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Augier, Mie; Barrett, Sean F.X.

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Cultivating Critical and Strategic Thinkers

Learning from the past, preparing for the future¹

by Mie Augier & Maj Sean F.X. Barrett

We recently wrote about the intellectual renaissance inspired by the 29th Commandant of the Marine Corps, Gen Alfred M. Gray, and the relevance of maneuver warfare ideas today. (See “People First,” *MCG*, Jun 19.) This article intends to explicate some themes regarding the thinking and decision making under uncertainty alluded to in our earlier article, as well as their usefulness given the trends in the current (and likely future) strategic operating environment.

FMFM 1, Warfighting states,

In an environment of friction, uncertainty, and fluidity, war gravitates naturally toward disorder ... It is precisely this natural disorder which creates the conditions ripe for exploitation by an opportunistic will.²

Early critics of maneuver warfare, however, argued that maneuver warfare did not give enemy commanders enough credit. After all,

it should not be assumed that enemy commanders will lose control of the situation and their forces disintegrate when faced with rapidly changing situations.³

Additionally, are we to assume our Marine commanders will somehow remain unaffected by the same conditions? Enemy forces have proven throughout history that they will fight on in spite of “a disastrous logistics and command and control situation.”⁴

>Dr. Augier does research and teaching in the areas of strategy, critical and strategic thinking, and strategic leadership at the Naval Postgraduate School.

>>Maj Barrett is an O202 currently serving a utilization tour as a Defense Systems Analyst (8852) at HQMC Force Preservation Directorate, G-10. He has previously deployed in support of Operations IRAQI FREEDOM, ENDURING FREEDOM, ENDURING FREEDOM-PHILIPPINES, and INHERENT RESOLVE.



We want to open a conversation about teaching critical and strategic thinking. (Photo by LCpl Jamin Powell)

We acknowledge that such assumptions are not altogether valid and aim to address these concerns by placing maneuver warfare philosophy within the larger literature on learning and problem solving under ambiguity in

order to provide some recommendations—nested within both established educational curricula and Marine Corps history—for facilitating interdisciplinary problem solving and re-cultivating this capability in our Marines.

In this article, we analyze the nature of thinking and “thinking about thinking,” but we do not discuss in detail the processes and pitfalls for critical and strategic thinking. Rather, we hope to extend the conversation about teaching critical and strategic thinking and to nudge our Industrial Age teaching and learning mindset not just to the Information Age, but rather one step further to the Judgment Age.⁵

An important point to keep in mind regarding learning (and approaches to learning) is that education aiming to help nurture critical and strategic thinking has both cognitive (i.e., knowledge) and attitudinal (i.e., instinctual/affective) aspects; neither are automatic. However, while cognitive skills for analyzing and understanding can be taught through concepts, heuristics, and methods, attitudinal aspects are more difficult to teach but still important and must be cultivated through mentoring and fostering curiosity and judgment.⁶ Thankfully, there are important lessons from the Marine Corps’ own history (and the institution’s emphasis on education for judgment) that might be useful to re-invigorate the education of future thinkers.

Ill-structured Problems and Learning and Problem Solving Under Ambiguity

Any informed discussion of how to improve thinking, learning, and education should be based on understanding the nature and process of human thinking and learning, the types of decisions humans make, and how we can improve decision making.⁸ A better understanding of such fundamentals of thinking and decision-making processes will help us to improve current and future practices, as well as help us learn from what has not worked well so that we can avoid simply becoming better in irrelevant areas.

