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Education in Nuclear Deterrence and Assurance

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Abstract

This study elaborates on actions taken by the United States air force towards the goal of increasing critical thinking of members of the nuclear enterprise about nuclear deterrence and assurance. Critical thinking is best sought via education, as opposed to training and accordingly member of the nuclear enterprise has several new options for part-time distance learning education supported by the air force together with military and civilian academia. Especially since the air force had just begun sponsoring members, these students could be considered "beta-test" cases, and the air force has initiated a rigorous academic program review to solicit student feedback in addition to professional feedback from the student's organizations (to ascertain if the education is improving critical thinking at work).

Keywords: Nuclear deterrence; Nuclear assurance; Distance learning; Critical thinking nuclear enterprise

Abbreviations

AFIT: Air Force Institute of Technology, CWMD: Countering Weapons of Mass Destruction, NC3: Nuclear Command and Control Communications, NWEPP: Nuclear Weapons Effects, Policy, and Proliferation, PCE: Professional Continuous Education, PSU: Portland State University

Introduction

This study elaborates on actions taken by the United States air force towards the goal of increasing critical thinking of members of the nuclear enterprise about nuclear deterrence and assurance. Critical thinking is best sought via education, as opposed to training and accordingly member of the nuclear enterprise has several new options for part-time distance learning education supported by the air force together with military and civilian academia.

Materials and Methods

Recent novel efforts to increase critical-thinking in the nuclear enterprise provides for several new education programs available to members of the enterprise, whether the members are active-duty military members (officer and enlisted) or military civilians. The following discussion will begin with a detailed elaboration of the programs being used to seek increased critical thinking, which is followed by a brief historical background that highlights the current deficiency. Descriptions of the various programs are taken directly from their respective websites and cited sequentially in the References.

New educational opportunities in nuclear deterrence

Defense and Strategic Studies: Missouri State University's Department of Defense and Strategic Studies (DSS), located in the Washington D.C. metropolitan area, provides professional, graduate-level education in national security policy; cyber security; WMD proliferation; international terrorism; military operations; global security challenges; foreign policy; arms control; missile proliferation; international security affairs; defense policy analysis, planning and programs; and intelligence analysis

Graduate certificate-Nuclear deterrence: Harvard designed this distance learning certificate to "gain understanding of the history and contemporary issues related to nuclear deterrence, security, nonproliferation, and arms control." The professional graduate certificate in nuclear deterrence requires four courses: required courses in nuclear weapons and international security, deterrence history, and deterrence theory, plus one elective selectable from a group of courses. These courses yield the following key outcomes: 1) Understanding of nuclear deterrence theory, the history of nuclear weapon development and proliferation, and the cold war's impact on the arms race; 2) Knowledge of the types and effects of the various types of delivery systems and nuclear arms, such as intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles; and 3) Insight into past and current international relations' frameworks, nuclear security policies in the US and other nation–states in the post-Cold War era, and the changing context of global conflict. The certificate is offered by Harvard's Extension School via distance learning/online methods [1].

Graduate certificate-International security: Stanford University offers the International Security graduate certificate which provides the opportunity to acquire a background in treaties and policy as context for work in defense systems, verification, and other complex security issues, examine global security problems and policy-relevant solutions, understand the relationship between technology and security threats, and explore domestic & international elements influencing the use of force. The program requires 3 courses selectable from five choices including the international history of nuclear Weapons (taught by Professor David Holloway), international security in a changing world (taught by Professor Scott Sagan) which emphasized nuclear nonproliferation, and technology and national security (taught by former Secretary of Defense Bill Perry, former Strategic Command Commander Admiral Jim Ellis, and Professor Siegfried Hecker [2].

Master of liberal arts-Government: Harvard's master's degree in the field of government is designed to: 1) Build an understanding of government's role in relation to economics, education, ethics, history, law, philosophy, and sociology, 2) Gain crucial theoretical and practical

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insights into governance and other challenges of governmental and nongovernmental administration, 3) Explore political practice and theory, and analyze political behavior, cultures, and systems. The degree includes 12 courses, three of which are taken on campus at Harvard. Courses from the nuclear deterrence graduate certificate can be applied towards this degree [3].

