Implementing Advanced Distributed Learning: A Case Study from Vigorous Warrior 2024 and Clean Care 2024 Exercises

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Keywords education, eLearning, advanced distributed learning (ADL), joint military exercise, NATO, flexible learning

Abstract *Multinational military exercises inherently bring together participants with diverse backgrounds, experience levels, and knowledge bases, creating challenges in achieving uniform preparedness. The pre-training phase plays a critical role in equipping participants for effective engagement in these exercises. Furthermore, the evolving nature of military operations—characterized by increasing multinational collaboration and operational complexity—necessitates innovative training approaches, rapid skill acquisition, and adaptability.*[1] *Integrating Advanced Distributed Learning (ADL) into multinational exercises represents a critical step in meeting these demands.*[2]

This case study focuses on the implementation of ADL in the Vigorous Warrior 2024 and Clean Care 2024 (VW24/CC24) joint multinational exercises. For the first time, these exercises incorporated an eLearning platform to support pre-training requirements and serve as an asset during and after the exercise. Designed to cater to both the Training Audience (TA) and Exercise Control (EXCON), the platform was accessible to civilian and military participants alike.

The authors present key lessons identified from the operational integration of ADL into VW24/CC24 and analyze its impact on the exercises. The study also highlights insights derived from learning analytics, including data collected from eLearning courses, illustrating the potential of ADL to enhance preparedness, streamline training, and support knowledge retention in complex multinational contexts.

1 Presnall, Biljana, Baker, Ryan: *Mapping eLearning Preparation to Training Objectives in a Multinational Exercise: A Q-Matrix Approach.*

2 Salkutsan, Serhii et al.: *Enhancing Military Exercise Team Performance with Diversified xAPI Instrumented eLearning.*

INTRODUCTION

The emergence of the COVID-19 pandemic[3] in 2020 led to the widespread cancellation of training courses globally. Training providers, schools, academies, and universities faced a shared challenge: how to deliver effective education and training under uncertain and rapidly changing circumstances. To address this, many institutions—public and private, civilian and military—were compelled to adopt fully online or hybrid learning formats to maintain continuity.

NATO institutions were no exception. They adapted by transitioning to virtual education and leveraging existing online learning capabilities. For the NATO MILMED COE, this unprecedented situation prompted a comprehensive review of its education and training delivery methods. It became evident that online courses and virtual learning opportunities were not merely stopgap solutions but valuable tools that could play a central role in areas like theoretical education. Recognizing this potential, NATO MILMED COE committed to embracing virtual education as a core component of its future strategy to deliver cost-effective, efficient, and modern training solutions through technology, digitization, and innovation.

As a first step, NATO MILMED COE began developing standalone online courses that could seamlessly integrate into blended learning programs. These courses were designed to support existing training by providing pre-learning material and foundational knowledge. By 2022, the focus expanded to exploring how ADL could enhance multinational exercises, specifically in the context of VW24/CC24.

In military exercises, the planning team must dedicate significant time and resources to bringing the training audience up to speed—a task that often detracts from other activities that could enrich the exercise and enhance learning outcomes. This challenge is particularly pronounced in multinational events, where participants bring diverse backgrounds, varying levels of knowledge, and different prior experiences.[4]

Automated eLearning courses provide a practical and efficient solution to this challenge. By supporting the pre-training phase, eLearning helps participants quickly gain the foundational knowledge needed to engage effectively in the exercise. Beyond pre-training, eLearning also proves valuable during and after the exercise. It facilitates just-in-time learning, enabling participants to access critical information when needed, and serves as a resource for after-action reviews and refresher training.

Moreover, in an era where the nature of warfare is rapidly evolving, the need for adaptive and effective training solutions is more critical than ever. eLearning represents a strategic asset in addressing this need, enabling training programs to be scalable, responsive, and aligned with the demands of modern military operations.