Building on and integrating some ideas from Herbert Simon, Gen Gray, LtGen Paul K. Van Riper, and others, we argue that most decision making is best viewed as taking place under conditions of bounded rationality, ambiguity, and when confronted with varying degrees of ill-structured problems—a key element of the current and future strategic

***For those placing unbri-
dled faith in technology,
war is a predictable, if
disorderly, phenomenon,
defeat a matter of simple
cost/benefit analysis, and
the effectiveness of any
military capability a fi-
nite calculus of targets
destroyed and casualties
inflicted. History paints
a very different picture.
Real war is an inherently
uncertain enterprise in
which chance, friction,
and the limitations of the
human mind under stress
profoundly limit our abil-
ity to predict outcomes.⁷***

environment. In particular, Van Riper’s distinction between analytical, intuitive, and systemic decision making is an instructive lens through which to view the usefulness of our teaching and learning approaches as well as the different types of problems for which they are useful.⁹

Analytic decision making. Some conceptions of decision making falling into this category include rational choice theory, (most of) game theory, and systems analysis. These are useful frameworks to describe some decisions as long as the conditions and assumptions upon which they are built are valid, there is only a little uncertainty (quantifiable risk), and the problem at hand is linear and relatively well-structured. Systems analysis in particular has been a major analytic framework for decades of DOD decision making. Despite its analytical elegance and simplicity, models used to capture analytic decision making are rarely useful in the domain of human activity, including war.¹⁰ The early fathers of systems analysis themselves were aware of the limitations of their perspective,

emphasizing the need to understand these limitations as well as the importance of not suppressing judgment in the name of analysis.¹¹ However, many are still often quite eager to understand the world through analytical models even at the expense of realism and understanding.¹² Van Riper appeals instead to the use of two other perspectives of decision making, which are applicable to problems that are neither linear nor simple and emphasize uncertainty, ambiguity, and the limits of human rationality.

Intuitive decision making. As Van Riper, Simon, and others have noted, most people do not think and make decisions in terms of numbers. Instead, we use pattern recognition and intuition enabled by mental or cognitive models. This is especially true with more ill-structured problems, when more uncertainty is present, and when having to make decisions with many unknown variables. We make intuitive decisions when we face situations under uncertainty. We recognize things as if part of a pattern or something we have seen (or read about) before; thus we convince ourselves that we do not need to think about it.

Systemic decision making. The most difficult form of decision making is when confronted with wicked problems and when you do not recognize patterns: no shared mental models can be relied upon. For these instances, Van Riper appeals to developing an understanding of the logic and drivers of the situation and using holistic, interdisciplinary, and empirically driven problem solving. John Boyd’s emphasis on thinking, analogies, and synthesis is a useful approach for such decision making.

Van Riper’s (and Simon’s) approach to decision making involves both art and science. However, given the complexity of the security environment, understanding and teaching the “art” aspects are paramount:

The art of war and the science of war are not coequal. The art of war is clearly the most important. It’s science in support of the art. Any time that science leads in your ability to think about and make war, I believe you’re headed down a dangerous path. The art is the thinking. It is the intellectual underpinnings of war.¹³

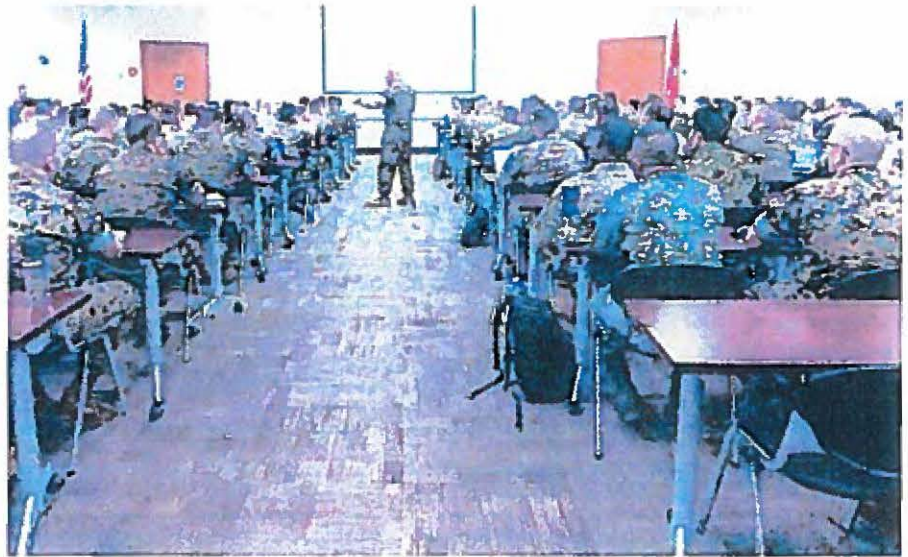
Education is the acquisition of the art of the utilization of knowledge. This is an art very difficult to impart. Whenever a textbook is written of real educational worth, you may be quite certain that some reviewer will say that it will be difficult to teach from it. Of course it will be difficult to teach from it. If it were easy, the book ought to be burned; for it cannot be education.¹⁴