Master of liberal arts-International relations: Harvard's master's degree in the field of international relations is designed to gain critical insight into today's pressing global issues and a deep understanding of the factors influencing relationships between nation-states and supranational organizations. Through the master's degree field in international relations you: 1) Gain an understanding of the perspectives and implications of global issues, such as poverty, genocide, armed conflict, terrorism, human rights, and the environment; 2) Develop critical insights and analysis of the precursors, processes, and outcomes of international interactions between governments, organizations, businesses, groups, and individuals; and 3) Build knowledge of the evolution, operations, and complexity of regional and global governmental and nongovernmental institutions dealing with trade, economies, and international law [4].

Online master's degrees in war studies: Three online master's degrees are offered by King's College London whose content includes nuclear deterrence and assurance in the context of international relations, modern war and airpower. War Studies Online degrees are two-year part-time degree programs. Students complete taught modules in two academic years and then have six months to write a 15,000-word master's-level thesis referred to as a dissertation by King's College [5].

- ***Master of arts air power in the modern world:*** This fully online two-year part-time degree builds on the "war in the modern world" program, designed for everyone interested in warfare from 1945 to the present day, with special reference to the seemingly ubiquitous role of air power [6].

- ***Master of arts international relations and contemporary war:*** This fully online two-year part-time degree provides students with deep and systematic understanding of the historical evolution of the international system and contemporary war, and critical awareness of current problems and new insights. Core modules provide advanced training in the main conceptual and theoretical debates within the discipline of international relations and apply them to current problems and issues in contemporary war [7].

- ***Master of arts war in the modern world:*** This fully online two-year part-time degree is designed for everyone interested in warfare from 1945 to the present day. It is advertised to be a rigorous, academically tested program [8].

Bachelor's master's and doctorate degrees focused on strategic security: National American University through its acquisition of Henley Putnam University now offers over 150 courses, 7-degree programs, and 31 certificate programs focused on Strategic Security exclusively online. The university offers part-time distance learning curricula leading to bachelors, masters, and doctoral degrees [9].

New educational opportunities in nuclear assurance-Nuclear command and control communications

Graduate certificates in nuclear command and control communications (NC3): The Naval Postgraduate School has proposed new graduate certificates for students of nuclear assurance. The certificate contains courses dedicated to components of the NC3 system: space component including military satellite communications and factors that degrade performance like the space environment; ground component including ground stations and operations centers, and command-and-control (C2) component.

Master of science degree in nuclear operations: The Naval Postgraduate School has proposed a new master of science degree comprised of constituent graduate certificates. The degree is tailorable to some extent beyond the core, required courses in nuclear command and control communications, and can include component certificates in social science, and operational and informational sciences to complement the core engineering and applied science courses to bestow a unique multi-disciplinary education where students learn to deal with detailed technology questions, but also learn the meaning and impacts of technology on nuclear deterrence and assurance.

Master of engineering-Systems engineering: Portland State University (PSU) offers a master's degree in engineering with specialization in a system of interest to you, over 1-7 years. Students who are part of an approved air force nuclear enterprise cohort may use courses taken as part of the nuclear weapons effects, proliferation and policy certificate at the air force institute of technology as part of PSU's systems engineering master's degree, and furthermore graduate research for the degree will be guided by the air force global strike command [10].

Graduate certificate-Decision analysis: Decisions made at many levels can have a profound effect on the outcome of a company. Overall success or failure can hang on a single action, which is why decisions need to be based on thorough analysis of multiple and often competing variables. Stanford's decision analysis graduate certificate develops the skills and mindset professionals need to succeed as managers in a technical environment. Through a combination of probabilistic risk analysis, case studies on international conflict and mathematical modelling, students will learn techniques that reliably lead to effective decisions and clearly demonstrate why they are valid. After examining a variety of data from the fields of health care, finance, and engineering, students will be capable of the advanced analysis that supports critical, strategic decisions. The focus of this certificate includes developing rules of thought to transform complex decisions into situations with a clear course of action; learning powerful distinctions that improve personal decision-making and help others to make important decisions; probability and risk assessment where multiple, changing factors come into play; and thee theory of decision analysis [11].