In the remainder of this article, we detail how ADL capabilities were integrated into the pre-training phase of the

3 Coronavirus disease 2019 (COVID-19) is a contagious disease caused by the coronavirus SARS-CoV-2.

4 Jefferson Institute: *ADL in exercises*.

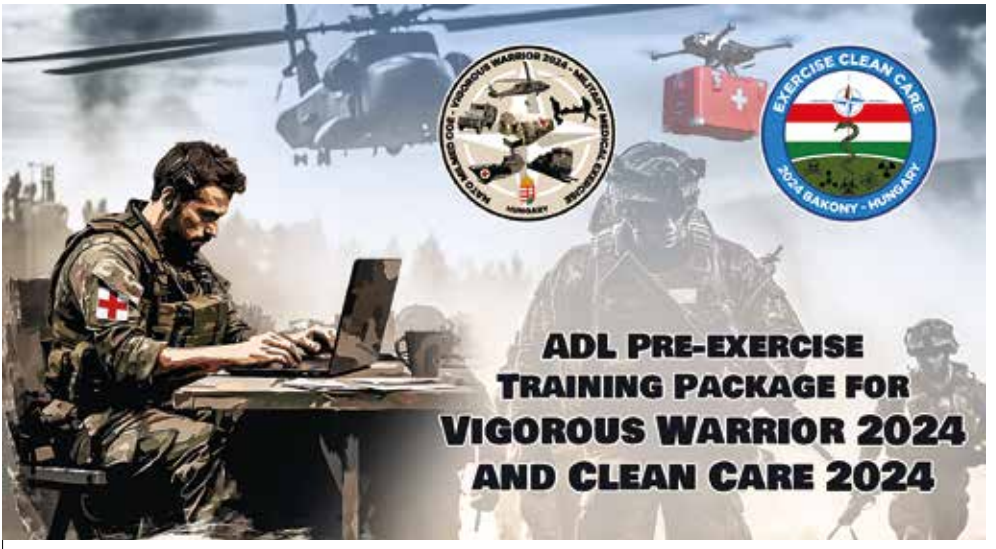

Figure 1: Banner_ADL Pre-exercise Training Package for VW24/CC24 (Photo by Lt. Ákos Szénási)

VW24/CC24 exercises, demonstrating their effectiveness in preparing participants for these complex multinational scenarios.

VIGOROUS WARRIOR (VW) EXERCISE

The Vigorous Warrior (VW) exercise series is NATO's largest multinational medical exercise, organized biennially by the NATO MILMED COE in collaboration with a voluntary host nation. The exercise addresses some of the most pressing challenges in the military-medical field within a multinational context under NATO's auspices. Its primary objective is to enhance the efficiency and interoperability of military medical support systems during NATO Major Joint Operations by simulating a complex, joint operational environment.

VW provides participating NATO and partner nations with the opportunity to train together in a realistic Article 5 scenario, practicing the full spectrum of medical support operations—from planning to surgical intervention—under realistic conditions. Participants not only engage in hands-on medical operations but also contribute to concept development, experimentation, and the testing of interoperability skills with other nations.

The VW24 exercise was particularly notable because it was conducted in conjunction with the Clean Care 2024 (CC24) chemical, biological, radiological, and nuclear (CBRN) exercise. This combined event took place in Bakonykúti, Hungary, in May 2024, creating a unique setting that brought together 1,600 participants from 35 nations. By integrating these two exercises, VW24 demonstrated the value of collaborative training in addressing complex, multidimensional operational challenges.

Figure 2: VW24/CC24 in Bakonykúti, Hungary, 4–8 May 2024 (Photo by Lt. Ákos Szénási)

ADL COMPONENT IN VW24 AND CC24

For the first time, the NATO MILMED COE introduced eLearning courses as part of the pre-exercise academic training for VW24/CC24. Using an ADL package, the pre-training phase was designed to orient exercise participants flexibly, effectively, and cost-efficiently. The primary goal was to ensure that both the Training Audience (TA) and Exercise Control (EXCON) staff shared a common operational understanding before the exercise began. Additionally, the ADL package aimed to reduce time spent on in-person academic instruction during the exercise, enabling more time to focus on other critical elements of the event.

