrypted or in the clear, the information environment is an expression of human

willing to challenge us asymmetrically within this maneuver space. Finally, she warned that if the United States could not expand its understanding of power projection beyond the kinetic and into this maneuver space, it would ultimately "fail to compete" there.⁸ Failing to compete is not an option, so the schools at MCU use OIE to contextualize the other domains of modern warfare.

Expeditionary Warfare School

This generation of Marine Corps leaders have grown up in that "global, instant, persistent, inclusive" information environment and understand the habit patterns needed to navigate it as instinctually as they breathe. It is thus appropriate that when young company-grade Marine Corps officers get their career-level PME at Expeditionary Warfare School (EWS), they experience a curriculum in which information is fully incorporated as the seventh Marine Corps warfighting function. Students and faculty also receive professional development on the fusion of innovation and the information environment. For instance, 5 of the 6 courses taught in the 41-week EWS curriculum have touchpoints linking the information environment with broader warfighting concepts. In particular, the Military Adaptation and Innovation and MAGTF

lessons learned from a panel of recent practitioners of OIE who operated at the MEU level. These efforts reinforce each other across the curriculum, ensuring young officers leave EWS with a strong foundation of OIE upon which to build as practitioners themselves.

Command and Staff College

As their careers advance, our students expand their operational perspective, so the educational approach to OIE expands as well when Marine Corps officers return to the PME continuum at Command and Staff College (CSC). In the CSC curriculum, "Information" has been elevated to a formal Program Outcome with associated learning outcomes in 2020. As such, upon graduation, CSC students are expected to understand the human, physical, and informational aspects of the security environment; apply options that integrate informational, cyber, and physical capabilities and activities in operations; analyze how the Joint Force executes operations in the information environment and modifies those operations as audiences respond; and recognize the opportunities and vulnerabilities created by widespread information dissemination enabled by emerging media.

The CSC curriculum integrates educational touchpoints with OIE in several other ways. The direct role and support of the DC-I in several of these efforts is significant. LtGen Reynolds provides introductions to three blocks of instruction focused on Information: Information as the Seventh Warfighting Function, Planning in OIE, and Planning in Cyber. Beyond the DC-I's direct involvement, these instructional blocks also include lectures and staff assistance from the Commanding General, Marine Forces Cyberspace Command; the Director of the Marine Corps Intelligence Activity; the Commanding Officer of the II Marine Expeditionary Force Information Group; and the Director of the Marine Corps Information Operations Center.

Additionally, the CSC exercise continuum reinforces and extends our students' OIE education. The capstone Joint Task Force-level exercise Pacific Challenge X features simultaneous in-

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thought. This includes the thoughts of the United States and its allies, adversaries and competitors, and independent third parties. Moreover, with the growing proliferation of artificial intelligence and machine learning, this environment encompasses non-human thought as well. LtGen Reynolds argued that this amalgamation of the information environment and the activities within it was a form of power beyond kinetic combat power. She further noted that our competitors were increasingly

Operations Afloat courses include modules that focus on OIE. Among these modules is a lecture session from Col T.X. Hammes, USMC(Ret) on the Fourth Industrial Revolution and its effect on the character of war.⁹ Other modules include a historical case study on the Tet Offensive as an illustration of both the battlefield and wider geopolitical impacts of OIEs as well as a battle study on the Russia-Ukraine conflict and tactical OIE effects. New this academic year, students will receive

formation wargaming, with the allied and adversary groups using “dueling narratives” of realtime OIE to gain advantage. The actions are adjudicated with the help of experts from DC-I, Marine Corps Information Operations Center, Training and Education Command, and MCU, and these actions affect outcomes in the larger digital wargame. Other lessons in security studies and war studies discuss information as a specific aspect of the great power competition while using wargames; this year Dr. Craig Hayden, Associate Professor of Strategic Studies at CSC, introduced a hex-based information wargame allowing students to conduct OIE to gain advantage in a security studies scenario.¹⁰

The electives program is another formative part of the students’ overall experience at CSC, and the information realm is well represented in the elective offerings. Of the 50 electives, 10 offered directly relate to information as a warfighting function, and they run the gamut of elective options: secret and unclassified topics, U.S. and adversary capabilities, electronic warfare, cyber, OIE, space, and historical examples of each are woven throughout the electives. All told, the operational perspective at CSC is increasingly the informational perspective as well.