New educational opportunities in nuclear studies

Graduate certificate in countering weapons of mass destruction: Missouri State University's department of defense and strategic studies offers a graduate certificate in countering weapons of mass destruction (CWMD) designed for but not limited to, mid-career professionals who are enrolled as "national defense university fellows". The graduate certificate in countering weapons of mass destruction is intended for those who have a defined but compressed period of time for their education, yet desire advanced study of major defense and strategic issues to further their career. Prospective students may enroll in the fall, spring, or summer semester. Once admitted, they must complete 15 credit hours selected from the list below in order to receive the certificate. Students may attend full-time (3 seminars per semester) or part-time (1 or 2 seminars per semester) [12].

Graduate certificate in nuclear weapons effects, policy, and proliferation (NWEPP): The air force institute of technology (AFIT) offers a program targeted to mid-career air force officers, non-

commissioned officers, and civilians with current or future assignments in the air force and department of defense nuclear enterprise. The primary focus of NWEPP is providing formal graduate education in the areas of nuclear weapon effects, nuclear proliferation and technologies, and nuclear weapon strategy and policy to the Air force's operational nuclear community. The NWEPP program consists of three 10-week academic quarters (~9 months), part time. Students must complete all three courses, and maintain a grade point average of at least 3.00. The student must fulfill the course and grade-point-average requirements within 2 years of enrolling and successfully completing the first course. Prospective students should be aware that this is a graduate level program with an expected time commitment of at least 16 hours per week for each class. For acceptance into the program a Bachelor degree is required with a minimum cumulative grade-point-average of 3.0 and candidates must have earned a C or better in college level algebra. This program is open to students in residence at AFIT and candidates that are nominated to the program by the air education and training command's (AETC) nuclear staff directorate AETC/A10 in consultation with air force global strike command (AFGSC). Interested persons outside of this scope must coordinate with AETC/A10 to gain entry. This certificate is available to US citizens only [13].

Master of science in nuclear studies: The Air Force Institute of Technology is developing a new degree program that incorporates professional continuous education (PCE) courses in nuclear deterrence operations (nuclear 200, nuclear 300, nuclear 350, and nuclear 400) together with certificate programs listed above that substantiate concentrated bodies of knowledge in nuclear studies. Mandatory courses include the four PCE courses plus the three courses in the NWEPP certificate, after which the student may tailor their studies using one-to-two distance learning graduate certificates described above [14].

Nuclear 200-AF nuclear fundamentals course: A four-day, in-residence course designed to enhance awareness of the air force nuclear mission the course covers nuclear weapon fundamentals, force structure, nuclear stockpile guidance and planning, the department of defense nuclear surety program, the nuclear community, and current issues related to the air force's nuclear mission. Attendance is controlled by quota allocations to each major command organization.

Nuclear 300-Advanced nuclear concepts: The purpose of the nuclear 300 course covers nuclear history and lifecycle, nuclear effects and surety, nuclear policy/strategy, the US Nuclear Enterprise, nuclear incident response, and stockpile sustainment. The focus of this course is for 'core nuclear' individuals at the 9+ year point working in the nuclear enterprise at the level of a number air force's division chief, a branch chief at a major command organization or an action officer in an air force headquarters or joint organization. Also, squadron commanders from nuclear career fields that have not attended before selection for command should attend this course.

***Nuclear 350-Science and technology frontiers of nuclear weapon delivery systems*:** This (to-be-developed) course will cover scientific and historical aspects of first, second and third offset strategies for the USA defense along with enabling and game changing scientific and technological areas for nuclear delivery systems and nuclear command and control communications.