To deliver effective eLearning resources, the Core Planning Team (CPT) of VW24/CC24 assigned the NATO MILMED Training Branch Course Developer to manage the integration of ADL. The project received critical support from the US Army Combat Capabilities Development Command (DEVCOM), with the Jefferson Institute, a Washington-based independent research and education organization, acting as a liaison. Although their involvement began late in the planning phase, their contributions significantly shaped the ADL components. Their support included:

- Designing and developing pre-training eLearning content.
- Assisting with the collection of standard-based learning analytics data.
- Visualizing these analytics within an exercise dashboard for real-time insights.

Throughout the planning phase, key events such as the Initial Planning Conference, Main Planning Conference, and Final Coordination Conference included the ADL initiative on the agenda. These meetings allowed updates to be shared on project progress and alignment with exercise objectives.

The ADL implementation timeline for VW24/CC24 was synchronized with the exercise's planning, execution, and evaluation phases, following the guidelines outlined in the Advanced Distributed Learning in Exercises Annex to the NATO ADL Handbook.[5] This annex serves as a practical framework for integrating ADL into exercises, providing guidance on planning, execution, and evaluation. It also offers insights for both ADL and exercise teams to effectively incorporate eLearning tools into training processes. Following these guidelines, the NATO MILMED COE ADL development team successfully integrated ADL into VW24/CC24, enhancing the overall efficiency and impact of the exercises.

ONLINE COURSES IN THE PRE-EXERCISE TRAINING PACKAGE

The core concept behind the ADL Pre-Exercise Training Package was to adapt topics traditionally presented in person by Subject Matter Experts (SMEs) during the Academic Phase of the exercise into an online format. This approach allowed participants to complete essential preparatory training flexibly and independently, ensuring a baseline of knowledge before the exercise began. All courses were delivered in English, with no translations provided, and the package was divided into two categories: "Need to Know" courses and "Enabling" courses.

"Need to Know" courses

These mandatory courses were required for all exercise participants and provided fundamental knowledge about key aspects of the exercises. The seven offered modules addressed critical roles, responsibilities, and processes during the exercise.

For example, "Introduction to VW24 and CC24" gave an overview of the key elements of the exercise, while "Exercise Evaluation (EXEVAL)" explained the evaluation process and criteria, and "Medical Lessons Learned" introduced participants to NATO's Lessons Learned methodology and its application in exercises.

To achieve the completion certificate, participants had to finish all seven modules, which collectively required an estimated 3–4 hours. An additional "Medical Evaluation (MEDEVAL)" course was mandatory for personnel directly involved in medical evaluation, requiring approximately 60 minutes to complete.

5 *Advanced Distributed Learning in Exercises*, Annex to NATO ADL Handbook.

