

# Anticipating the Future: Continuing Officer Education Beyond the Captains' Career Course

A Monograph

by

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## Abstract

Anticipating the Future: Continuing Officer Education Beyond the Captains' Career Course, by MAJ Eric E. Norgard, 48 pages.

If the past is any indicator, future operational environments will be challenged with newer and deadlier Chemical, Biological, Radiological and Nuclear (CBRN) threats. The CBRN threats of the past have informed the doctrine and learning of today but our Professional Military Education precludes institutional learning beyond the Chemical Captains' Career Course (CCCC). In respect to the US Army Chemical Corps, this is a significant educational and developmental gap that harms our officers' ability to understand emerging threats in the future. The fourth year in the Army after the CCCC should not be the end of branch-specific officer education.

This monograph does not advocate for the creation of a new or a series of new PME courses. In a resource constrained environment, that is not a reasonable conclusion. Instead, this monograph seeks to evaluate the resources we have available now and developing upon them to create further learning throughout the entirety of the officer's career. This is accomplished through an open-source review of current and future CBRN threats, review of the current chemical officer PME Programs of Instructions (POI), literature reviews of 'how learners learn' and proposed methods to create the instructional medium. Lastly, recommendations are offered to facilitate education throughout the entire officer's career.

## Contents

Abstract.....	iii
Acknowledgments.....	v
Acronyms.....	vi
Illustrations .....	vii
Introduction.....	1
Threats from the World in Which We Live .....	2
Officer Education Today.....	7
How Learners Learn .....	12
Instructional System Design and Integration.....	21
Educating for the Future: Recommendations for Future Learning .....	29
Continuing Professional Education .....	30
Tabletop Exercises.....	32
Case Studies.....	33
Webinar .....	34
Good Judgement Project.....	35
Conclusion and Opportunities for Future Research.....	36
Bibliography .....	38

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## Acronyms

ADDIE	Analyze Design Develop Implement Evaluation
ADP	Army Doctrine Publication
BOLC	Basic Officer Leadership Course
CBRN	Chemical Biological Radiological Nuclear
CCC	Captains' Career Course
CCCC	Chemical Captains' Career Course
COIN	Counter Insurgency
COVID	Corona Virus Disease
CWC	Chemical Weapons Convention
DOTLD	Doctrine Organization Training & Leader Development
DSCA	Defense Support of Civilian Authorities
DTRA	Defense Threat Reduction Agency
FEMA	Federal Emergency Management Agency
FM	Field Manual
FTX	Field Training Exercise
HAZMAT	Hazardous Materials
ISD	Instructional System Design
Kt	Kiloton
LSCO	Large Scale Combat Operations
NGO	Non-Governmental Organization
OCS	Officer Candidate School
OPCW	Organisation for the Prohibition of Chemical Weapons
OPTEMPO	Operational Tempo
PME	Professional Military Education
ROTC	Reserve Officer Training Corps
TRADOC	Training and Doctrine Command
UN	United Nations
USMA	United States Military Academy
VX	Venomous Agent X
WMD	Weapons of Mass Destruction

## Illustrations

Figure 1: National Planning Scenarios (FEMA).....	3
Figure 2: Simulated 15kt Nuclear Explosion at Kansas City, Mo.....	6
Figure 3: Bloom’s Taxonomy.....	13



## Introduction

We live in very uncertain and unpredictable times. Our past has been characterized by highly formative black swan events, such as 9/11, that have significantly changed the US Army officer education system. In the field of CBRN, both threats of the past and the future will continually challenge commanders of future operational environments. While there have been small scale CBRN attacks from state and non-state actors, they have not been significant in terms of widespread death. Despite this, if the past is any indicator, the future will hold complex threats that we may not have prepared for in the institutional domain.

This monograph focuses on how the US Army continues to conduct education and engage its chemical officers throughout their careers. This monograph seeks to provide a framework and opportunities for the officer to continue to develop as a tactical, operational thinker long after the Chemical Captains' Career Course (CCCC). Written through the perspective of challenges facing the Chemical Corps, the final recommendations could apply to any branch in the US Army.

The guiding research question for this monograph is, "How does the US Army Chemical Corps continue and implement officer Professional Military Education (PME) beyond CCCC to posture itself to meet the threat of CBRN events throughout the entirety of the officers' career?"

The events of 9/11 instantly changed how the military confronted threats. Before 9/11, the training and education focus was on Large Scale Combat Operations (LSCO). In the aftermath of 9/11, the Army faced a new warfare style in Counter Insurgency Operations (COIN) that it hadn't seen since the Vietnam War. COIN was a significant paradigm shift that has challenged how its officer and enlisted soldiers understood warfare for the last nineteen years. In this era, there has been little emphasis on CBRN threats. The rise of competitors in Russia, China, Iran, and North Korea have resulted in an educational and doctrinal shift to an emphasis on LSCO. These long multi-decade swings in time from LSCO to COIN to LSCO have begotten a new generation of officers that may be challenged by complex CBRN challenges in a LSCO environment.

Army officers should always seek to develop their cognitive understanding of current and future challenges and threats as a community of professionals. Since the early 20th century and the introduction of chemical and biological weapons (later nuclear), the Chemical Corps has been at the forefront of protecting the nation from these threats. The threats will not go away. New threats will begin to present themselves. Army officers and Department of Defense (DoD) civilians will need to be in a constant state of development to meet, match, and confront these threats, both known and unknown.

The US Army has been challenged with a diverse spectrum of CBRN threats in the past. Chemical threats include nerve agents such as Sarin, Venomous Agent X (VX) gas, and Novichok. Biological hazards include the malicious Anthrax to the novel Coronavirus or Corona Virus Disease 2019 (COVID-19). Radiological threats include the radiological dispersal device or a 'dirty bomb.' The nuclear threat would be in the form of a nuclear bomb like the Nagasaki and Hiroshima bombs. This monograph does not suggest a solution to these threats. Instead, the monograph seeks to rouse thought on approaching the CBRN challenges of the future by instilling a culture of education after the CCCC.

## Threats from the World in Which We Live

Offered by the Federal Emergency Management Agency, the National Planning Scenarios demonstrate the threat of a CBRN attack is both real and plausible (see Figure 1). Eleven out of fifteen of the National Planning Scenarios are in some way CBRN related that will require a Hazardous Materials (HAZMAT) team's response.<sup>1</sup> The scenarios are an amalgamation of foreseeable threats so that emergency personnel (both first and second) can plan their organization's response. The primary audience for the National Planning Scenarios is not typically active duty due to Posse Comitatus and Defense Support of Civilian Authorities (DSCA) considerations. However, there is a likelihood that the active duty will become augmented if the CBRN event exceeds the capabilities of local responders.

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<sup>1</sup> "National Planning Scenarios," Federal Emergency Management Agency, accessed October 25, 2020, <https://www.hsd.org/?view&did=683091>.

National Planning Scenarios	
Key Scenario Sets	National Planning Scenarios
1. Explosives Attack – Bombing Using Improvised Explosive Device	Scenario 12: Explosives Attack – Bombing Using Improvised Explosive Device
2. Nuclear Attack	Scenario 1: Nuclear Detonation – Improvised Nuclear Device
3. Radiological Attack – Radiological Dispersal Device	Scenario 11: Radiological Attack – Radiological Dispersal Device
4. Biological Attack – With annexes for different pathogens	Scenario 2: Biological Attack – Aerosol Anthrax Scenario 4: Biological Attack – Plague Scenario 13: Biological Attack – Food Contamination Scenario 14: Biological Attack – Foreign Animal Disease
5. Chemical Attack – With annexes for different agents	Scenario 5: Chemical Attack – Blister Agent Scenario 6: Chemical Attack – Toxic Industrial Chemicals Scenario 7: Chemical Attack – Nerve Agent Scenario 8: Chemical Attack – Chlorine Tank Explosion
6. Natural Disaster – With annexes for different disasters	Scenario 9: Natural Disaster – Major Earthquake Scenario 10: Natural Disaster – Major Hurricane
7. Cyber Attack	Scenario 15: Cyber Attack
8. Pandemic Influenza	Scenario 3: Biological Disease Outbreak – Pandemic Influenza

Figure 1: “National Planning Scenarios,” Federal Emergency Management Agency, accessed October 25, 2020, <https://www.hsdl.org/?view&did=683091>.

As the designated organization to ensure compliance of the Chemical Weapons Convention (CWC), the Organisation for the Prohibition of Chemical Weapons (OPCW) conducts identification and verification of the 193 member countries.<sup>2</sup> Entered into force in 1997, the CWC bans the use of chemicals for offensive purposes by the member countries.<sup>3</sup> Because the signatories are nations, the CWC applies primarily to ‘state actors’ willing to obey international laws and norms. The National Planning Scenarios ignore whether the attack is sourced from a state or non-state actor because that knowledge doesn’t change the CBRN attack's effects.

<sup>2</sup> “Mission: A World Free of Chemical Weapons. 2020,” Organisation for the Prohibition of Chemical Weapons, accessed September 13, 2020, <https://www.opcw.org/about-us/mission>.