Fortunately, Marines have acknowledged this for quite a while, and the emphasis on systemic and intuitive decision making is built into core organizational documents and Gen Gray's vision for Marine Corps PME. Thus, remembering his emphasis in the context of current PME challenges, including what teaching methodologies are most appropriate, will be useful.

Learning and Thinking in the Marine Corps and Beyond

As mentioned in our previous article, Gen Gray sought to institutionalize the intellectual renaissance in the Marine Corps and key to that was the founding of Marine Corps University (MCU). Fundamentally, he wanted to ensure his Marines were as mentally ready to fight as they were physically. This required more than Marines simply memorizing facts or becoming academic historians; instead, education was intended to serve as a vehicle for sharpening judgment and warfighting capabilities:

Through education we can equip ourselves to make sound military judgments even in chaotic and uncertain situations. The ability to make clear and swift judgments, amidst chaos, is



Marines must study the profession of arms, not only in school, but through self-study. (Photo by Sgt Olivia Ortiz.)

what sets the warrior apart intellectually. Though practice in the field and in wargames is important to improving military judgment, its development remains anchored to education about war.¹⁵

This emphasis on education was reiterated in *FMFM 1*, which emphasized every Marine's responsibility to study the profession of arms on his own, putting self-study on par with physical training: "Self-study in the art and science of war is at least equal in importance and should receive at least equal time to maintaining physical condition."¹⁶

As Commandant, Gen Gray ordered his Marines to read and publish a manual, *Book on Books*, to introduce and explain the professional reading program he would institutionalize as the Commandant's Reading List. Col Mike Wyly, who wrote Section 1, noted that professional reading itself was not the end product desired; thinking and actions on the battlefield are. However, reading, thinking about what you read, and internalizing by relating it in real ways to one's job are necessary preparatory actions.¹⁷ Wyly explains the lessons, ranging from the most tactical to the most strategic levels, one can learn from reading in depth about a single battle and how they can be applied to other battles. Military literacy only improves by reading about multiple battles.¹⁸

This learning emphasis is similar to the case method, which first rose to prominence at Harvard Law School in the late 1800s and at Harvard Business School in the early 1900s.¹⁹ The DOD could further incorporate the case method—in lieu of more enabling and terminal learning objectives—into PME institutions to foster critical thinking and judgment. According to Kenneth Andrews' classic definition, a case is

a carefully written description of an actual situation in business which provokes in the reader the need to decide what is going on, what the situation really is, or what the problems are—and what can and should be done.²⁰

The case method balances the tension between experiential and academic knowledge, placing less emphasis on the abstract knowledge against which Gen Gray warned and more on how to recognize and react in concrete situations. While critics warn that too heavy an emphasis on the case method might detract from systematic knowledge and analytical skills and argue that cases can be overly simplistic, the principal claim of proponents is that the case method develops students' problem-solving skills for when they are later confronted with ill-structured problems in the real world, and it leverages the heterogeneity of the students to foster interdisciplinary problem-solving.²¹

Gen Gray recognized and emphasized the merits of this form of instruction and took steps toward emphasizing both thinking and judgment in exercises as well as key institutional documents to help educate for the future.²²