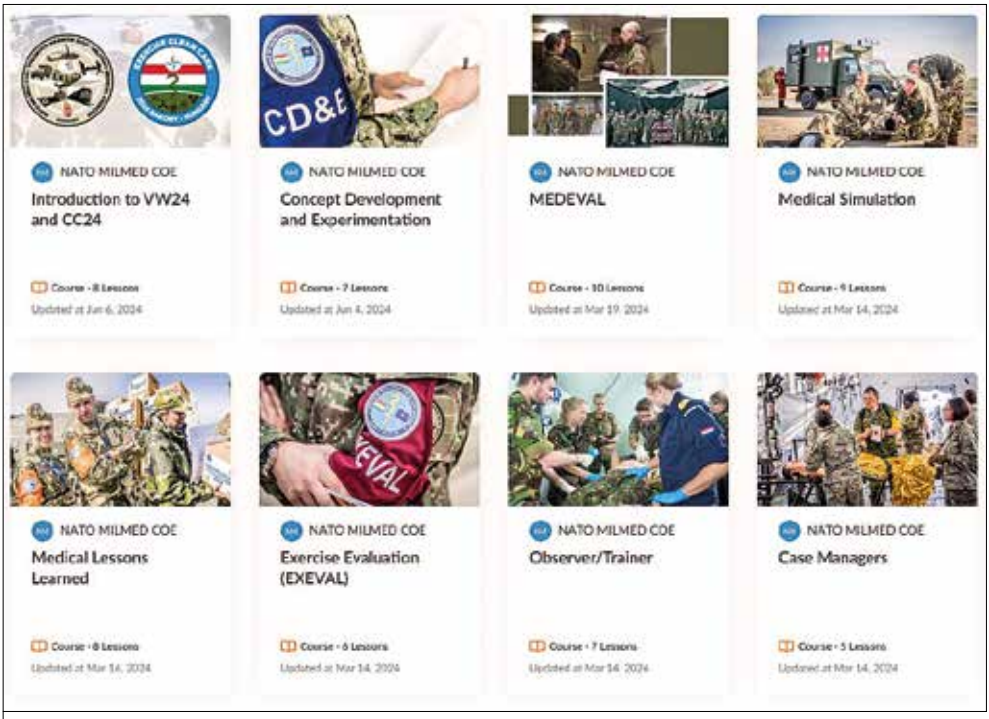

Figure 3: Courses of ADL Pre-exercise Training Package (Source: NATO MILMED COE)

The scope and length of the "Need to Know" courses were intentionally limited to focus on content relevant to the exercise. These courses were developed based on curricula provided by SMEs and adhered to pedagogical and instructional design principles.

"Enabling" courses

These optional courses were recommended but not required, offering participants the opportunity to explore supplementary topics. They included some essential information about NATO's functions as "Introduction to NATO" or awareness of integrating gender perspectives to improve operational effectiveness.

These courses were outsourced and as the NATO MILMED COE was not the content provider, the participation could not be tracked. However, they were made available to participants seeking a broader understanding of NATO structures, policies, operations, or contemporary Alliance issues.[6]

6 *Joining Instruction to ADL Pre-exercise Training Package for Vigorous Warrior 2024 and Clean Care 2024.*

IMPLEMENTATION AND LEARNING MANAGEMENT SYSTEM

The Joint Advanced Distributed Learning (JADL) platform, NATO's official Learning Management System (LMS), was chosen for delivering the ADL Pre-Exercise Training Package.[7] This platform facilitated seamless content delivery and user engagement, ensuring that participants could access the training materials efficiently and effectively.

The educational material was made available on JADL starting six weeks prior to the exercise, giving participants ample time to complete the required courses. The availability of the ADL package was extended until three months after the exercise, allowing participants to revisit the content for review, after-action analysis, or refresher purposes.

The courses were designed to be self-paced, enabling learners to progress through the material at their own speed and on their own schedule. This flexibility was particularly important given the diverse professional commitments and time zones of the multinational

Figure 4: Medical Lessons Learned course (Source: NATO MILMED COE)

7 https://jadl.act.nato.int

participants. Importantly, the courses did not require active instructor engagement, which streamlined delivery and further enhanced scalability.

Figure 5: Medical Lessons Learned course (Source: NATO MILMED COE)