<sup>3</sup> Daryl Kimball, “The Chemical Weapons Convention (CWC) at a Glance,” Arms Control Association, accessed October 25, 2020, <https://www.armscontrol.org/factsheets/cwcglance>.

of mass destruction is a threat to international peace and security.”<sup>4</sup> In 2017, Kim Jong Nam (Kim Jong Un’s half-brother) was the victim of a VX attack in Malaysia.<sup>5</sup> The attack on Kim is significant because it highlights how little effort is needed to release a lethal weapon such as VX so clandestinely. VX, being a tasteless and odorless oil-like substance was easily smuggled into a pen cartridge released on Kim Jong Nam. Twenty minutes later, after experiencing coughing symptoms, tightening chest, and blurry vision, Kim Jong Nam was dead.<sup>6</sup>

In 2020, Alexei Navalny was the subject of a deliberate chemical attack by Novichok (Russian for ‘newcomer’).<sup>7</sup> Novichok is a 4th generation chemical agent that paralyzes the heart muscles, including the ones needed for breathing. Novichok is five to eight times more toxic than VX nerve agent. The road to recovery is long if they survive the threat of death. After three weeks in a medically induced coma, Navalny emerged responsive to verbal stimuli.<sup>8</sup> Now, Navalny is fully recovered and currently imprisoned in Russia. Navalny's poisoning is significant because it represents a sinister step toward using more toxic agents by non-state (or state) actors.

In 2020, the White House was the target of an attempted Ricin attack.<sup>9</sup> Ricin comes from the waste of Castor beans that has no known antidote. Ricin is a biological weapon with a delivery system that includes being aerosolized and ultimately inhaled. Ricin can be ingested from poisoned food or a contaminated water supply. Inhaled Ricin causes fever, chest tightness, cough, and respiratory problems

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<sup>4</sup> Vladimir Voronkov, “Ensuring Effective Interagency Interoperability and Coordinated Communication in Case of Chemical and/or Biological Attacks,” United Nations, accessed October 20, 2020, [https://www.un.org/sites/www.un.org.counterterrorism/files/uncct\\_ctitf\\_wmd\\_wg\\_project\\_publication\\_final.pdf](https://www.un.org/sites/www.un.org.counterterrorism/files/uncct_ctitf_wmd_wg_project_publication_final.pdf).

<sup>5</sup> Bruce Bennett, “Death by Nerve Gas: Two Arrests, Many Questions in Attack in Malaysia,” RAND, accessed October 22, 2020, <https://www.rand.org/blog/2017/03/death-by-nerve-gas-two-arrests-many-questions-in.html>.

<sup>6</sup> Ibid.

<sup>7</sup> “Navalny 'poisoned': What are Novichok agents and what do they do?,” British Broadcasting Corporation, accessed October 22, 2020, <https://www.bbc.com/news/world-europe-43377698>.

<sup>8</sup> Ibid.

<sup>9</sup> Katie Benner, “Ricin Is Said to Have Been Sent to White House,” *New York Times*, accessed October 24, 2020, <https://www.nytimes.com/2020/09/19/us/politics/ricin-white-house-postal-service.html>.

that may become fatal.<sup>10</sup> Ricin is just one of many biological weapons that can, in some cases, cause fatalities but will always cause panic in the immediately affected area.

Biological agents come in different forms. On one end of the spectrum are malicious biological agents such as Anthrax. On the other end are natural biothreats in toxins that come from living organisms such as animals. Anthrax was first used in 2001 in the post 9/11 mailings as a malicious biological agent.<sup>11</sup> Easy to cultivate using standard laboratory equipment, the biologist can create large quantities of Anthrax.<sup>12</sup>

Distinctively different from the biological threat of Anthrax is the novel (new) Coronavirus or COVID-19. COVID-19 is a major biological challenge for the world because of its transmissibility.<sup>13</sup> COVID-19's transmissibility is established by its  $R_0$  (pronounced as "R-naught"). COVID-19 is widely accepted to have a  $R_0$  of 1.4-3.9.<sup>14</sup> The  $R_0$  means that for everyone one person that is infected, they will infect 1.4-3.9 other people. Inverse to chemical threats, biological threats are hazardous because they take longer for the body to demonstrate symptoms (because the immune system initially engages the pathogen or toxin), fast-spreading, and hard to pinpoint to their source.

Elena Sokova of the Center for Nonproliferation Studies posits two scenarios for non-state actors to obtain nuclear weapons. They are (1) the acquisition of a nuclear device from the existing arsenal of nuclear-armed states and (2) constructing a crude atomic bomb using highly enriched Uranium or

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<sup>10</sup> Pritish Tosh, "What is ricin, and what should I do if I'm exposed?," Mayo Clinic, accessed October 23, 2020, <https://www.mayoclinic.org/ricin/expert-answers/faq-20057863>.

<sup>11</sup> "A History of Anthrax," Center for Disease Control and Prevention, n.d., accessed October 25, 2020, <https://www.cdc.gov/anthrax/resources/history/index.html>.

<sup>12</sup> Charles Ornstein. "Anthrax Easy to Grow, Distribute," *LA Times*, accessed October 23, 2020, <https://www.latimes.com/archives/la-xpm-2001-oct-14-mn-57096-story.html>.

<sup>13</sup> Setu K. Patolia, "COVID-19 Pulmonary Management," *Medscape*, accessed October 25, 2020, <https://emedicine.medscape.com/article/2500117-overview#a1>.

<sup>14</sup> Erin Schumaker, "What is R-naught for the COVID-19 virus and why it's a key metric for re-opening plans," ABC News, accessed October 24, 2020, <https://abcnews.go.com/Health/r0-covid-19-virus-key-metric-opening-plans/story?id=70868997>.

Plutonium.<sup>15</sup> The fulfillment of either of these scenarios is in the realm of possibility with the right resources and planning. One of these scenarios will occur if there is a severe and significant gap in nuclear storage sites' security. Through the United Nations, International Atomic Energy Agency, and some Non-Governmental Organizations (NGO), there is a lot of effort to prevent these sites' breach. Should a violation and a follow-on attack occur, the nation' CBRN resources must be ready to respond on behalf of the American people. Figure 2 visualizes what a 15 Kiloton (Kt) nuclear explosion (similar to the Hiroshima bomb) in Kansas City, Missouri, could look for illustrative purposes.

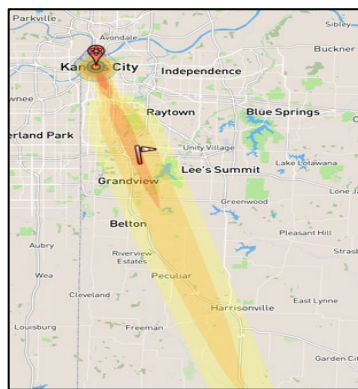


Figure 2: Alex Wellerstein, "Simulated 15kt Nuclear Explosion at Kansas City, Mo.," Nukemap, accessed October 25, 2020, <https://nuclearsecrecy.com/nukemap/>.

The dirty bomb is a crude radiological weapon that is easy to acquire and has devastating consequences when exploded. The dirty bomb combines conventional explosives such as dynamite with radioactive material. When detonated, the dirty bomb's effects are highly psychological. Often referred to as a 'weapon of mass disruption' (as opposed to a weapon of mass destruction), dirty bomb deaths are caused more by the conventional explosive than the radiological fallout.<sup>16</sup> Additionally, the explosion creates an extensive contamination area.

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<sup>15</sup> Elena Sokova. "Understanding Nuclear Weapon Risks: Non-State Actors and Nuclear Weapons," Middlebury Institute of International Studies at Monterey, accessed October 25, 2020, <https://nonproliferation.org/understanding-nuclear-weapon-risks-non-state-actors-and-nuclear-weapons/>.

<sup>16</sup> Tom Harris, "How Dirty Bombs Work," How Stuff Works, n.d., accessed October 25, 2020, <https://science.howstuffworks.com/dirty-bomb.htm/printable>.

The threat of a CBRN attack is real. The preparation and response to a CBRN attack is a whole-of-government approach that requires every responder (local, state, and federal) to be competent and ready to mitigate the effects of the attack and human suffering. This can be achieved through education that recognizes past challenges with an eye to the future. While there are many unknowns regarding the potential for future chemical attacks, a continued dialogue among the community of professionals can help improve the cognitive understanding of future threats and challenges.

Gaining an understanding of the current and future CBRN operational environment demonstrates that there is a need for self and group guided profession development throughout a US Army officer's career. CBRN agents and threats are constantly in a state of evolution towards becoming deadlier and harder to identify. Prior to 2019-20, the agent Novichok was not in public knowledge or curriculum. As a novel agent, Novichok required the community of professionals to learn and adapt to its lethality after it was used openly. In the course of time, new agents and threats will be developed and sought to be employed by state and non-state actors. The challenge for the community of professionals is to continually prepare, learn and adapt to the unmanifested threats.

## Officer Education Today

Training and Doctrine Command (TRADOC) Pamphlet 525-8-2 (The US Army Learning Concept for Training and Education 2020-2040) provides guidance and direction for the future of Army learning. The pamphlet defines learning as “the acquisition of new knowledge or skill by experience, instruction, study, or a combination of all three.”<sup>17</sup> Throughout an officers' career, learning is continuous. It should not end when institutional learning ends. The future operating environment is complex, unknown, and evolving. Army officers will need enduring branch-specific education to meet the complex future operating environment.

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<sup>17</sup> US Department of the Army, Training and Doctrine Command Pamphlet (TRADOC) 525-8-2, *The US Army Learning Concept for Training and Education 2020-2040* (Fort Eustis: Government Publishing Office, 2017), 9.

