



FedLearn

WHITE PAPER

Mission Readiness Knowledge Index: *Transforming Training Readiness in the U.S. Department of War*

**Moving Beyond Course Completions to Authentic
Competence and Readiness Measurement**

Date: January 2026

EXECUTIVE SUMMARY

In the U.S. Department of War (DoW) today, workforce readiness reporting equates course completion metrics with readiness. However, *course completion is only a proxy for exposure—not competence.*



The FedLearn Mission Readiness Knowledge Index (MRKI), powered by our Z1, or knowledge transfer, measurement, *transforms online training reporting into a competence-based, mission-relevant readiness measure.*

**Course completion = Exposure
MRKI = Competence**

INTRODUCTION



The DoW requires a workforce that is both highly trained and mission ready. However, current training initiatives rely heavily on course completion, professional certifications and commander assessments as metrics of readiness. While these methods are scalable and standardized, *they fall short of what the modern mission requires.*

Course completion shows that personnel participated in a training event but does not measure whether they retained or can apply that knowledge on the job. In fast-changing domains, such as artificial intelligence (AI), cybersecurity and space, relying on exposure as a proxy for competence introduces operational risk.

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This white paper discusses:

- ❖ **History of DoW training readiness measurement**
- ❖ **Issue of relying on traditional learning metrics as proof of workforce readiness**
- ❖ **Definition, significance and application of MRKI**
- ❖ **How DoW organizations can use MRKI to measure workforce readiness**
- ❖ **Path to MRKI implementation**
- ❖ **Future implications of AI-based readiness**

HISTORICAL CONTEXT OF DOW TRAINING READINESS MEASUREMENT

For most of its history, the DoW measured readiness through training events, professional certifications and commander judgment. Training readiness reporting began with checklists noting if a unit completed required exercises. Over time, reporting evolved into course completions and formal certifications, which offered a more standardized view of competence.



The development of the Defense Readiness Reporting System (DRRS) brought further structure—tying readiness to mission essential tasks (METs). Yet, even in this framework, training is still largely reported in terms of whether personnel completed required training events. *What is missing is a validated measure of whether the workforce actually learned and is prepared to perform in real-world operations.*

DOW CURRENT METRICS

While completion rates and certifications offer scalability, they are weak proxies for competence. A course completion rate of 100 percent may create the illusion of readiness when, in fact, large portions of the workforce may remain unable to execute mission-essential tasks.

Commander assessments add judgment but are inherently subjective and inconsistent. Exams or assessments, when used, provide a one-time snapshot and are vulnerable to guessing, rote memorization or knowledge decay. In high-stakes domains, like AI, cybersecurity operations or space mission assurance, these weaknesses can translate directly into mission failure.

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U.S. Government Accountability Office Findings: Why DoW Needs New Readiness Metric

A 2025 report from the U.S. Government Accountability Office (GAO) underscores the limitations of current readiness reporting and reinforces the need for new, competence-based measures like MRKI.

“...[O]verall U.S. military readiness has declined over the past two decades...”

The GAO documented that overall U.S. military readiness has declined over the past two decades—driven by high operational demands, maintenance shortfalls and training gaps. Current reporting emphasizes system availability (e.g., mission-capable rates) and course completions but does not measure whether personnel are competent to perform mission-essential tasks.

Specifically, the GAO identified shortages of trained personnel, including aircraft maintainers, sailors and missile defense operators in the U.S. Department of Defense (DoD; report released prior to name change)—*shortfalls that directly affect readiness*. The agency also highlighted the U.S. Marine Corps' inability to meet training requirements in Indo-Pacific ranges for nearly a decade—leading to reliance on virtual substitutes. These cases demonstrate that tracking course completions or training event participation does not guarantee competence or operational readiness.

DOD READINESS REPORTING GAPS

- “Readiness has declined over the past two decades due to operational demands, maintenance shortfalls, and training gaps.”
- “The Marine Corps has been unable to meet training requirements in Indo-Pacific ranges for nearly a decade.”
- “DoD readiness reporting lacks consistent performance goals and measures across services.”