This form of instruction has a history in Marine Corps PME institutions that even predated the founding of MCU and is rooted in the initial development of maneuver warfare philosophy. When Col Wyly took over as Head of Tactics at Amphibious Warfare School for the 1979–80 academic year, he felt the curriculum (that he had studied himself while a student at Amphibious Warfare School) was lacking in history and intellectual rigor. Dissatisfied with Marine Corps doctrine and educational curricula, Wyly turned to the ideas of John Boyd and resolved to deemphasize instruction on manuals and doctrine, which he felt became ends in themselves.²³ Wyly invited Boyd to speak during that school year, and he incorporated his-

Other important bureaucratic tendencies that Gen Gray warned against is the desire to measure—ostensibly “progress”—and create standard processes, both of which oftentimes are the enemy of critical thinking and create burdensome requirements that undermine a Marine’s motivation to learn.²⁶ In the forward for *Book on Books*, he recognized that individuals and units could use different methods for executing his order to read. This theme of decentralized implementation continued throughout the text and is consistent with mission-type orders. In explaining what to read, Wyly asserted, “Marines should pick their books according to their needs.”²⁷ The books referenced were simply meant to be “seed corn ... to stimulate interests in reading about the profession.”²⁸ Implementing the program would be “left up to the discretion and initiative of commanders and individuals.”²⁹ In marked contrast to today’s mounting administrative and training requirements, Wyly informed

kills the best part of our culture. When you analyse in the light of experience the central task of education, you find that its successful accomplishment depends on a delicate adjustment of many variable factors. The reason is that we are dealing with human minds, and not with dead matter. The evocation of curiosity, of judgment, of the power of mastering a complicated tangle of circumstances ... all these powers are not to be imparted by a set rule embodied in one schedule of examination subjects.³²

Leaders should implement the program in such a way that Marines are encouraged and motivated to read and do not view professional reading as a troublesome requirement.³³

Furthermore, even the best designed institutional educational structures can only do so much ...

torical battle studies and exercises that required students to make decisions. Wyly also eliminated prescribed solutions that instructors had previously relied on during these exercises and even deviated from established norms and curricula by taking his students to the field for tactical exercises without troops.²⁴ His ability to transform the curriculum was made possible by the high degree of freedom his chain of command afforded him. However, when his superiors changed, Wyly was ultimately reassigned to a mundane staff position because his superiors wanted to return to the old attrition doctrine.²⁵ This episode is instructive in that it highlights the bureaucratic tendency to resist change and emphasizes the need to build and maintain a broad base of support that can foster change from the bottom up, a tactic that Gen Gray presciently employed.

readers, “Do not anticipate a reporting process, or a centralized requirement for written exams, designed to assure that Marines are reading.”³⁰

The perils of relying on centralized exams and requirements too heavily, as well as the importance of active learning (e.g., cases), should inform current educational initiatives. In discussing the aims of education, Alfred North Whitehead warns:

In education, as elsewhere, the broad primrose path is represented by a book or a set of lectures which will practically enable the student to learn by heart all the questions likely to be asked at the next external examination.³¹

While acknowledging that “such examinations have their use in testing slackness,” Whitehead contended that the uniform central examination

Thus, fostering a culture that inspires Marines to “realize [their] own potential in order to better fulfill [their] professional calling” is a culture consistent with Gray’s vision for education as well as earlier foundational discussions concerning the history and philosophy of education, the emphasis on interdisciplinary reading and learning, and the importance of thinking and understanding (i.e., not just accumulating facts).