Army Doctrine Publication (ADP) 7-0 (Training) states that the training of individual tasks occurs in either the operational, self-developmental, or institutional domains.<sup>18</sup> The operational domain “encompasses training activities that unit leaders schedule and individuals, units, and organizations undertake.” This is (organized) training that occurs outside of a structured educational and academic environment. The institutional training domain includes all of the structured joint (and non-joint) military schools in which the officer is a learner. These are schools that are administered by TRADOC or its joint service equivalent. The self-development domain is the domain that is not overtly administered by an operational or institutional domain but is directed only by the officer in accordance with their own learning needs.<sup>19</sup>

Upon completing their commissioning source - US Military Academy (USMA), Reserve Officer Training Corps (ROTC) or Officer Candidate School (OCS) - the new second lieutenant begins their respective branch's technical training. This is called Basic Officer Leaders' Course. During BOLC, the lieutenant is taught a fundamental understanding of their branch of expertise. They are taught its roles, functions, and that branch's contribution to the greater Army mission. After BOLC, they begin service in the operational domain, typically as a platoon leader, company executive officer, or staff officer in a battalion. The second lieutenant in the operational domain gains valuable operational experience serving under a captain or a major. Approximately four years later, the officer attends the CCCC. CCCC is the last time in the officer's career to receive any significant formalized technical training concerning CBRN, aside from the voluntary Technical Escort course.

The re-write of Field Manual (FM) 3-0 *Operations* to include LSCO warfare has significantly influenced CBRN officer education. The re-write has rightfully caused a renewed emphasis on the integration of CBRN operations in a LSCO environment. In response to the re-write of FM 3-0

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<sup>18</sup> US Department of the Army, Army Doctrine Publication (ADP) 7-0, *Training* (Washington, DC: Government Publishing Office, 2019), 1-1.

<sup>19</sup> US Department of the Army, Army Regulation (AR) 350-1, *Army Training and Leader Development* (Washington, DC: Government Publishing Office, 2017), 4.



Operations, seeking to serve the maneuver commander better in CBRN matters, BOLC and CCC changed the curriculum to better support the relationship.<sup>20</sup> Critical to the new direction is that new instruction does not forget about the lessons of COIN over the past twenty years. Additionally, any CBRN instruction must continue to realize the perpetual and immutable threat of terrorism. The current BOLC and CCC curriculum acknowledges these challenges past, present, and future.

As its mission, BOLC seeks to “To train newly commissioned Lieutenants in basic military skills and to prepare them for initial assignment as Chemical officers.”<sup>21</sup> BOLC plays a vital foundational role in the young officer’s career in the second lieutenant's professional evolution. It is a highly formative experience. The BOLC instructs technical fundamentals, emphasizing the administrative responsibilities of a second lieutenant in the operational domain. Additionally, BOLC provides an introduction to current and future CBRN threats.

At sixteen weeks and three days, the CBOLC transforms a new second lieutenant into a chemical platoon leader or a battalion/squadron level CBRN officer. This training occurs throughout eleven different and distinct modules. These modules include (hours of training): Administration (132), Leadership and tactical (145), CBRN Staff Officer (56), Digital Systems (25), Basic Rifle Marksmanship Field Training Exercise (FTX) (96), HAZMAT (80), Nuclear Defense (81), Chemical Defense (82), Biological Defense (42), CBRN Recon (43) and CBRN FTX (105).<sup>22</sup> In aggregation, these training blocks instill the fundamentals need to understand and operate in the operational domain for the second lieutenant.

In the operational domain, the second lieutenant is expected to exude technical and tactical confidence commensurate with their position and that unit's mission. The second lieutenant exercises the

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<sup>20</sup> Byron Galbraith and Matthew Mason. "84th Chemical Battalion: CBRN OTD Training and Integration Initiatives," *Army Chemical Review* (Summer 2018): 12-18.

<sup>21</sup> “CBRN Basic Officer Leader Course,” US Army, n.d., accessed September 15, 2020, <https://home.army.mil/wood/index.php/units-tenants/USACBRNS/Courses/BOLC>.

<sup>22</sup> “Course Management Plan 74A for Chemical Biological Radiological and Nuclear Basic Officer Leader Course B,” US Army CBRN School, accessed September 15, 2020, <https://home.army.mil/wood/application/files/5115/5258/1021/BOLCCMP.pdf>.

technical expertise learned in BOLC. In the first three to four years of the officer's career, there is a tremendous amount of investment by the Army in that officer for branch-specific education. From that point on, branch-specific education only occurs in the operational or self-developmental domain.

After approximately four years in the operational domain, the officer returns to the institutional domain for the CCCC. Much like BOLC, the CCCC is a significant investment by the Army in the officer's educational and professional development. The officer has demonstrated a technical and tactical competency to serve at that senior level of the company grade officer. More so, the officer has shown the ability to handle positions of greater responsibility, such as a company commander or a brigade staff CBRN officer. These are important positions that will be formative for the officer as they later enter the ranks as a field grade officer.

At twenty-one weeks, the CCCC is conducted over seven significant instructional blocks or modules. The modules begin with the common core curriculum. Common Core is 240 delivery hours of instruction that includes course work with examples such as Apply Moral Processing, Establish and Exert Influence, Counseling, and Cross-Cultural Skill Building.<sup>23</sup> Common Core also includes professional development events such as leadership panels with battalion and company commanders.

After common core, the focus shifts to chemical branch-specific instruction. The CCCC curriculum demonstrates there are future CBRN threats that must be confronted. The curriculum includes Effects of Weather/Terrain on Dissemination of Biological Agents, Radiological Operations Clearance Criteria, CBRN agents, and their effects and Countering Weapons of Mass Destruction (WMD) Strategy.<sup>24</sup> Also worth revisiting later in the career of an officer is how equipment has and will change. Technology, such as biological detection equipment, will have undergone many developments due to time and advancements. A recent Air University Press article acknowledges that the speed of technological

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<sup>23</sup> "Course Management Plan for the CBRN Captains Career Course," US Army CBRN School, accessed September 15, 2020, <https://home.army.mil/wood/application/files/3615/5258/1307/C3CMP.pdf>.

<sup>24</sup> Ibid.

change is among one of the “four emergent threats that will drive profound and rapid change over the next 20 years.”<sup>25</sup>

Current CCCC officer education also uses scenario-based training for officers to collaborate and solve problems that have unknown qualities. Mostly inexpensive and abstract, the CCCC uses tabletop exercises to teach their officers to solve unforgiving problems such as chemical weapons release, nuclear blast, or a hazardous materials release. In the CCCC curriculum, the officers use case studies such as The Pentagon and 9/11, 2006 Southwest Asia Tsunami, Minneapolis Bridge Collapse, and a nuclear detonation tabletop exercise to hone their skills as future incident commanders.<sup>26</sup>

Supplemental to Army officer professional education are opportunities to continue education in the self-developmental domain. After validation, the Defense Nuclear Weapons School offers several self-paced and online (also resident) courses to continue education for the officer. Administered by the Defense Threat Reduction Agency (DTRA), the courses offered online include Applied Radiological Response Techniques (level 1), Basics for Radiological-Nuclear Incident Response and Nuclear Safety Studies, and Review.<sup>27</sup> These courses provide opportunities for the officer to advance their education long after their enrollment in the CCCC.

Additionally, civilian administered organizations such as the Federal Emergency Management Agency (FEMA) and the Emergency Management Institute provide online courses to increase the officer’s knowledge of the civilian response to CBRN events. Using DSCA principles, the Emergency Management Institute courses provide valuable insight into how the armed forces augment civilian

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<sup>25</sup> Darryl Roberson and Matthew Stafford. "The Redesigned Air Force Continuum of Learning," *Air University Press* (2017): 1-2.

<sup>26</sup> “Course Management Plan for the CBRN Captains Career Course,” US Army CBRN School, accessed September 15, 2020, <https://home.army.mil/wood/application/files/3615/5258/1307/C3CMP.pdf>

<sup>27</sup> “Radiological & Nuclear Training Course Catalog,” Defense Nuclear Weapons School, accessed September 16, 2020, [https://www.dtra.mil/Portals/61/FY\\_2021\\_Course\\_Catalog](https://www.dtra.mil/Portals/61/FY_2021_Course_Catalog).

authorities. These courses include Introduction to the Incident Command System, Fundamentals of Emergency Management, and Radiological Emergency Management.<sup>28</sup>

The professional officer should always seek to develop professionally, but even the best efforts may fall short of what is required to maintain currency with current and future operational challenges. Organizations such as the Doctrine Organization Training & Leader Development (DOTLD), DTRA, DHS, FBI, and FEMA have an intimate, professional knowledge of future threats that can benefit the education and development of US Army officers. The lack of branch-specific education after CCCC misses the opportunities and experiences of professionals from these agencies.

The curriculum within the BOLC and CCCC courses share and contain a deep understanding of the past, current and future CBRN operating environment. The FEMA, Defense Nuclear Warfare School and DTRA classes provide highly valuable and enhanced knowledge on future threats and how they will affect the OE. In the development of an educational program, it is integral to gain an understanding of pedagogical theories to be incorporated to help learners learn. The next section is a survey of learning theories, that when paired with the future CBRN operating environment, creates the curriculum needed to educationally develop US Army officers after the CCCC.

## How Learners Learn

The geographic distribution of the US Army is a significant challenge to overcome in developing an educational program. Before the appearance of the internet, institutional learning took place in the standard brick and mortar classroom environment. Today, learning takes place in classroom-based, distance learning, blended learning (a combination of classroom and distance learning), and work-based learning.<sup>29</sup> Compounding this, the officers of the Army come from a variety of educational backgrounds

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<sup>28</sup> “Emergency Management Independent Study,” Emergency Management Institute, accessed October 10, 2020, <https://training.fema.gov/is/>.