Source: GAO

The GAO also emphasized human factors, such as fatigue, which degrade readiness and increase the risk of accidents. *MRKI can provide commanders with early warning signals of degraded performance*—addressing the GAO's call for improved human performance measurement.

Finally, the GAO stressed that the DoW readiness reporting lacks consistent, standardized metrics across services, which limit oversight and accountability. MRKI addresses this challenge directly by providing a quantitative, standardized scale (0–100) across roles, units and training events that is linked to knowledge, skills, attributes and tasks (KSATs) and METs. *MRKI offers Department leaders auditable and transparent data to justify training investments and assess true mission readiness.*

In short, the GAO's findings validate the core challenge MRKI was designed to solve: *to move beyond proxies of exposure toward authentic, competence-based readiness measurement.*

INTRODUCTION TO MRKI

FedLearn developed MRKI to address this critical gap.

MRKI is a validated readiness index that uses FedLearn Z1 (knowledge transfer) scores to measure competence, retention and application—not just exposure.

By rolling up individual Z1 scores across roles, units and training events, MRKI provides a readiness picture that is quantitative, defensible and actionable.

Z1 Score Range	Competence / Readiness Level	Interpretation
0 – 40	At Risk (low readiness)	Learner shows limited knowledge transfer. High reliance on guessing, low engagement. Not competent or ready
41 – 60	Developing (partial readiness)	Some learning demonstrated, but inconsistent retention/application. Needs reinforcement or practice before mission tasks
61 – 80	Competent (ready)	Clear evidence of knowledge transfer with sustained engagement and reduced guessing. Learner is competent for role-based tasks.
81 – 90	Proficient (high readiness)	Strong knowledge retention and ability to apply content in varied contexts. Mission-ready with confidence
91 – 100	Expert (fully ready / mentor level)	Exceptional mastery. Almost no guessing. High engagement. Strong application across contexts. Ready to lead or mentor others

MRKI Scoring

FEDLEARN Z1 SCORE



The FedLearn adaptive online learning platform, powered by AI, tracks every learner interaction across online course modules or components, for example, pausing or replaying videos, revisiting key sections, pacing, time on task, quiz answer changes and more. *The AI models combine this “clickstream” data with performance signals from embedded assessments to provide a dynamic record of knowledge transfer, retention and application over time.*

Z1 measures if an individual actually learned in real time while taking an online course. It is *not* a single test score at the end of training. Instead, *Z1 is a running measure of competence that updates as the learner progresses through a course.* The FedLearn AI models recognize when knowledge is consolidated, when it fades and when a learner is relying on lucky guesses.

“Z1 measures if an individual actually learned in real time while taking an online course.”

This continuous approach produces a readiness score that reflects learning across an entire training event—and not just exposure to the content

By contrast, course completion is binary—either the learner finished or not. It serves as a proxy for exposure, but it does not indicate whether the learner:

- ❖ Retained the information
- ❖ Can apply the content in context
- ❖ Is able to recall information after training

In short, *course completion is an attendance metric, while Z1 is a competence metric*. The difference is critical: a unit may report 100-percent course completion rate, but the Z1 reports whether that 100 percent translates to readiness or masks gaps that undermine mission performance.

SCIENCE BEHIND Z1



Z1 is grounded in a decade of peer-reviewed research revealing that fine-grained learner behavior (tracked by clickstream data) is a reliable signal of knowledge transfer and readiness—not just exposure. In massive open online course data sets (made up of tens of thousands of quiz attempts and more than one million click events), researchers consistently found:

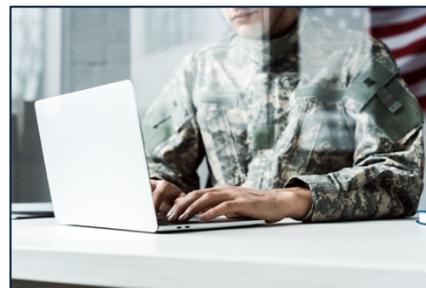
- ❖ **Behavior performance linkage.** Specific video-watching patterns (e.g., reflective replay/pauses versus rapid skimming) are significantly associated with being correct on the first attempt on quizzes. AI models that encode clickstream sequences or training events and positions visited, improve prediction quality over baselines, including in “earliest detection” settings where performance history is sparse. This demonstrates that how a learner engages in training is predictive of what they learn and retain.
- ❖ **From behavior to latent competence.** Beyond correlating behavior to outcomes, recurrent neural network (RNN)-based, probabilistic AI models recover latent knowledge states and infer prerequisite structures between microsegments of content—even when no assessments exist—by modeling how behavior changes as knowledge gaps close. These models achieved 90-percent-plus accuracy in predicting learner behavior and produced prerequisite maps validated by subject-matter review. This is the foundation for the Z1’s ability to measure knowledge transfer in assessment-light environments.
- ❖ **Individualization signal.** The FedLearn adaptive, online learning platform demonstrated significantly higher engagement (approximately 72 percent more pages viewed) versus one-size-fits-all delivery—using behavioral measurements to update learner models and tailor content. Engagement is a key driver of learning. This is an operational pattern Z1 employs at scale.

What This Means for Z1

- ❖ **Competence, not just exposure.** Because individual learning styles and dwell/rewind patterns tie to first-attempt correctness and retained understanding, Z1's behavioral modeling provides a validated proxy of competence across the learning journey—and not just at exam time.
- ❖ **Continuity and sensitivity.** Z1 can update after each learning interaction (e.g., after each video)—enabling continuous readiness assessment and early detection of risk.
- ❖ **Assessment-light applicability.** Even where formal tests are scarce, RNN latent-state AI models recover knowledge progress and prerequisite mastery from behavior alone—allowing readiness estimates in even short courses and microlearning.
- ❖ **Actionable personalization.** Because these AI models are interpretable (e.g., which segments act as prerequisites), Z1 can activate remediation—or the provision of short snippets of similar content to improve learning understanding—precisely where knowledge transfer is failing.

HOW DOW ORGANIZATIONS CAN USE MRKI

The real power of MRKI lies in how DoW organizations can apply it to workforce readiness reporting. At the individual level, commanders can gain a clear view of whether a learner is at risk, developing, competent, proficient or expert. *Instead of assuming completion equals readiness, leaders can see exactly who requires additional training opportunities, coaching or mentoring before mission deployment.*



At the enterprise level, MRKI enables the development of readiness dashboards that highlight skills gaps across services, commands or functions. *These dashboards provide predictive insights into areas of risk—allowing the DoW to address workforce challenges before they impact operations.*

Linking MRKI to DoW Work Roles

“Z1 scores can be mapped to a specific KSAT—creating direct links between training outcomes and defined workforce standards.”

MRKI gains even greater value when the metric is aligned with established DoW frameworks, such as DoW 8140 for cybersecurity and AI and data roles. *Z1 scores can be mapped to a specific KSAT—creating direct links between training outcomes and defined workforce standards.*

The implications are significant. Department leaders can now draw a direct line from **training event** → **Z1 score** → **KSAT** → **role readiness** → **mission readiness**. *This linkage makes training defensible as an investment, traceable for audits and transparent for resourcing decisions.*

For commanders, readiness reporting is no longer abstract. MRKI provides traceable, audit-ready evidence that units and individual personnel meet the KSATs required for their roles. For policymakers, it ensures that training investments directly advance mission capabilities.

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MRKI IN CONTEXT OF MISSION-ESSENTIAL TASKS

Readiness is ultimately about mission execution. *MRKI provides the missing link between individual learning outcomes and unit readiness reporting.* When aggregated, MRKI scores can be aligned with METs in DRRS—giving leaders confidence that training readiness reflects mission capability.