Implications for PME

As senior leaders increasingly call for improving the education of critical and strategic thinking in our PME institutions,³⁴ a new doctrinal philosophy for learning might find inspiration from integrating the philosophies of Whitehead and Gray, as well as from Simon and Van Riper’s emphasis on human thinking and problem-solving. The story of Gen Gray’s emphasis on education, thinking, and judgment—and their significance to the maneuver warfare movement—is important to more than the story of a particular period of Marine Corps history. Rather, it provides

an intellectual framework for dealing with the type of ill-structured, complex problems that Simon, Van Riper, and others emphasize and lays the necessary groundwork toward providing the intellectual and institutional structure (e.g., MCU) to support an enduring emphasis on teaching thinking and judgment. However, implicit in both Whitehead and Gray's philosophies is the difficulty in measuring educational advancements and benefits as well as their concern that attempts to do so only serve to suffocate thinking. Unfortunately, the tendency of large organizations, including those that house PME, is to evolve in ways that suppress individual creativity, thinking, and other "disruptive" forces even though they are the very foundation for strategic and critical thinking. Thus, senior leaders of PME institutions and military organizations must always seek to counter the forces stifling thinking, including internal politics and processes that seem designed mostly never to change.

Furthermore, even the best designed institutional educational structures can only do so much if the students or Marines are not inspired with a curiosity to explore, discover, think, and learn. The philosophies of Gray and Whitehead thus underscore creating a "culture of curiosity" as the first mover to improving education, as well as the centrality of leadership and mentorship to learning and thinking. While a wider perspective will probably shed some light on how the architectures of larger organizational structures might need to be reformed in order to support, not stifle, the education of strategists and thinkers, first developing certain attitudes (rather than functional knowledge and content) and ways of thinking in our Marines can prove to be an integrating force in the development of future strategic leaders. Thankfully, the Marine Corps has a rich history of empowering lower-level leaders with mission-type orders that it can leverage to further embrace and enhance education and ward off the calcification and status quo (and other) biases inherent in large organizations.

Notes

1. We are grateful to Andrew Marshall, Gen Alfred M. Gray, Jr., USMC(Ret), Col G.I. Wilson, USMCR(Ret), and MajGen William Mullen for comments on a previous version and discussions on the topic. Any remaining errors were produced without help.
2. Headquarters Marine Corps, *FMFM 1, Warfighting*, (Washington, DC: 1989).
3. Richard H. Voigt, "Comments on Maneuver Warfare," *Marine Corps Gazette*, (Quantico, VA: March 1982).
4. Ibid.
5. Al Gray and Paul Otte, *The Conflicted Leader and Vantage Leadership*, (Columbus, OH: Franklin University Press, 2006). Gray and Otte discuss how the knowledge age, or knowledge revolution, moved us from emphasizing managers to emphasizing leaders. The Judgment Age extends the focus on uncertainty and leadership and places a key emphasis on the important role of judgment, an art very difficult to teach yet critical to emphasize in PME.
6. Additionally, while critical thinking is an important educational tool and the processes in critical thinking can be important knowledge tools to help de-bias one's thinking and make it more logical, "thinking critically" is not "just" critical thinking, which oftentimes devolves into a check list. Structured analytic techniques which rose in prominence following the intelligence community's failures vis-à-vis the attacks on 9/11 and the case of weapons of mass destruction in Iraq, are examples of this mentality. A good discussion of the difference between critical thinking approached as analysis and the kind of critical thinking that is essential to PME can be found in Paul K. Van Riper, "The Identification and Education of U.S. Army Strategic Thinkers," in *Exploring Strategic Thinking: Insights to Assess, Develop, and Retain Army Strategic Thinkers*, (Fort Belvoir, VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 2011).
7. Robert H. Scales, Jr., and Paul K. Van Riper, "Preparing for War in the 21st Century," in *Future of Warfare Anthology*, revised edition, edited by Robert H. Scales, Jr., (Carlisle Barracks, PA: U.S. Army War College, 2000).
8. Daniel Kahneman, for example, divides thinking into two systems: System 1 and System 2. System 1 "operates automatically and quickly, with little or no effort and no sense of voluntary control" and is prone to making