<sup>29</sup> Charles Juwah, *Interactions in Online Education: Implications for Theory and Practice* (New York: Routledge, 2006), 207.

and experiences. This chapter seeks to help the curriculum developer to develop an educational item that is online, contemporary and relevant to learners' goals.

In creating an educational program, it is vital to have a good understanding of how adults learn. An understanding as to how they learn will help to increase the effectiveness of a proposed educational endeavor. Benjamin Bloom created Bloom's Taxonomy as a way to depict increasing complexity and application of learning. While his taxonomy includes three domains (cognitive, affective, and psychomotor), only the cognitive domain will be discussed for this piece.<sup>30</sup> In curriculum development, the cognitive domain "deals with the recall or recognition of knowledge and the development of intellectual abilities and skills."<sup>31</sup> The taxonomy components, starting at the foundation, are Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.

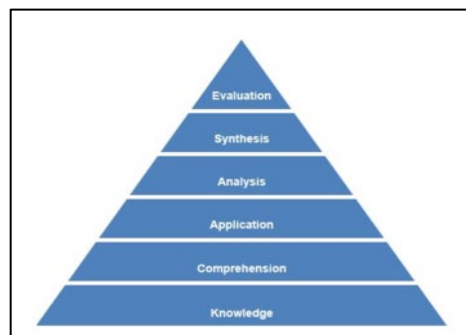


Figure 3: "Bloom's Taxonomy," University of Central Florida, Bloom's Taxonomy. n.d., accessed October 26, 2020, <https://fctl.ucf.edu/teaching-resources/course-design/blooms-taxonomy/>.

Bloom describes knowledge as remembering an idea or phenomenon in the same way that it was encountered.<sup>32</sup> Data is recallable on its face value with no more in-depth interpretation of the information presented. An example of this would be rote memorization of a fact, dates, person, or place.

Comprehension is the translation of an oral or written communication to the receiver that they can understand and make meaning from it. At the comprehension level, the learner can interpret the information provided. An example of this would be a chemical officer memorizing the different types of

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<sup>30</sup> Benjamin Bloom. *Taxonomy of Educational Objectives* (White Plains: Longman, 1984), 7.

<sup>31</sup> *Ibid.*, 8

<sup>32</sup> *Ibid.*, 7

chemical agents. Application is described as the ability to apply or relate and understand a piece of knowledge to another area of information such as demonstrating the knowledge of how the chemical agents effect humans. Bloom further describes Application as “remembering and bringing to bear upon given material the appropriate generalizations or principles.”<sup>33</sup>

Analysis is the level on the taxonomy that should take place in an educational program for US Army officers. This is because it requires the learner to break the information down and to be able to understand the relationships among the parts and how they are organized.<sup>34</sup> An understanding of the future CBRN environment requires thinking that challenges current knowledge that will eventually produce new knowledge which can be applied to future problems. Once the connections are discovered, the learner uses Synthesis to combine the elements back into a whole to give it a different meaning that previously existed. Synthesis also requires a level of creativity from the learner.<sup>35</sup> At the apex of the taxonomy, Evaluation is when the learner has applied the five preceding parts of the taxonomy and can apply sound judgment to the information. Judgment, in this sense, is a cognitive action, not expressive. Evaluation requires a deep understanding of the CBRN material (fictional or real) followed by the creation of new knowledge that can applied to future CBRN events. An example that Evaluation has been achieved is when the learner has identified the presence of a logical fallacy.<sup>36</sup>

As a matter of practice, it is important for the developer and educator to remember that as adults, Army officers learn through different ways. Adults learn either through audio, visual, or discussion-based. Audio learners learn by listening to the material that is presented to them by the educator. Visual learning is based on an observed resource or platform that the learner can interpret with their own eyes. Discussion strategies can combine audio and visual learning to promote learning by verbalizing. For the educator, a conscious understanding of the ways adults (officers) learn is critical to creating a quality educational

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<sup>33</sup> Ibid., 144

<sup>34</sup> Ibid.

<sup>35</sup> Ibid., 162

<sup>36</sup> Ibid., 189

experience. Don Seaman and Robert Fellenz have posited that through discussing and verbalizing many adults learn best in those ways.<sup>37</sup> This is because discussion requires a greater level of engagement in material which results in future recall of material.

US Army TRADOC Pamphlet 525-8-2 proposes that education is defined mainly through two ways of learning. These are cognitive learning and affective learning. Cognitive learning is the knowledge of the content and the “development of intellectual skills.”<sup>38</sup> Cognitive learning is the type of learning most associated with learning based on a form of curriculum. Affective learning is how the learner can deal with things emotionally, such as through “values, motivations, and attitudes.”<sup>39</sup> As such, affective learning increases through time, experience, and maturation.

As a way to define how an adult learns, the term andragogy is used. Andragogy is the “art and science of helping adults learn.”<sup>40</sup> An andragogical educator focuses on preparing the learner and the climate in which they will learn. A focus on andragogy is critical in creating the learning connections required for a CBRN learning program. As such, an andragogical educator is focused on creating an optimal learning experience specifically for the adult learner.

As a framework for developing an education program for adults, the Andragogy Model harnesses the human desire to learn. The model recognizes the knowledge and experiences that adults have compared to the term pedagogy, which is associated with the education of children. It operates on six assumptions that, as a process model, harness engagement in the learning development of an adult learner.

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<sup>37</sup> Don Seaman and Robert Fellenz, *Effective Strategies for Teaching Adults* (Columbus: Merrill Publishing Company, 1989), 120.

<sup>38</sup> US Department of the Army, Training and Doctrine Command Pamphlet (TRADOC) 525-8-2, *The US Army Learning Concept for Training and Education 2020-2040* (Fort Eustis: Training and Doctrine Command, 2017), 10

<sup>39</sup> *Ibid.*, 10

<sup>40</sup> Malcolm S. Knowles, Elwood Holton, and Richard Swanson, *The Adult Learner* (New York: Routledge, 2015), 40

These six assumptions are: (1) The need to know, (2) learner's self-concept, (3) the role of the learner's experience, (4) readiness to learn, (5) orientation to learning, and (6) motivation.<sup>41</sup>

The first assumption needs to know relies on the why, what, and how of the learner.<sup>42</sup> The learner's self-concept means that the learner begins their journey with a higher dependence on the educator. As maturation occurs, the learning becomes more self-directing. The role of the chemical officer's operational experience can be valuable to the professional dialogue. Fourth, readiness to learn assumes that the learner is appropriately and professionally positioned to receive and understand what is taught. The fifth assumption, orientation to learning, identifies that adult learners have different incentives to learn than pedagogic learners. Adult learners understand the importance of education. The last assumption in the Andragogic Model is motivation. The motivation for adult learners is attributed to increased job satisfaction, self-esteem, and quality of life.<sup>43</sup>

In online learning, the educator has responsibilities that must be met to provide a quality educational experience. Charles Juwah posits that an educator should perform four roles. These are pedagogical (task-based, intellectual), social (human relationship in the learning community), managerial (administrative, organizational, procedural), and technical (ease in use of hardware and software).<sup>44</sup> Each of these four roles is important and must be included in any online learning program. The educator (or facilitator) should have a working understanding of the material being taught and conduct a professional dialogue based on credibility. The educator must have the ability to connect with the learners or participants on a human-to-human level. The educator's managerial role requires that the course material is organized and relevant, so the learner leaves the course with a deeper understanding of the curriculum.

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<sup>41</sup> Ibid., 43-46

<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

<sup>44</sup> Charles Juwah, *Interactions in Online Education: Implications for Theory and Practice* (New York: Routledge, 2006), 209.



The technical function of online learning requires that the platform and its components are reasonably intuitive to the learner.

Shifting focus to the learner, when an educator-learner relationship is established, the pedagogical approach by the educator is among (or a combination of) four different schools. These schools are Behaviorism, Cognitivism, and Constructivism.<sup>45</sup> Due to modern technology, a new approach has emerged in Connectivism.<sup>46</sup> Through these instruction methods, the educator leverages the more (not most) effective way to instruct based on the needs of the needs, ability, and experiences of the learner. Teaching methods should be tailored to one of these learning schools that results in the most desired learning outcome. They must consider the learning audience and their intellectual abilities to derive meaning and value from the educational experience.

Behaviorism requires a knowledge of the educator's external environment to shape the educational environment for the learner.<sup>47</sup> Behaviorism is primarily concerned with the factors that cause motivation or incentive for the learner to partake and invest themselves in the educational experience. The behaviorist views learning through reactions based on the external environment. Behaviorism, unlike the other two schools, occurs only through observable behavior.<sup>48</sup> The inputs to behaviorism are empirical in nature. Behaviorism is based on the belief that learning occurs through repetition.<sup>49</sup> This is based on influences from outside stimuli. An example of this relationship is (to a learner) “if you do this, this will happen.”

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<sup>45</sup> Lucia Baruque and Rubens Melo, "Learning Theory and Instructional Design Using Learning Objects," *Journal of Educational Multimedia and Hypermedia* 13, no. 4, (2004): 343.

<sup>46</sup> Daniel Fischer and Erin Jonesrebandt, “Connectivism,” You Tube, accessed October 29, 2020, <https://www.youtube.com/watch?v=cFCYjm6nf40>.