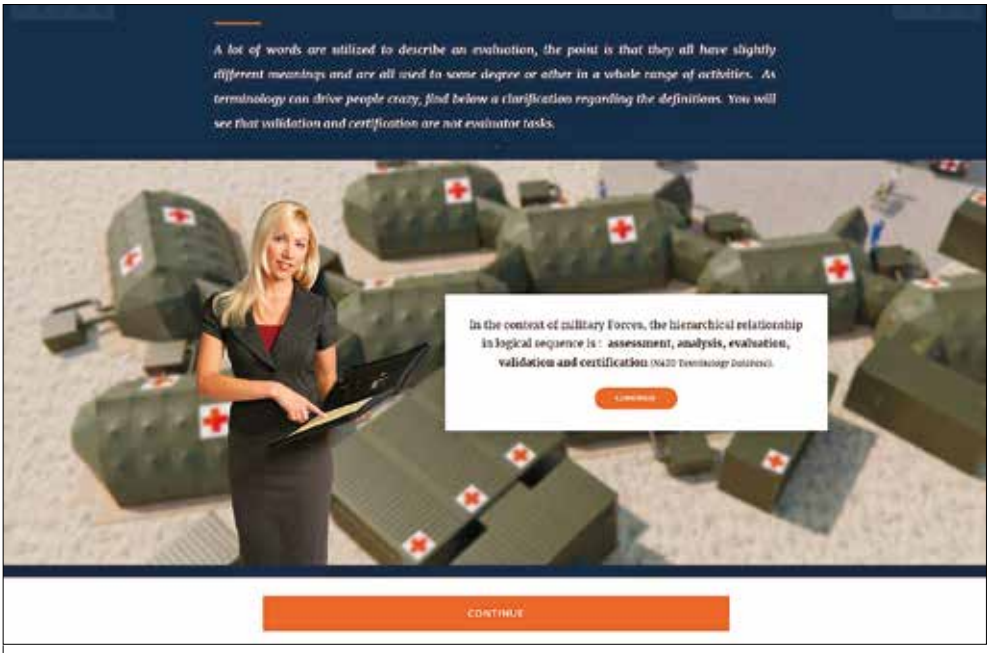

Figure 6: MEDEVAL course (Source: NATO MILMED COE)

Figure 7: Introduction to VW24/CC24 course (Source: NATO MILMED COE)

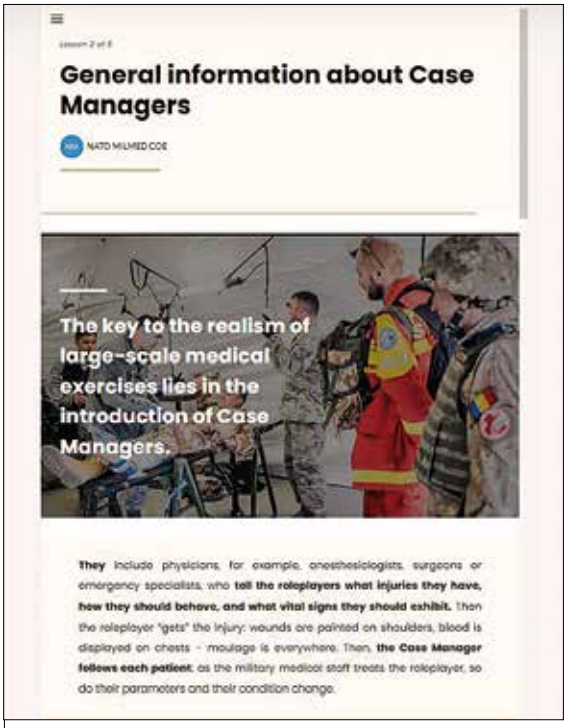

Figure 8: Case Managers course (Source: NATO MILMED COE)

JADL provided a comprehensive eLearning service, supporting all the essential components required for effective online education and training. Its features included:

- Course Delivery: Accessible modules with an intuitive interface for participants to navigate through the training material.
- Learning Progress Tracking: Detailed tracking and monitoring of individual progress, ensuring participants completed the required courses.
- Customizable Areas: Capability to tailor course layouts and content areas to meet the specific needs of the exercise.
- Forum Functionality: Enabling peer-to-peer interaction, discussion, and support, which enhanced collaboration among participants.
- Reference Material Upload: Easy sharing of supplementary documents, guides, and resources to enrich the learning experience.
- Data and Statistics Extraction: Comprehensive analytics tools for gathering insights into participation, completion rates, and learning outcomes, which informed post-exercise evaluations and improvements.

The JADL platform's modern interface and robust functionality ensured an accessible and user-friendly experience for all participants. Self-paced learning modules were accompanied by progress indicators and completion certificates,

Figure 9: ADL Pre-Exercise Training Package course page (Source: JADL)

motivating users to engage with the content thoroughly. Additionally, the platform's ability to integrate with other NATO systems ensured that data could be aggregated and analyzed efficiently, supporting both operational and strategic objectives.