systematic errors in specified circumstances. In contrast, System 2 is more often associated with concentration and allocating attention to the "effortful mental activities that demand it, including complex computations." While System 1 runs automatically, System 2 is typically "lazy" and sometimes fails to override mistakes made by System 1. Such errors are known as biases. Kahneman's heuristics and biases approach prefers formal models or rules. See Daniel Kahneman, *Thinking, Fast and Slow*, (New York, NY: Farrar, Straus, and Giroux, 2011). Another relevant reference here is Gary Klein, one of the developers of the naturalistic decision-making approach. Those from the naturalistic decision-making line of research are skeptical about imposing universal rules and structures on judgments in complex environments. Klein conducted field work to study decision making by experts, who make decisions based on a two-stage process involving intuitive recognition of what response is required, followed by mental simulation evaluating whether the response is valid. Gary Klein, *Sources of Power: How People Make Decisions*, (Cambridge, MA: MIT Press, 1999). Kahneman and Klein explore the differences between their two approaches in Daniel Kahneman and Gary Klein, "Conditions for Intuitive Expertise: A Failure to Disagree," *American Psychologist*, (Washington, DC: American Psychological Association, September 2009). The authors also provide suggestions for improving the quality of judgments and choices.

9. Gen Gray and Dr. Paul Otte also capture important elements of the larger environment and the importance of judgment.
10. As Simon noted, all the information in the world will not solve the problem of limited rationality and complex interdependencies: "[T]he dream of thinking everything out before we act, of making certain we have all the facts and know all the consequences, is a sick Hamlet's dream. It is a dream of someone with no appreciation of the seamless web of causation, the limits of human thinking, or the scarcity of human attention." Herbert A. Simon, *Models of Bounded Rationality, Vol. 2*, (Cambridge, MA: MIT Press, 1982). Simon's lifelong passion for an empirically driven and realistic conception of decision making speaks both to the real nature of limited rationality and complex decision making and to the inclination of scholars, especially economists, to reduce reality to what their models can capture. Much of Simon's emphasis is consistent with the spirit of Van Riper and *FMFM 1*.

11. Charles Hitch writes, "Uncertainties make life difficult for the systems analyst, but this is so because the problem of intelligent behavior

under uncertainty is *really* hard." See Charles Hitch, "An Appreciation of Systems Analysis," *Journal of the Operations Research Society of America*, (Cantonsville, MD: INFORMS, November 1955).

12. Van Riper mentions what can go (*really*) wrong when we apply models designed for systems analysis to the domain of imperfect rationality and conflict, recalling Secretary Robert McNamara's introduction of systems analysis to the battlefield. In linking his reflections on the more recent MILLENNIUM CHALLENGE Exercise to the lessons not learned from Vietnam, Van Riper observed,

What I saw in this particular exercise and the results from it were very similar to what I saw as a young second lieutenant back in the 1960s, when we were taught the systems engineering techniques that Mr. [Robert] McNamara [Secretary of Defense under Presidents John F. Kennedy and Lyndon Johnson] had implemented in the American military. We took those systems, which had good if not great utility in the acquisition of weapon systems, to the battlefield, where they were totally inappropriate. The computers in Saigon said we were winning the war, while out there in the rice paddies we knew d... well we weren't winning the war. Uncertainties make life difficult for the systems analyst, but this is so because the problem of intelligent behavior under uncertainty is *really* hard.

See "The Immutable Nature of War," *Public Broadcasting Service*, (Online: April 2004), available at <https://www.pbs.org>.

13. "The Immutable Nature of War."

14. Alfred North Whitehead, *The Aims of Education*, (New York, NY: Free Press, 1967). Our inclusion of Whitehead here is no coincidence; he was an important figure in the early development of certain approaches to learning (along with William James and others) that emphasize interdisciplinary and holistic problem-solving and teaching "how" to think, not what to think. This emphasis is very consistent with Gen Gray's vision for Marine Corps PME and learning. Thus, future elaborations of Gray's vision and the development of educational documents in line with *FMFM 1* might find inspiration from studying and applying Whitehead's ideas, too.