<sup>47</sup> Lucia Baruque and Rubens Melo, "Learning Theory and Instructional Design Using Learning Objects," *Journal of Educational Multimedia and Hypermedia* 13, no. 4, (2004): 343.

<sup>48</sup> Kaya Yilmaz, “The Cognitive Perspective on Learning: Its Theoretical Underpinnings and Implications for Classroom Practices,” *The Clearing House* 84, no.1 (2011): 205.

<sup>49</sup> Daniel Fischer and Erin Jonesrebandt, “Connectivism,” You Tube, accessed October 29, 2020, <https://www.youtube.com/watch?v=cFCYjm6nf40>.

Unlike Behaviorism, Cognitivism is not physically observable. As a theory, it is not attributable to one particular theorist.<sup>50</sup> Cognitivism is an internal process that focuses on how the learner makes sense of and processes information.<sup>51</sup> Cognitivism is a process in which the learner is an active participant that seeks to process and acquire knowledge.<sup>52</sup> Cognitivism requires an active interplay between the learner and the educational material in a future CBRN educational program. As an output, knowledge gained through Cognitivism can be applied to more complex, yet to be identified, CBRN challenges. Cognitivists believe knowledge is an intangible expression that occurs in the learner's mind. Using a cognitivist approach, the educator will design teaching methods that draw upon the knowledge from previous experiences to resolve the educational dilemma. It is "an internal and active mental process which develops, within a learner, increased mental capacity and skills in order to learn better."<sup>53</sup> In other words, Cognitivism is about seeing the big picture and not the individual pieces.<sup>54</sup>

The third learning school is Constructivism. As an internal process, Constructivism relies on the learner's previous experiences to understand the educational experience. As an approach to andragogy, the reliance on previous experiences can be highly valuable in a CBRN educational program. Providing more definition, Constructivism is a collaboration between the problem to be solved, social context, and the learner's existing knowledge.<sup>55</sup> In a constructivist approach, the educator designs educational opportunities that increase knowledge based on the educational experience. A constructivist educational experience holds that learning is an adaptive activity; the learner constructs knowledge, and prior

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<sup>50</sup> Kaya Yilmaz, "The Cognitive Perspective on Learning: Its Theoretical Underpinnings and Implications for Classroom Practices," *The Clearing House* 84, no.1 (2011): 204-212.

<sup>51</sup> Ibid.

<sup>52</sup> Ibid.

<sup>53</sup> Gregory McLeod, "Learning Theory and Instructional Design," *Learning Matters* 2, (2003): 35-43.

<sup>54</sup> Daniel Fischer and Erin Jonesrebandt, "Connectivism," You Tube, accessed October 29, 2020, <https://www.youtube.com/watch?v=cFCYjm6nf40>.

<sup>55</sup> Lucia Baruque and Rubens Melo, "Learning Theory and Instructional Design Using Learning Objects," *Journal of Educational Multimedia and Hypermedia* 13, no. 4, (2004): 343.

understanding plays a role in the learning.<sup>56</sup> The constructivist learning school allows the learner to invest in the learning process in more depth than a behaviorist approach.

A fourth and more contemporary learning school is Connectivism. Connectivism is a reflection of present-day technology and how it is used to help people learn.<sup>57</sup> Operating in a networked age, connectivists seek to gain an understanding of a topic using various technological nodes. Much like a system, the learner gains a sense of a subject using an amalgamation of informational websites, blogs, video websites, newspapers (web or print), or social media. This allows the learner to build on their current knowledge by pursuing more knowledge fueled by increasing interest in the topic. A learner using Connectivism includes an intersection of the social and technology in which learning will occur through contact.<sup>58</sup> In the geographically distributed US Army, a conscious leveraging of Connectivism in a CBRN educational program will be highly valuable to creating a great learning experience.

The next challenge before the developer is defining the relationship between the educator and the learners. This is a very important part of seeking to continue education after the career course. The methods in which the learners interact in an online environment comes in four forms or paradigms. The one-alone method is where the learner interacts only with the teaching software. The teaching software lacks any human interaction with the learner. The second form of interaction is the one-to-one method in which the learner interacts with their educator or fellow learners. Thirdly is the one-to-many method. The one-to-many method is where the teacher addresses the learners like a traditional classroom. Lastly is the many-to-many method. In this method, the community of learners “teach and learn at the same time through discussion, group projects, and forums, etc.”<sup>59</sup>

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<sup>56</sup> Gregory McLeod, “Learning Theory and Instructional Design,” *Learning Matters* 2, (2003): 35-43.

<sup>57</sup> Daniel Fischer and Erin Jonesrebandt, “Connectivism,” You Tube, accessed October 29, 2020, <https://www.youtube.com/watch?v=cFCYjm6nf40>.

<sup>58</sup> Ibid.

<sup>59</sup> Morten Paulsen, "Teaching Methods and Techniques for Computer Mediated Communication" (paper presented at the 18th ICDE World Conference: The New Learning Environment, A Global Perspective. State College, PA, May 29-31, 1997)

Delving deeper into the interactions, Santosh Panda and Charles Juwah identify the interface that occur for the learner. Learner-content describes the conversation that occurs between the learner and the information that they view. Learner-instructor is how the learner and the educator dialogues with each other. This goes beyond the standard pedagogical relationship that exists between the learner and educator. It includes providing counseling, encouragement, and motivation for the learner on an enduring basis. The learner-learner interaction is the relationship that occurs among the learners. This condition emphasizes cooperative and collaborative learning among learners.<sup>60</sup> While it may be believed that the response to a CBRN event would be very mechanistic, it is not. An educational program that is learner-learner based will help learners to teach each other and provide different perspectives on how to respond to a CBRN event.

Don Olcott offers that there are guiding principles in the conduct of distance education that educators and developers should remember. They are the five “I”s of effective distance teaching. Interaction is the relation between learner-content, learner-instructor, and learner-learner. Introspection is how the learner demonstrates an understanding using discussion boards, audio, visual, and graphics. Innovation recognizes that adults are of different learning styles that require other methods to create learning opportunities. Integration is incorporating the “facts, concepts, theories, and applied knowledge” to make the distance education experience. Lastly, the information must be relevant that furthers the educational understanding. While it can be reasonably inferred that the five I’s are only applicable to distance learning, Olcott says that they can be applied in any teaching situation-including traditional instruction.<sup>61</sup> These guiding principles will help in the creation of a CBRN education program as it incorporates methods to keep the learner engaged throughout the entire learning experience.

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<sup>60</sup> Charles Juwah, *Interactions in Online Education: Implications for Theory and Practice* (New York: Routledge, 2006), 160.

<sup>61</sup> Don Olcott, "Selecting and Using Distance Education Strategies," In *Teaching at a Distance: A Handbook for Instructors*, by Mary Boaz, Betty Elliot, Don Foshee, Darcy Hardy, Carolyn Jarmon, & Don Olcott, (San Diego: Harcourt Brace, 1999): 38-39.

The approach to online instruction cannot be mirrored to the method found in traditional education. The educator must be aware that officers are susceptible to distractions in their virtual learning environment. The conduct of an online form of instruction must recognize the distractions when they appear and be prepared to respond to them. The educator should consider methods that promote engagement with the learner through more in-depth discussions and two-way dialogue. This will require educators to understand that there is adversity in the online environment. To overcome distractions and obstacles, the educator must emphasize that the main reason that learners will learn is that the knowledge gained will solve a later practical purpose.<sup>62</sup>

In order to understand the CBRN threats of tomorrow, the Army officer must be cognitively prepared. The emergence of complex threats combined with the curriculum of the institutional domain programs (i.e. CCCC) prepare the officer to be value added in their unit of assignment. In learning, the educator and the officer have equally important roles that must be identified and considered. In the development of a CBRN educational program, it is critical to gain an understanding of theories applicable to how learners learn before the implementation of the program.

## Instructional System Design and Integration

The previous section introduced several pedagogical theories to provide a knowledge of “how learners learn.” In this section, the focus shifts to creating and implementing instructional vehicles needed for officers to continue their education after the CCCC. Through the use of Instructional System Design (ISD), the developer takes the theories of how learners learn and creates the means in which the developed CBRN educational program is implemented. Conceptually, (ISD) is the “set of procedures for systematically designing and developing instruction.”<sup>63</sup> ISD acknowledges that there are significant

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<sup>62</sup> George Hill, "The Psychology of Adult Learning," *Phi Delta Kappa International* 24, no. 8, (April 1942): 314-318.

<sup>63</sup> Lucia Baruque and Rubens Melo, "Learning Theory and Instructional Design Using Learning Objects," *Journal of Educational Multimedia and Hypermedia* 13, no. 4, (2004): 343.

obstacles to implementation. ISD will require an organizational developmental change to achieve implementation.

TRADOC Pamphlet 525-8-2 says that because of the future operational environment, the future learning environment must “evolve to support the training and education requirements of teams, soldiers, and Army civilians.”<sup>64</sup> The future operating environment is rife with uncertainty that requires educational programs that are forward-thinking, imaginative, and that seek to understand the future before it arrives. The initiation of an organizational developmental change is a challenging thing to do. It requires the people in the organization to plunge into the unknown and pursue an objective that may or may not work. Employees, rightfully so due to human nature, begin to question any affront to the status quo.

Acceptance of the status quo is inadequate to meet the challenges of the future operating environment. To meet the challenges, organizational development will be required. Just as the US Army puts so much emphasis on soldier and civilian development, so must the same focus be placed in the organizational development process(es). Organizational development, in this sense, has two elements, according to French, Bell, and Zawacki. They are: “first, development may be an act, process or end state and second, development refers to bettering something.”<sup>65</sup> The “bettering of something” is a vital lodestar that must be embraced as the Army begins the implementation of long-term educational programs for its chemical officers to confront emergent CBRN challenges.