Nuclear 400-Senior leader nuclear management: The focus of this two-day nuclear issues course is for senior leaders working internal to the nuclear enterprise in a job at the level of military colonels or flag officers (generals and admirals) and civilian-equivalents that have nuclear responsibilities anywhere in their portfolio of responsibilities. Attendance is by invitation. The course is offered twice a year at Kirtland AFB.

Results and Discussion

Pre-2013: Taiwan fuses, inadvertent flight

According to Arms Control Today [15], in March 2008 "Pentagon admitted March 25 that it had mistakenly shipped four nuclear-weapon fuses to Taiwan in August 2006. The fuses had been shipped instead of four replacement helicopter batteries, which Taipei had ordered." The incident was a second recent embarrassment for the USA nuclear establishment and led to strengthened calls for a more thorough re-evaluation of the nation's nuclear security than will be provided by the currently scheduled report. The first was in August of 2008 when the air force lost track of six nuclear warheads for 36 hours when they were inadvertently flown on a B-52 bomber between bases in North Dakota and Louisiana [16]. By December, the honorable (former admiral) James Schlesinger had published the "Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management" [17] containing the damning assessment:

"Within the department of defense as a whole, the task force detected some of the same forces at work as were discerned in the case of the air force: loss of attention and focus, downgrading, dilution, and dispersal of officers and personnel. This reflected a failure to appreciate the larger role of deterrence-as opposed to warfighting capability. Consequently, both the uniformed services and individual commands have diverted resources away from sustaining the deterrent to other purposes, which appeared more pressing."

The report went further to state a lack of education on nuclear deterrence has contributed to this problem. This shortfall of experience and understanding will become even more acute among senior leaders in the future. Renewed emphasis should be placed on education in and advancement of deterrence theory, strategy, and policy. The report also recommended the chief of naval operations (CNO) should require a greater number of naval officers to complete appropriate educational programs to sustain expertise required to support leadership and staff billets in deterrence policy and strategy positions as well as nuclear operations and technical matters with similar recommendations for the army and air force. The secretary of defense should direct a comprehensive review of the curricula of all academies, service schools, and senior-level professional military education institutions and provide recommendations for strengthening the understanding of deterrence theory, strategy and policy on the part of military leaders through revised or new courses, research, and analysis.

The air force's inspector general's deputy for intelligence published a report in 2009 Status of Recommendations to Improve the Air Force Nuclear Enterprise [18] which described the air force as addressing all 107 of the recommendations contained in the command directed investigation and reports, while amongst the key issues still needing to be addressed included "developing effective recruiting and retention plan to build expertise in the nuclear program." Six of twelve force development recommendations remained open, while a key closed recommendation included a review of the various command-sponsored, nuclear-related courses and determine whether they should remain within each major command or be offered on an enterprise-wide basis.

By the order of the secretary of the air force in a 2011 policy directive numbered 13-5 [19] identified air education and training command (AETC) duty to develop and sustain robust and realistic nuclear training and education programs. Strategic nuclear deterrence, extended deterrence, and nuclear culture will be emphasized at all levels of air force developmental education.

Flight plan for the nuclear enterprise, 2013

Vectors provide strategic level, long-term guidance to the nuclear enterprise. Successful execution requires that "vector champions" apply their understanding of deterrence principles and priorities to vector guidance in order to develop action plans for improvement, along with mechanisms to assess and track progress. Vector champions advocate for their plans at the nuclear oversight board (NOB), implement actions within their authority, and request NOB support for plan execution, as necessary. Once approved, vector champions, with the support of the nuclear issues resolution and integration board (NIRI) and nuclear working group (NWG), track action plans and provide periodic updates to the NOB. Strengthening is a continuous process and vector champions will continually evaluate progress and revise action plans as needed to further the goals of each vector. Progress and plans must be regularly monitored, assessed, and maintained to ensure continuous improvement in the nuclear enterprise. The following five vectors were assigned to their respective vector champions in the 2013 "Flight Plan for the Nuclear Enterprise" [20].