School of Advanced Warfighting

Consistent with the joint concept for OIE, the School of Advanced

Warfighting (SAW) takes a multi-regional, multirole, and multifunctional approach that emphasizes great power competition from peacetime confrontations to escalation and major combat operations.¹¹ Exercises and curriculum critically examine joint doctrine on deception, introducing students to political psychology and theories of decision making that help planners understand how to gain an advantage through surprise.¹² Historical cases help students reenact key decisions and how inaccurate and incomplete information and competing narratives shape operations. In the Changing Character of Conflict course and future war research program, students examine the role of cyber operations alongside inform and influence activities as they relate to shaping operations and the new concept of dynamic force employment. Students study Chinese force structure, such as the Strategic Support Forces, and emerging concepts like Systemic Confrontation, as well as studies on how China signals adversaries and behaves during crises.¹³ Also covered is the Russian concept of New Generation Warfare, in which multiple states combine instruments of power with active measures and flexible deterrent options to alter how targets see the world and make decisions.¹⁴ Seminars include statistical analysis of past disputes: for example, how Chinese leaders use particular outlets to create a narrative during brinkmanship.¹⁵ SAW builds in

opportunities for students to experiment with integrating OIE into operations through wargames.¹⁶ Students fight each other in dynamic competition exercises and wargames, learning first-hand how to integrate OIE into the competition continuum.¹⁷ They also learn red teaming techniques to challenge assumptions, explore alternatives, and detect deception—all consistent with OIE. The net result is a better appreciation not just of OIE but modern great power competition in general.

SAW faculty also maintain an active research agenda and advisor role related to OIE. Dr. Benjamin Jensen served as the senior research director and lead author for the U.S. Cyberspace Solarium Commission. Faculty publish on OIE and how it relates to contemporary warfighting in the *Marine Corps Gazette*, *War on the Rocks*, and *Lawfare*.¹⁸ These efforts included co-authoring major think tank monographs for the CATO Institute and the Atlantic Council with fellows in the Krulak Center.¹⁹ Faculty have even received research support to work with other universities to develop new OIE-linked great power competition wargames that examine how states use cyber operations during crises and early stages of combat operations.

Marine Corps War College

The Marine Corps War College (MCWAR) curriculum focuses on the “strategic-level” of operations; that is, “The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) strategic security objectives and guidance, then develops and uses national resources to achieve those objectives.” Information is an important lens through which to view elements of national power, so OIE is woven throughout the MCWAR curriculum.

MCWAR’s curriculum consists of core courses in Diplomacy and Statecraft, Warfighting and Economics, Leadership and Ethics, National Security, and Joint Warfare. These core courses are supplemented by an Advanced Studies Program, which enables a “deep dive” into specific topic areas. The study and application of infor-



The School of Advanced Warfighting produces Marine, joint, and allied officers uniquely skilled in critical thinking, problem solving, and deliberate planning. (Photo: MCU)



The Krulak Center for Innovation and Creativity is the MCU community's an engine of change, and their PME portal, "The Landing," serves as the platform for sharing ideas. (Photo: MCU)

mation operations is not confined to a single seminar, or even a single department, because that would give the subject short shrift. OIE applies across all departments, and the nuances of it are more readily brought forth in seminar discussions with senior military leaders and faculty members.

This supports MCWAR's program outcomes, which aim to develop leaders able to frame ambiguity, evaluate information and arguments, ask the right questions, challenge assumptions, and find creative solutions to the challenges of a complex and dynamic security environment. The information maneuver space is part of that complex environment, which is why the MCWAR curriculum integrates it in all coursework.

Krulak Center

The Krulak Center occupies a unique position within MCU; it is not a school with its own curriculum, but its talented cadre of military and civilians act as "general support artillery" to enhance the student experience at all schools while also engaging external partners to make their specific expertise available to students as well. So, just as the student experience varies depending on the program of instruction, so too are the Krulak Center programs quite varied in their content. But despite the variance, innovative approaches to OIE are a consistent component of the Center's offerings.