Organizational development is an effort that is (1) planned (2) organization-wide, and (3) managed from the top (emphasis added) to (4) increase organizational effectiveness and health through (5) planned interventions in the organization’s “processes,” using behavioral science knowledge.<sup>66</sup> Additionally, organizational development must be “long-range, planned, and sustained that is based on an

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<sup>64</sup> US Department of the Army, Training and Doctrine Command Pamphlet (TRADOC) 525-8-2, *The US Army Learning Concept for Training and Education 2020-2040* (Fort Eustis: Government Publishing Office, 2017), 11.

<sup>65</sup> Wendell French, Cecil Bell, and Robert Zawacki, *Organizational Development: Theory, Practice and Research* (Dallas: Business Publications, 1978), 11.

<sup>66</sup> Richard Beckhard, "What is Organization Development?" in *Organization Development: Theory, Practice and Research*, by Wendell French, Cecil Bell, & Robert Zawacki (Dallas: Business Publications, 1978), 20.

overall strategy.<sup>67</sup> An effort of organizational development requires a tremendous amount of investment by its leadership and the members of the organization. In order for continuing education after the CCCC to be maintained it must operate under the consideration that is a long-term effort. The implementation of an enduring CBRN educational program requires a tremendous amount of support from leadership and members of the CBRN branch.

Achieving a change in an organization's system requires a great deal of effort. It requires an acknowledgment that there are both external and internal forces exerting pressure (and resistance against a change. It requires continuous engagement in the organization's leadership to achieve success against resisting pressures. Examples of external pressures could be the changing future operating environment and stakeholders that have an affected vested interest in the results of change. Internal forces include members of the organization that are resistant to the proposed change. These challenges require a model that respects, understands, and can overcome these challenges. John Kotter, famous for the Kotter Change Model (1994), provides a sequence of eight steps that help the leader or manager achieve the proposed change against external and internal challenges.

The Kotter Change Model says that complacency is the number one cause of failure in achieving organizational change.<sup>68</sup> Siloed in their various departments, members of an organization have an incentive to maintain the status quo. A change, if implemented, may directly negatively affect their job or positioning within the organization. The change may cause the member to lose their employment or cause the person to do more work than they have been accustomed to. Therefore, complacency as a tactic to resist change is a passive way in which to preserve their status quo in the organization. Complacency must diminish for change to become a reality in an organization.

The implementation of a CBRN educational program is as equally challenging as its development. There will some level of organizational resistance to the implementation to any new

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<sup>67</sup> Wendell French, Cecil Bell, and Robert Zawacki, *Organizational Development: Theory, Practice and Research* (Dallas: Business Publications, 1978), 11.

<sup>68</sup> John Kotter, *Leading Change* (Boston: Harvard Business School Press, 1996), 4.

initiative. To assist in the implementation, The Kotter Change Model (1994) has eight steps that are required to bring about change through organizational development. These steps are: 1) Establishing a sense of urgency, 2) Forming a powerful guiding coalition, 3) Creating a vision, 4) Communicating the vision, 5) Empowering others to act on the vision, 6) Planning for and creating short term wins, 7) Consolidating improvements and producing more change and 8) Institutionalizing new approaches.<sup>69</sup> As a model, Kotter says that the first four steps contest a “hardened status quo.”<sup>70</sup> Steps five to seven introduce the new change into the organization. The last step will anchor the recent change into the organizational structure.

Resistance and complacency will be endemic to the change process. Establishing a sense of urgency and 2) Forming a powerful guiding coalition is essential because it provides the cooperation needed to ferry the change through times of resistance. The nation’s enemies, evidenced by the novel *Novichok*, are seeking new and deadlier agents that are continually less detectable. This requires a powerful coalition of leaders and specialists to imagine plausible scenarios that require intellectual engagement by CBRN officers. The coalition must be willing to be comfortable with ambiguity throughout the change effort—especially in the development of a CBRN education.

Similarly, in steps three (Creating the vision) and four (Communicating the vision), the vision is critical because it is the roadmap for the change effort. The change effort must always be tied into the vision. The lack of a vision is a severe impediment to enacting the change because it is that “picture of the future” for the members of the organization to work toward continually. Kotter describes the creation of a compelling vision as an “exercise of the head and the heart.”<sup>71</sup>

The vision keeps the creation of the CBRN educational programs on track to realization. The end product of a successful vision “results in a direction for the future that is desirable, feasible, focused,

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<sup>69</sup> *Ibid.*, 21

<sup>70</sup> *Ibid.*, 22

<sup>71</sup> *Ibid.*, 79



flexible, and is conveyable in five minutes or less.”<sup>72</sup> Once the vision is established, it must be communicated with sincerity at every reasonable and appropriate opportunity. The vision must be internalized in deed and word at every level of the organization. Failure to do so will result in a lack of commitment to organizational development, effectively stopping the change from realization. The thoughtful vision will motivate the members of the organization to accomplish the organizational development goal. This new vision would include an organizational commitment to facilitating ongoing educational development through the entirety of an officers’ career.

Step five (Empowering others to act on the vision) is essential because it is when the members of the organization begin to see the fruits of their commitment and labor. After the establishment of the vision, the organization’s members will start to implement the change effort. This is when they will face obstacles to empowerment. These obstacles include formal structures that make it challenging to act, a lack of need skills that undermine actions, bosses that discourage activities that aim to implement the new vision or (change effort), and personnel and information that make it difficult to act.<sup>73</sup> The guiding coalition must be aware of the friction that will manifest itself, seeking to undermine the effort. These inhibitors to success are structures, skills, systems, and supervisors.<sup>74</sup> The development of a CBRN educational program requires a vast network of leaders and specialists that each will have valuable input to the programs. Leveraging this will be critical to the programs’ success.

Step six (Planning for and creating short-term wins) and Step seven (Consolidating improvements and producing more change) provides the empirical results need to continue the investment into the change effort. The guiding coalition and the members of the organization should be able to see that their efforts are generating success(es). The short-term wins are the manifestation of the action being successful and paying off. After the short-term wins are occurring, it is imperative not to declare victory

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<sup>72</sup> Ibid., 81

<sup>73</sup> Ibid., 102

<sup>74</sup> Ibid.

too early. Consolidating improvements and producing more change ensures that the effort continues long after initial successes. It is the reminder to stay committed to the change and to continue to build momentum to realize the promise of more significant victories. The implementation of a CBRN training program should happen at a methodical pace that understands that long term success will in fact be long term. There will be early victories such as trainings that result in a greater understanding of CBRN effects. Additionally, refresher training is of value that can be a short-term win.

The final step of the Kotter Change Model (1994), step 8 (Institutionalizing new approaches), focuses on anchoring the change into the culture of the organization. Kotter defined culture as “the norms of behavior and shared values among a group of people.”<sup>75</sup> The culture is the underlying structure and qualities that provide the personality of the organization. At the realization of the change effort, the culture should look different than what previously existed before step one (Create a sense of urgency). This is the most delicate step in the creation of CBRN educational program. The developer must understand that any change effort should be continually assessed-even after implementation. As the most difficult to change, new shared values reflective of the vision demonstrates that the organization is operating anew.

When the learner requires learning a piece of material, but the material is not yet in existence, therein lies a problem. A problem lies where the learner cannot cross the gap from where they currently are to where they want to be.<sup>76</sup> Instructional Design is the process in which a new curriculum is identified, created and implemented. It provides the material in which the learner will learn. As a function of Instructional Design, design is a disciplined inquiry engaged in to create some new thing of practical

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<sup>75</sup> Ibid., 148

<sup>76</sup> Gordon Rowland, "Designing and Instructional Design," *Educational Technology Research and Development* 41, no. 1 (1993): 80.; US Department of Defense, Joint Staff, Joint Publication (JP) 5-0, *Joint Planning* (Washington, DC: Government Publishing Office, 2017), IV-14.

utility.<sup>77</sup> Instructional Design holds that the end instructional product will serve a useful purpose that can engage the learner and achieve the learning outcomes.

The Analyze Design Develop Implement Evaluation (ADDIE) model is a preferred way to create and implement a new educational experience. As a tool for training developers and instructional designers, the ADDIE model consists of five steps that begin with a need for an educational experience and end with a review of if the learning outcomes were achieved. The five phases are Analysis, Design, Development, Implementation, and Evaluation. It is a conceptual framework to provide for an educational result. ADDIE, in itself, gives the components of a good design process.<sup>78</sup> Its sequential yet recursive structure provides for the pedagogical practitioner to provide an educational experience that previously did not exist.

The first phase, the basis for the ADDIE model, is the Analysis phase. The Analysis phase is “the defining of what is to be learned.”<sup>79</sup> In the Analysis phase, the problems are identified. This includes the identification of any shortages of knowledge or information. While not all inclusive some of the problems that CBRN officers may be faced with include the characteristics of CBRN agents, interactions with the environment and the way in which a response would be conducted. The exploration and understanding of the problem will set the foundation for the other four phases.

The Design Phase takes the outputs of the Analysis phase and devises the conceptual strategy to create the educational product. The educator uses the information learned from the Analysis Phase and identifies the instructional approaches, resources, and tools of technology that will facilitate creating the educational product.<sup>80</sup> This phase is one of the more difficult of the five phases. In the Design phase, the

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<sup>77</sup> Gordon Rowland, "Designing and Instructional Design," *Educational Technology Research and Development* 41, no. 1 (1993): 80.