For example, the U.S. Space Force MET, “Ensure availability and integrity of mission data assets,” can be broken down into KSATs on metadata governance, data quality and lifecycle enforcement. MRKI validates whether personnel are competent in these areas—translating directly into a green, amber, red or black readiness status.

Readiness Color Ratings
Green
Amber
Red
Black

MRKI IN CONTEXT OF MISSION-ESSENTIAL TASKS

The path to adopting MRKI follows a phased approach:

- 🌀 **Step 1:** Map organization and FedLearn courses to KSATs and mission tasks
- 🌀 **Step 2:** Deploy MRKI scoring on selected pilot cohorts
- 🌀 **Step 3:** Scale to units—linking MRKI outcomes to readiness dashboards
- 🌀 **Step 4:** Integrate MRKI into DRRS reporting for enterprise readiness visibility

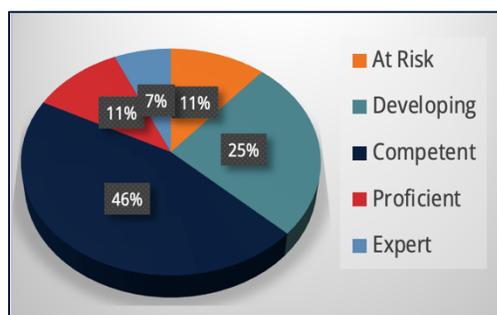


This approach allows DoW organizations to start small, validate outcomes and then expand to enterprise-level adoption without disrupting current reporting structures.

CASE STUDY: APPLYING MRKI TO DOW LEARNING COHORT

How does MRKI work in practice? FedLearn applied MRKI to a cohort of 195 learners from a DoW organization. This group was assigned our online, asynchronous course, AIDATA109 – Introduction to AI & Machine Learning Concepts & Terminology. Course completion data revealed that 125 learners completed the course or 64 percent. This would suggest a 64-percent readiness level for this group. However, FedLearn AI models measure Z1 even when a learner does not complete a course. Therefore, MRKI told a different and richer story:

- ❖ **22 At Risk (0–40 score)**
- ❖ **50 Developing (41–60 score)**
- ❖ **89 Competent (61–80 score)**
- ❖ **21 Proficient (81–90 score)**
- ❖ **13 Expert (91–100) score**



MRKI Application to DoW Cohort

This distribution showed that while 72 percent of the learners were competent or better, nearly one-third were below readiness thresholds. *This knowledge let DoW leaders focus interventions precisely where needed, instead of retraining everyone equally.*

FUTURE IMPLICATIONS OF AI-BASED READINESS

MRKI is only the beginning. By integrating AI into readiness measurement, the DoW sets the stage for predictive readiness models. Future systems could forecast knowledge decay, recommend reinforcement before readiness declines and even integrate field simulation data with classroom learning.



Over time, MRKI could become a core input into personnel management, promotion and talent development decisions—ensuring the right people with the right skills are ready for the right missions.

CONCLUSION

The DoW can no longer equate course completion with readiness. In modern operations, exposure is not enough. *Competence, retention and application are what matter.*

“By aligning KSATs and mission-essential tasks, MRKI ensures that training outcomes are truly mission

MRKI provides a quantitative, authentic and continuous measure of workforce competence. By aligning MRKI to KSATs and mission-essential tasks, training outcomes are truly mission relevant.

With MRKI, FedLearn enables the DoW to transition from “Did personnel take the required course?” to “Are personnel mission-ready?”

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ABOUT FEDLEARN

FedLearn (fedlearn.com) is transforming learning for federal government and government contractor organizations. We offer adaptive learning solutions—enabled by AI—to deliver contextualized courses and content directly supporting government mission areas, particularly in the DoW and Intelligence Community. Our state-of-the-art technology solutions enable workforce readiness by offering a rich, dynamic and personalized learning experience with quantifiable outcomes. FedLearn is a certified service-disabled veteran-owned small business.