While the JADL platform provided a solid foundation, the implementation process revealed key considerations for future improvements:

1. User Onboarding: Ensuring all participants were familiar with the platform's functionalities required additional effort, particularly for those less experienced with online learning systems.
2. Technical Support: Addressing connectivity issues and ensuring consistent platform availability were critical to maintaining engagement across different regions.
3. Content Adaptation: Designing materials to be engaging for a diverse audience emphasized the importance of multimedia elements and interactive components.

EVALUATION OF THE ADL PRE-EXERCISE TRAINING PACKAGE

The ADL Pre-Exercise Training Package was evaluated to measure its effectiveness, user experience, and areas for improvement. Feedback was gathered through participant interviews, usage data, and a structured post-course evaluation survey.

Despite some challenges, the level of engagement exceeded initial expectations for this first deployment of the ADL capability. A total of 477 users accessed the platform, completing 8 courses with a total of 3,131 completions recorded. The breakdown of course participation showed varying levels of engagement:

- The Introduction to the VW/CC24 course was the most completed, with 428 participants.
- The MEDEVAL course had the lowest completion rate at 253 users, which was expected as it was only required for personnel involved in medical evaluation.

These results highlight a positive initial uptake of the eLearning platform while underscoring the need to improve engagement and participation rates further.

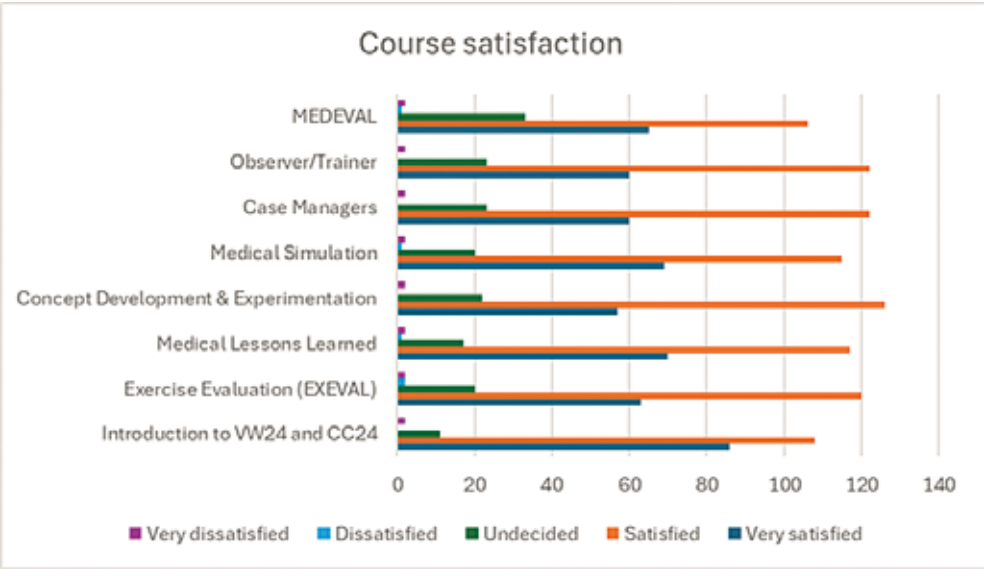

Figure 10: Survey Analysis – Course Satisfaction

To gather detailed feedback, a Post-Course Evaluation survey was administered through the JADL platform. The survey focused on key aspects of the user experience, including course structure and content, visual design, eLearning path and navigation, quizzing, multimedia and interactivity, and overall experience.