15. Gen Alfred M. Gray, *Book on Books*, (Quantico, VA: Marine Corps University), Alfred M. Gray Collection, Box List Part 2, Box 5, Folder 9, BGen Edwin H. Simmons Center for Marine Corps History, Quantico, VA. The quote is from Section 1, which was authored by Col Mike Wyly.

16. *FMFM 1, Warfighting*.

17. *Book on Books*.

18. Describing the tacit knowledge acquired through reading that enhances military judgment, Wyly writes,

A Marine who knows one battle well knows more about his profession than one who has read a hundred manuals. He may not be able to define what he knows, or divide the battle into phases, or tell you where the line of departure was, or who manufactured the aircraft or what kind of alloys were in the metal of the machines. He may still need to read some manuals. But he has gained a sensing of what the battle was about. And he needs this sensing.

See *Book on Books*.

19. Mie Augier and James G. March, *The Roots, Rituals, and Rhetorics of Change: North American Business Schools After the Second World War*, (Stanford, CA: Stanford University Press, 2011), for a description of the case method's law school origins and its spreading to and among North American business schools.

20. Kenneth Andrews, *The Case Method of Teaching Human Relations and Administration*, (Cambridge, MA: Harvard University Press, 1951).

21. *The Roots, Rituals, and Rhetorics of Change*.

22. Gray wrote,

My intent in PME is to teach military judgment rather than knowledge. Knowledge is of course important for developing judgment, but should be taught in the context of teaching military judgment, not as material to be memorized ... The focus of effort [of PME] should be teaching through doing, through case studies, historical and present-day, real and hypothetical, presented in war-games, map exercises, and table exercises, free-play, force-on-force 'three day wars' and the like. ... As education progresses ... the material should grow more complex, but the essence should remain the same: teach officers and NCO's how to win in combat by out-thinking as well as out-fighting their opponents.

Commandant of the Marine Corps to CG, Marine Corps Combat Development Command, "Training and Education," October 1988, located in the Alfred M. Gray Collection, Box List Part 2, Box 6, Folder 12, BGen Edwin H. Simmons Center for Marine Corps History, Quantico, VA.

23. Fideleon Damian II, "The Road to FMFM 1: The United States Marine Corps and Maneuver Warfare Doctrine, 1979-1989," (Master's thesis, Kansas State University, 2008).

24. "The Road to FMFM 1." Wyly developed an instructional program to teach maneuver warfare, which he later published as an appendix to Bill Lind's *Maneuver Warfare Handbook*. Each

lesson consisted of a historical background of the concept being taught as well as a scenario providing a practical application exercise regarding the application of the concept. A copy of the handbook can be found in the Alfred M. Gray Collection, Box List Part 2, Box 50, Folder 5. Wyly also developed a reading list for his students which developed into what would become the Commandant's Reading List.

25. *Ibid*.

26. Gray notes that the current evaluation process relying on lesson plans, Enabling Learning Objective and Terminal Learning Objective "is inappropriate for education, although it may have use for training in techniques. A new evaluation process must be devised that recognizes the inherent impossibility of 'objectively' or quantitatively measuring and art." Commandant of the Marine Corps to CG, Marine Corps Combat Development Command, "Training and Education," October 1988.

27. *Book on Books*.

28. *Ibid*.

29. *Ibid*.

30. *Ibid*.

31. *The Aims of Education*.

32. *Ibid*.

33. *Book on Books*.

34. Summaries of its intent can be found at Thomas B. Modly, "Memorandum for Distribution: Department of the Navy Education for Seapower (E4S) Study," (Washington: DC, April 2018) and Ben Werner, "Focus on Critical Thinking is Key in New Navy Education Study," *USNI News*, (Annapolis, MD: August 2018).

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