<sup>78</sup> Elizabeth Boling, et al., "ADDIE: Perspectives in Transition," *Educational Technology* 51, no. 5 (September-October 2011): 35.

<sup>79</sup> Ganesan Muruganatham, "Developing of E-content package by using ADDIE Model," *International Journal of Applied Research* 1, no.3 (2015): 52-54.

<sup>80</sup> Hui-Chin Yeh and Sheng-Shiang Tseng, "Using the ADDIE Model to Nurture the Development of Teachers' CALL Professional Knowledge," *Journal of Educational Technology & Society* 22, no. 3 (July 2019): 3.

developer identifies the best platforms and methods that will be needed in which the CBRN officers will receive education. Any resourcing shortages must be identified and rectified throughout the Design Phase. Additionally, in the Design Phase, the educator will determine what the learning outcomes and goals will be.

In the Development Phase, the educator constructs the educational product. Using the learning outcomes as a guide, the educator builds the curriculum needed to reach those outcomes. In this phase, the educator makes the prototype of the lesson. This includes the curriculum itself and the vehicle (or delivery system) in which the learner will receive the instruction. This consists of the type of platforms such as in-person, online, laboratory, or blended formats.<sup>81</sup> The Development Phase is concluded when the educational product is generated and ready for use and implementation. Realizing that CBRN officers are globally distributed, the educational product must be able to reach and be inclusive of all officers.

The Implementation Phase is the phase in which the educational product is provided to the learner population. This is the actual delivery of the instruction created in the Development Phase. In the Implementation Phase, the delivery could be an in-person, online, laboratory, or blended format. In a geographically distributed Army, online learning interactions will provide the avenue for the furthest reach and the most inclusion of officers possible. The Implementation Phase is crucial because it is the first time that the developer can ascertain the efficacy of the instruction. This is the most critical phase of the ADDIE process because it is the culmination of the previous steps which result in a CBRN educational program.

Occurring throughout the ADDIE process, the Evaluation Phase requires the planner to be engaged and observe any indicators that may improve or inhibit the learner's educational experience. The Evaluation Phase is not endemic to one particular phase. In the instructional design process, the Evaluation Phase occurs both between and within all phases.<sup>82</sup> If conducted properly, Evaluation will

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<sup>81</sup> Ganesan Muruganantham, "Developing of E-content package by using ADDIE Model," *International Journal of Applied Research* 1, no.3 (2015): 52-54.

<sup>82</sup> *Ibid.*, 53

identify and produce an outcome that matches the end state with the Analysis Phase's intent. As a recursive process within the ADDIE Model, the Evaluation Phase provides the opportunity to make adjustments to reach the intended educational outcome.

The creation of a new educational product for worldwide utilization by CBRN officers will be a very difficult endeavor. There are forces and pressures, both interpersonal and institutional that will provide a significant amount of friction which will inhibit implementation of a CBRN educational program. Any organizational development must have engagement and commitment from members of the organization's leadership. A new CBRN educational initiative will receive interpersonal resistance because it is an affront to the status quo. The Kotter Change Model will help navigate through the interpersonal challenges. Additionally, there will be inherent obstacles in the gestation of a CBRN educational program from concept to implementation. The ADDIE Model provides a framework from the creation of the CBRN educational program to execution of the right platform.

### Educating for the Future: Recommendations for Future Learning

The use of internet-based instruction technologies can close the resourcing gap to allow for the officers' instruction using distance learning methods and platforms. Internet based instruction is cost-effective in a resource constrained environment. The forthcoming recommendations or platforms are how learning will happen in a globally distributed environment. It must be mentioned that the media and technology used to deliver the courseware cannot fix a substandard program (of instruction).<sup>83</sup> The platforms should offer choices, flexibility, and the ability to change over time.<sup>84</sup>

Using pre-existing internet platforms within the US Army, officers can collaborate, learn, and contribute to the professional discourse. The forthcoming are recommendations for future learning after the CCCC that are intended to leverage branch-specific professional adult learning extending throughout the entire

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<sup>83</sup> Don Foshee, "A Practical Primer for New Learning Enviroments," in *Teaching at a Distance: A Handbook for Instructors* by Mary Boaz et al. (San Diego: Harcourt Brace 1999), 26.

<sup>84</sup> Ibid.

course of the officers' career. The most appropriate proponent for the below recommendations would be the CBRN DOTLD whose mission is "The DOTLD develops, delivers and supports institutional and unit training requirements that educate and produce Joint and International CBRN Specialists who are trained and ready to protect the force and the nation from Weapons of Mass Destruction (WMD)/CBRN threats and hazards."<sup>85</sup>

### Continuing Professional Education

As soldiers and officers, we often compare our profession to the specialized professions (doctors, lawyers, accountants) of the civilian world. To make this comparison, it requires a continuous investment in continuing education throughout an officers' career.<sup>86</sup> Continuing education is the required investment to retain the description of being a professional. The three domains (operation, institutional, and self-developmental) offer ways continuing education can manifest itself. In order to develop as a body of professionals, we must seek to apply our experiences (operational domain), learn (institutional domain) and reflect (self-developmental domain).

As a recommendation, continuing professional education is an enduring framework that is created to promote and instill a culture of learning needed to provide the officer tools to think through current and become prepared for future challenges. As professionals, a continuing professional education program will develop the individual and develop the learner's understanding of the profession and the inherent challenges. A continuing education program must be grounded in practicality, relevance, and provide value for the learner. We live in a civilization where "information is growing geometrically."<sup>87</sup> The geometric growth of information will require officers that are engaged and attuned to potential future CBRN scenarios. Leveraging the professional engagement and experiences of the officer, the use of the

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<sup>85</sup> "Directorate of Training and Leader Development," US Army CBRN School, accessed October 26, 2020, [https://home.army.mil/wood/index.php/units-tenants/USACBRNS/CBRN\\_units/DOTLD](https://home.army.mil/wood/index.php/units-tenants/USACBRNS/CBRN_units/DOTLD).

<sup>86</sup> US Department of the Army, Army Doctrine Publication (ADP) 6-22, *Army Leadership and the Profession* (Washington, DC: Government Publishing Office, 2019), 10-5.

<sup>87</sup> Darlene Weingand, "Continuing Education: Continuing Professional Education: Luxury or Necessity?," *Journal of Education for Library and Information Science* 39, no. 4 (Fall 1998): 333.

learning schools of Cognitivism and Constructivism must be at the core of any continuing professional education program.

Continuing professional education has unique characteristics. The first characteristic is that it is an enduring program made up of “one-shot” workshops and seminars.<sup>88</sup> This means that the program, as a whole, is seemingly never-ending, but its engagements within are single topic focused. This is an important distinction for CBRN education. One topic can be on where to establish a decontamination site following a mustard gas attack. The following workshop can be a discussion on the capabilities of newly fielded CBRN equipment. A major benefit of a continuing professional education program is that it leverages the tremendous insight and value of the DOTLD to create relevant training for the force. Another characteristic is that the individual engagements are short term that takes place throughout a couple of hours or less. The continuing professional education program events should be short and memorable that the officer can later recall. Continuing professional education focuses on “information learning, not skill learning.” This means that the learner obtains new knowledge and is informed on how to apply that knowledge.

Leveraging some of the many distance learning tools in cyberspace such as Microsoft Teams (of which the Department of Defense contracts use of) or Blackboard, continuing professional education would be a quarterly event. Initially, the topics would be decided, executed and supervised by the DOTLD (with input from the force). The Continuing Professional Educational events will be promoted to the force through the Chemical Corps branch communicational methods (email and newsletters) and via CBRN units. The audience is open to 74 series personnel including active duty, National Guard and Army Reserve.

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<sup>88</sup> Dean Spitzer, "Continuing Professional Education: A Critique of a New Challenge for the Educational Technologist," *Educational Technology* 19, no. 11 (November 1979): 26-28.

## Tabletop Exercises

Some of the most common learning styles available for soldiers are visual, auditory, and hands-on.<sup>89</sup> Utilizing these learning styles, a tabletop exercise is a low threat event that uses a simulation, such as a dirty bomb attack, to stimulate discussion on what the military response would be. Realistic in nature, the tabletop exercise leverages the combined experiences of the participants to seek the best solution that is significantly cheaper than a full-scale exercise complete with the requisite equipment and personnel needed for a CBRN event exercise. Another important distinction for the tabletop exercise is that it is conceptual in nature meant to inspire professional discussion.

It is essential to establish that the exercise is not ‘taught’ but is facilitated. It is facilitated as a way for the officers to communicate and discuss their way through the problems presented. Unlike the one-to-many method (traditional teacher to student education), in the many-to-many method (facilitated), the participants can find solutions and the gaps that exist between and plan and capabilities. In a tabletop exercise, the role of the facilitator is very limited in that their role is to manage the tempo of discussion to maximize educational benefits for the officers. Additionally, tabletop exercises leverage a learner-learner relationship based on integration which incorporates “facts, concepts, theories, and applied knowledge.”<sup>90</sup>

In a tabletop exercise, sometimes the tasks are precise, sometimes they are not.<sup>91</sup> The ambiguity of the tabletop exercise allows the facilitators and participants to ask each participant what their response would be to questions. The ultimate goal of tabletop exercises does not conclude with “...concrete facts

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<sup>89</sup> Richard Stafford and William Thornhill, “The Army Learning Model: Changing the Way Sustainers Train,” US Army, accessed November 3, 2020, [https://alu.army.mil/alog/issues/MarApril12/Army\\_Leaning\\_Model.html](https://alu.army.mil/alog/issues/MarApril12/Army_Leaning_Model.html).