The survey design featured single-choice questions, 5-level Likert scale ratings, and optional comment sections for qualitative feedback. Out of the 477 users, 207 completed the survey, providing a representative sample for analysis:

– Overall Feedback: The platform received overwhelmingly positive reviews, with participants expressing high appreciation for its quality, relevance, and usefulness in preparing for the exercise.
– Technical Issues: Some users reported technical difficulties with the JADL platform, which occasionally affected their learning experience.
– Content Gaps: Participants requested additional resources and clearer guidance on course selection and supporting documents. Suggested additions included:
  - An introduction to military medical terminology for civilian participants.
  - A summary of EXCON structure, roles, and planning cycles to improve understanding of organizational processes.
  - A remedial Military Medical English course to support non-native English speakers.

Overall opinions of the platform were very positive, and its usefulness and quality were highly appreciated. Some participants indicated technical issues with the JADL eLearning platform. The users indicated requirements for more content in the platform, clearer guidance on what courses to take, and what documents to read. Additional content

might include an introduction to military medical terminology for civilians; a summary introduction to the structure, organization, and various component roles and planning cycles of EXCON; and remedial Military Medical English.[8]

The evaluation results underline the success of the ADL Pre-Exercise Training Package in meeting its primary objectives while revealing areas for enhancement. Moving forward, addressing technical issues, expanding content offerings, and improving guidance for users will further optimize the platform's impact. These adjustments, combined with ongoing participant feedback, will ensure that future iterations of the ADL package continue to evolve as a key component of NATO multinational training exercises.

Figure 11: Wordcloud of ADL participant comments

LESSONS LEARNED

The use of ADL in VW24/CC24 proved to be a cost-effective, flexible, and essential tool for supporting exercise preparation. However, its potential extends beyond pre-training; ADL can also serve as a powerful performance support tool, enabling better outcomes during live exercises. To fully harness this capability, future iterations must incorporate the following lessons:

1. Integrate ADL Into the Planning Phase by following guidelines developed by NATO:[9]
   - ADL should become an integral component of the planning process for the next iteration of the exercise of Vigorous Warrior and/or Clean Care.
   - Establishing an ADL Working Group (WG) will ensure dedicated focus on this capability. This group should appoint representatives to the Exercise Planning Group (EPG) and work collaboratively to align eLearning efforts with broader exercise objectives. Aligning eLearning efforts with training objectives can significantly increase performance in exercises.[10]
2. Expand and Optimize eLearning Content
   - The scope of e-learning should be broadened to include mandatory and optional microlearning courses, tailored to the exercise's Training Objec-

8 NATO Centre of Excellence for Military Medicine: *Final Exercise Report*.

9 *Advanced Distributed Learning in Exercises*, Annex to NATO ADL Handbook.

10 Presnall, Biljana, Baker, Ryan: *Mapping eLearning Preparation to Training Objectives in a Multinational Exercise: A Q-Matrix Approach*.

tives and themes. Diversified eLearning content has proven beneficial in tactical exercises.[11]
– Mandatory courses should focus on critical content that all participants must understand, while optional modules can provide supplementary knowledge.
– Careful consideration is needed to limit the number of required courses, ensuring participants can realistically complete them within their schedules.

3. Improve Strategic Communication
– Despite efforts to inform unit commanders about the ADL package, low participation stemmed primarily from a lack of awareness. Accessibility issues with the JADL platform may have also contributed.
– To address this, the importance and added value of ADL must be communicated early and clearly, emphasizing that mandatory eLearning content must be completed prior to the exercise.
– These requirements and expectations should be formalized in official exercise documents, such as the Exercise Specification Document, to ensure consistent messaging.

4. Measure Training Effectiveness
– Future exercises should incorporate mechanisms to evaluate the training effectiveness of ADL courses, not only in the pre-exercise phase but also during live events. Collecting data on participant performance and applying lessons learned will further refine the eLearning approach.

SUMMARY

ADL is about much more than cost reduction; it represents a transformative approach to military training, allowing content to be scaled and personnel to adapt rapidly in dynamic environments. The eLearning initiative in VW24 and CC24 was a critical step in integrating ADL in multinational exercises.[12] Its objectives were threefold:

1. Support the pre-exercise preparation of the Training Audience and Exercise Control (EXCON) staff.
2. Reduce the time spent on academic instruction during the exercise.
3. Enhance the quality of learning outcomes.