Some of these offerings are targeted to specific schools—for example, the Center's Bren Chairs, funded by the

Marine Corps University Foundation, teach several of the CSC electives that explore the information environment. Mr. J.D. Work, Bren Chair for Cyber Conflict and Security, offers a yearly elective on "Cyber Operations, Intelligence, and Conflict." Mr. Donald Bishop and Dr. Brandon Valeriano (Bren Chairs for Strategic Communication and Military Innovation, respectively) offer a joint elective on "Modern Political Warfare: Cyber and Information Operations," which links the narrative messaging aspect of OIE with the ones and zeroes flowing through digital networks. This academic year, the Center is also providing a new elective in partnership with the Massachusetts Institute of Technology's Lincoln Labs, a "Survey of Artificial Intelligence and Machine Learning." As mentioned above, "information" can include "thought" exchanged—even generated—by sufficiently advanced algorithms and machines.²⁰ Non-human players in the information space deserve attention of their own.

Yet, most Krulak Center programs are open to students from any PME program. This both increases the opportunities for the Center to act in direct support and creates a cross-pollinated learning environment in which students can share knowledge with, and learn from, a much broader experiential array than they would encounter in their standard PME curriculum. One example of this is the Gen Robert H. Barrow Fellowship, which includes students from all MCU schools, along with Marine Corps entities in the National Capi-

tal Region. The theme for this year's fellowship is the space domain and its criticality in great power competition, including the access to, and denial of, the information realm. This past spring, the Center had the opportunity to liaise with students and instructors from several non-MCU schools. Center representatives participated in a two-day wargame with members of the Army War College and Marine Corps Civil-Military Operations School, with the game focusing specifically on OIE following a theoretical collapse of the North Korean regime.

The Krulak Center has also joined with a number of partners outside MCU to creatively explore the information realm, for the benefit both of PME students and Marines across the FMF. This summer, the Center collaborated with the *Marine Corps Gazette*, Ender's Galley innovation website, and Marine Forces Cyberspace Command in an OIE "Call to Action." This project used targeted questions, and both fictional and non-fictional written pieces to drive discussions aimed at helping Marines make sense of new and old terms, potential operating models, and emerging doctrine in the OIE world.²¹ The Center has also utilized the unconventional medium of the graphic novel as a platform to help Marines dive deeper into the information space. The "origin story" of *Destination Unknown* as a grassroots innovation effort is a tale in itself, but in two volumes already published, a digital "holiday special" released December 2020, and a third volume in the planning stages, the Marine Corps author/

artists teams of *Destination Unknown* used art and fictional narratives to examine the potential future impacts of artificial intelligence, cyber, the space domain, and their nexus in the world of information.²² From the lecture to the comic book, the Krulak Center provides a plethora of perspectives to student on OIE.

Conclusion

If information—the expression of thought, both human and machine—encompasses all the domains of the current and future operating environments, then Marines must be educated in its many aspects and applications. As seen throughout this article, we are seeking to ingrain such education—along with innovative and unconventional approaches to conveying it—into all PME curricula and enhancement opportunities at MCU. Marines leaving these schools must leave armed with the awareness of the absolute imperative to gain and maintain a competitive advantage in the information space—and the knowledge to do so. Inside or outside the weapons-engagement-zone, the “highly educated force” must understand that in a realm that is global, instant, persistent, and all-inclusive, OIE is not episodic—it does not start or stop in neat phases. It endures, so our Marines are taught that OIE encompasses and endures, from competition to conflict and the gray zones in between.

Notes

1. Quote attributed to LtGen Lori Reynolds on 20 October 2020.
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4. Gen David H. Berger, *38th Commandant’s Planning Guidance*, (Washington, DC: July 2019).
5. Quote attributed to LtGen Lori Reynolds on 20 October 2020.
6. LtGen Lori Reynolds, “Information Warfare and Operations in the Information Environment,” (lecture, Information Warfare Symposium, Washington, DC: March 2020).
7. Ibid.
8. Ibid.
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11. *Joint Chiefs of Staff, Joint Concepts for Operating in the Information Environment*, (Washington, DC: July 2018).
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16. Benjamin Jensen, “Welcome to Fight Club: Wargaming the Future,” *War on the Rocks*, (January 2019), available at <https://warontherocks.com>.
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21. Staff, “Call to Action: Operations in the Information Environment,” *Marine Corps Gazette*, available at <https://mca-marines.org>.
22. The “origin story” for the *Destination Unknown* series can be found on the Krulak Center’s YouTube channel at <https://youtu.be>. Volume 1 and 2 are both available for download from the Marine Corps University Press at <https://www.usmcu.edu>. A digital-only volume 2.5 was released in December 2020 and can be found on Marine Corps University’s online PME portal, “The Landing:” <https://innovatedefense.net/the-landing>.