<sup>90</sup> Don Olcott, "Selecting and Using Distance Education Strategies," *In Teaching at a Distance: A Handbook for Instructors* by Mary Boaz et al. (San Diego: Harcourt Brace 1999), 38-39.

<sup>91</sup> Robert McCreight, *An Introduction to Emergency Exercise Design and Evaluation* (London: Bernan Press, 2019), 187.



but rather a deeper understanding of the human aspect of decision making...”<sup>92</sup> As a matter of practice, tabletop exercises are focused on creating knowledge on how to resolve a future CBRN event. The discussion that occurs in a tabletop exercise helps the officers to imagine future scenarios in which discussion will be applicable. An example of a tabletop exercises could be the response effort to a 15Kt nuclear explosion in Kansas City, Missouri.

### Case Studies

In *The Landscape of History*, John Lewis Gaddis writes: “...we’re bound to learn from the past whether or not we make an effort, since that is the only database we have...”<sup>93</sup> Whereas tabletop exercise and case studies look very similar in practice, they are very different in their aims. Tabletop exercises look at what a future response would be to an event. Case studies explore and seek an understanding of the decision-making that occurred in a significant CBRN event. The participants can then apply the lessons they learned to future real-life responses (or tabletop exercises). Understanding an event that occurred will help build the participants' cognitive abilities in a future real-life event.

History is replete with case studies that can teach officers on lessons learned in CBRN events. The 2001 Anthrax letter attacks and the 2013 Texas West Fertilizer Company<sup>94</sup> explosion which killed 35 people including ten emergency responders are examples. Discussion of these and many events can help officers understand why decisions were made the way they were. Additionally, case studies of events that occurred recently can include actual decision makers that were a part of the response. Their perspective can be invaluable in the educational development of the CBRN officers.

Most importantly, the use of case studies provides opportunities for future learning for the CBRN officers. Case studies should generate questions as to why certain decisions were and in what context they

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<sup>92</sup> Rebecca Hersman et al., "Tabletop Exercise Takeaways," *Center for Strategic and International Studies* (2020): 44.

<sup>93</sup> John Lewis Gaddis, *The Landscape of History* (Oxford: Oxford University Press 2002), 8-9

<sup>94</sup> “A Timeline of Texas Chemical Plant Explosions and Legal Ramifications,” *Laws101.com*, accessed November 21, 2020, <https://laws101.com/texas-chemical-plant-explosions/>.

were made. An understanding of the context is important for the CBRN officer if they become challenged with a similar situation later. Upon completion, the case study method should stimulate a need for more knowledge about subject(s) of study. A unique characteristic about case studies is that it doesn't require multiple participants like a tabletop exercise. Case studies may be studied with or without the presence of other participants.

## Webinar

The webinar format is structurally different than the aforementioned recommendations. In the webinar, an educator provides instruction in a one-to-many online format. The participant(s) receive information from the educator followed by a locution of questions and answers. The seminar is an informal discussion that is mostly agnostic to learners of different experiential backgrounds. The backgrounds of the officers may or may not manifest themselves in the webinar. Therefore, webinars can be valuable for those officers that are unfamiliar with the material presented. Webinars allow the officers to question and learn from each other that have more knowledge and experience.

The webinar format, while it does have educational value, lacks the collaboration needed for some learners to create new knowledge (Bloom's Taxonomy). It is more likely that the apex of outcomes in a seminar will end at the Comprehension level because Application will come later through the employment of the knowledge attained. Additionally, an obstacle to education that should be identified in the webinar format is that there may be a higher number of distractions present than in person learning. Therefore, it is the responsibility of the officer to mitigate the effects that the distractions will have.

While the former recommendations can be resource-intensive, a webinar requires the least amount of resources. This is because seminars utilize many tools of education, such as lectures, films, slides, and videotapes/DVDs/visual media.<sup>95</sup> Because of the lack of resourcing needed to conduct a webinar, they are easier to conduct. This can be very advantageous in a resource constrained organization

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<sup>95</sup> Robert McCreight, *An Introduction to Emergency Exercise Design and Evaluation* (London: Bernan Press, 2019), 200-201.

to be able to conduct a valuable educational experience. Some examples of a CBRN oriented webinar are a force design update or a refresher program on Detailed Troop Decontamination. Because they are online, webinars have the ability to reach a very large worldwide audience.

### Good Judgement Project

In *Superforecasting* Phillip Tetlock and Dan Gardner uses forecasting to inform our decision-making in solving complex problems. In *Superforecasting* and co-created by Tetlock, the Good Judgement Project posts complex problems online and asks its members to ascertain an event's likelihood.<sup>96</sup> Unique to the Good Judgement Project are questions that are of time value. That is, they typically begin with: “when will, who will or what will, etc.” Once the problem is defined, the members make judgments based on precise probability rather than hunches”.<sup>97</sup> Throughout the project, the forecasts have resulted in stunning accuracy precisely because of the “wisdom of the crowd.”

The model of the Good Judgment Project can be advantageous in continuing professional education for US Army officers in time constrained positions that make it difficult to attend tabletop exercises, case studies or webinars. Using the wisdom of the crowd, the Chemical Corps DOTLD can post complex problems to CBRN officers to stimulate professional discussion. This discussion can result not only in educational benefits but may also inspire a change in doctrine and practice. In this framework, the combined brainpower of hundreds of highly knowledgeable and experienced officers can contribute to challenging and difficult problems. A Good Judgement Project for the Army could result in answers to dilemmas or problems that may reduce the need for resources in future CBRN events or even better save lives.

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<sup>96</sup> Phillip Tetlock and Dan Gardner, *Superforecasting: The Art and Science of Prediction* (New York: Broadway Books, 2015), 16.

<sup>97</sup> “Good Judgement,” Good Judgement Project, 2020, accessed October 26, 2020, <https://goodjudgment.com/>

## Conclusion and Opportunities for Future Research

In describing his hockey success, Wayne Gretzky said, “I skate where the puck is going, not where it has been.”<sup>98</sup> The inevitability of the future will invite new and deadlier CBRN events. These events, big or small will greatly challenge CBRN officers. The nerve agent Novichok is not the last chemical agent to be developed. Our officers must be continuously updating their understanding of current and future threats in the CBRN realm. Because the science of CBRN events is inherently complex, they rely on continued engagement through the entirety of the officer’s career.

As a learning organization, the US Army has both the capacity and will to develop its officers. The Army has invested heavily in education early in the officer’s career through BOLC and the CCCC. The education received in those courses is thorough and prepares the officer for continued service as a CBRN company grade officer. Unfortunately, education is perishable due to time and the lack of assignments that reinforce the knowledge learned in the CCCC.

In the establishment of an educational program, it is critical to understand ‘how learners learn.’ This understanding will later guide the development of the curriculum in order to provide the best educational experience possible. The application of Bloom’s Taxonomy can help guide the developer to design the curriculum with the educational goals in mind. The Andragogy Model and the learning schools leverage the knowledge and experiences of the CBRN officers to enhance the educational experience. Charles Juwah also wrote of the roles and responsibilities of the educator in the performance of an educational program.

The implementation of any new program will be difficult because it is a challenge to the status quo. There are two very significant obstacles that a new educational program will likely face. Institutional resistance and the creation through the implementation of the educational program (tabletop exercise, case study, webinar or something like unto the Good Judgement Project). These obstacles are not easily

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<sup>98</sup> “Wayne Gretzky Quotes,” Brainy Quotes, n.d., accessed October 25, 2020, [https://www.brainyquote.com/quotes/wayne\\_gretzky\\_383282](https://www.brainyquote.com/quotes/wayne_gretzky_383282)

surmountable. The Kotter Change Model will help the leader to navigate the murky waters of institutional resistance by emphasizing the importance of the educational initiative and . The use of ADDIE model will help in creation to implementation of the educational program. Lastly, the most important aspect of any organizational development is that that it has leader commitment from conception to implementation. Without leader engagement and support throughout the process, the initiative is doomed for failure.

As professionals in the US Army, it is incorrect to believe that completing CCCC is equal to meeting any need for further learning in branch-specific education. The purpose of this monograph is to seek to find viable ways, that if implemented, will create that culture of learning that is so needed for the Army. Because of the current slowdown in Operational Tempo (OPTEMPO), the US Army should take this valuable time to reflect on the past and prepare for the future through continued education. The Army has learned so much over the last 20 years, and now is the time to apply those lessons to reach the apex of Bloom's taxonomy and create new knowledge for the next great challenge of warfare.

There are several opportunities for future research beyond this monograph. While this monograph was written with Chemical Corps officers in mind, its education recommendations after the CCC can be applied to any branch. That is the hope that these recommendations can be used as the framework to facilitate discussion to advance the officer corps' cognitive abilities to solve problems collectively. While the recommendations offered are not inclusive of all potential educational endeavors, future research could spawn more ways in which education can continue to meet the challenges of the future. Whether the next war is in the form of LSCO, COIN, combination of or a type of warfare yet to be realized, we must place an emphasis on career-long development and learning. While no one knows precisely as to what the next type of warfare will be, career long education and development can prepare our officers to meet that future challenge when it arrives in the present.

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