These objectives were largely achieved and deemed relevant and useful by participants, but the experience revealed opportunities for improvement.

To maximize the potential of ADL, future exercises must embed it more deeply into the planning and execution phases, ensuring all participants and stakeholders recognize its value. Data analytics and insights derived from ADL can further enhance exercise effectiveness, offering actionable intelligence to improve both training content and delivery. By building on the lessons identified, NATO MILMED COE can continue to innovate in training and prepare military personnel for the complex challenges of modern operations.

11 Salkutsan, Serhii et al.: *Enhancing Military Exercise Team Performance with Diversified xAPI Instrumented eLearning.*

12 Ljung, Niclas et al.: *Integrating Advanced Distributed Learning into Multinational Exercises.*

ACKNOWLEDGEMENTS

Special thanks to the Jefferson Institute and U.S. Army DEVCOM. Collaboration with partners like them added significant value to the NATO MILMED COE effort. Maintaining and expanding these partnerships will be pivotal in refining and advancing ADL integration for Vigorous Warrior 2026 and beyond.

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ONLINE KÉPZÉS MEGVALÓSÍTÁSA: ESETTANULMÁNY A VIGOROUS WARRIOR 2024 ÉS A CLEAN CARE 2024 GYAKORLATOKBÓL

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Kulcsszavak oktatás, eLearning, Advanced Distributed Learning (ADL), közös hadgyakorlat, NATO, rugalmas tanulás

Absztrakt *A többnemzeti hadgyakorlatok természetüknél fogva összehozzák a különböző hátterű, tapasztalati szintű és tudásbázisú résztvevőket, kihívást jelentve az egységes felkészültség elérésében. A gyakorlatokat megelőző képzési fázis kritikus szerepet játszik abban, hogy a feladatokra delegáltak hatékonyan tudjanak részt venni ezeken az eseményeken. Az ezen szakaszt támogató erőforrásoknak intuitívaknak, hozzáférhetőknek és könnyen navigálhatóknak kell lenniük a kihívások kezeléséhez. Ezenkívül a katonai műveletek változó jellege – amelyet a növekvő multinacionális együttműködés és a műveleti összetettség jellemez – innovatív képzési megközelítéseket, gyors készségszerzést és alkalmazkodóképességet tesz szükségessé. Az Advanced Distributed Learning (ADL) – E-learning/online képzés – integrálása a többnemzeti gyakorlatokba kritikus lépést jelent ezen igények kielégítésében.*

Ez az esettanulmány arra összpontosít, hogy milyen formában valósult meg az ADL alkalmazása a Vigorous Warrior 2024 (VW24) nemzetközi katona-egészségügyi NATO-gyakorlat során, amely esemény különlegessége az volt, hogy a Clean Care 2024 (CC24) vegyi, biológiai, radiológiai és nukleáris gyakorlattal közösen hajtották végre. Ezek a gyakorlatok először használtak eLearning platformot a képzés előtti követelmények elsajátítására, amely hasznos eszközként szolgált a katona-egészségügyi esemény végrehajtása során és után is. A Training Audience (kiképzendő állomány) és az Exercise Control (a gyakorlatot irányító állomány) számára kialakított online felület polgári és katonai résztvevők számára egyaránt elérhető volt.

A cikkben a szerzők bemutatják az online képzés VW24/CC24-be történő hatékony beillesztésének legfontosabb tanulságait, és elemzik annak a gyakorlatokra kifejtett hatását. A tanulmány emellett kiemeli a tanuláselemzésből származó meglátásokat, beleértve az eLearning kurzusokból gyűjtött adatokat, amelyek bemutatják az ADL-ben rejlő lehetőségeket a készenlét fokozására, a képzés egyszerűsítésére és a tudásmegtartás támogatására összetett, többnemzeti összefüggéseken keresztül.