Vector 1: Deliberately develop and manage an experienced cadre of airmen with nuclear expertise to support and conduct nuclear deterrence operations (NDO). Vector Champion is AF/A1.

Vector 2: Build, mature, and sustain robust Air force organizations and processes to provide advocacy, support, and guidance for NDO. Vector Champion is AF/A10.

Vector 3: Ingrain continuous, rigorous self-assessment and improvement throughout the NE. The vector Champion is AF/A10.

Vector 4: Establish and maintain an integrated, strategic approach to meet the Nation's needs for Air force-provided deterrence and assurance capabilities. The vector Championis AF/A10.

Vector 5: Develop and foster Air force critical thinking on deterrence and assurance. The vector Champion is Air Education and Training Command.

The objective of this vector is to develop Airmen with a comprehensive understanding of deterrence and the ability to apply critical thinking to the deterrence challenges of the twenty-first century. This includes developing an Air force vision for deterrence that will resonate with every Airman. We will instill in all Airmen an enduring professional understanding of the Air force role in deterrence that is supported by conventional, space, cyber, ISR, and nuclear capabilities. We will deliberately develop Airmen and leaders who have the tools and expertise to advance critical thinking in these areas. We will foster an analytically-based understanding of the role of nuclear weapons in twenty-first century conflicts and examine how other countries view nuclear weapons and their thresholds for use. Successful execution of this vector will re-establish Air force intellectual leadership in deterrence and assurance by engaging with the broader community to develop conceptual and pragmatic approaches to future deterrence and assurance challenges. Action plans to advance intellectual capital will include development of curricula and training plans to instill critical thinking about deterrence in our Airmen and engagement plans to increase Air force interactions in the broader deterrence community, including public, government, military, and academic circles. Airmen should be encouraged to develop papers and articles for publication in academic and professional journals and engage in forums on deterrence and assurance.

Strategic master plan

From page 3 of the plan: "The Air force will increase Agility by strengthening our culture of adaptability and innovation in Airman development and education, capability development, operational training and employment, and organizations."

"The Air Force Strategy's five strategic vectors identify priority areas for investment, institutional change, and operational concepts: Provide effective 21st-Century deterrence: The nuclear mission remains the clear priority…"

Page 4 goes on to describe (with emphasis added), "…the strategic master plan represents a significant shift in the way the Air force conducts its business". Resources are directed on page 7, "These vectors [in this plan] will guide investments…" The first strategic imperative is highlighted on page 13 (with emphasis added), "The air force will enhance agility by strengthening our culture of adaptability and innovation by long-term investments in: airman development and education, specifically related to recruiting and new options for service, retention, and education."

The Air force is directed to pursue a very challenging task on page 14 to "unlock capacity for comprehensive education. The Air force will develop Airmen who are critical and creative thinkers by implementing an agile, individually tailored approach to life-long education, and eliminating superfluous demands from already encumbered schedules."

Two years after the air force's strategic master plan the United States House of Representatives seemed to add some imperative for action, "… the (secretary of defense) should take appropriate steps to refocus the military member education to ensure it is adequately covering, across-the-board, the essentials of nuclear deterrence policy and operations (including such concepts as strategic stability and escalation control)" [21].

Program action directive centralized management of the nuclear enterprise

Air force general Robin Rand the commander of the global strike command testimony in the hearing on National Defense Authorization Act for fiscal year 2017 report [22] describes the program action directive for centralized management of the nuclear enterprise as the implementation of the nascent effort to modernize nuclear command and control communications (NC3). NC3 remains a key piece of future education efforts for the nuclear enterprise.

Conclusion

The air force had just begun sponsoring members of the nuclear enterprise in several distance learning education opportunities seeking to enhance their critical thinking. These students could be considered "beta-test" cases, and the air force has initiated a rigorous academic program review to solicit student feedback in addition to professional feedback from the student's organizations (to ascertain if the education is improving critical thinking at work).

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