Reconciling the Science and Practice of Extended Reality Training

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We Optimize Human Performance

Apply **Human Centered Engineering** methods and technologies to optimize the performance of humans in technology intensive, mission critical settings.

- **Performance Assessment Technologies**
  - Improving organizational performance by optimizing individual and team performance

- **Intelligent Analytic Technologies**
  - Combining data analytics with immersive, naturalistic user experiences to create seamless analyst-machine interfaces

- **Performance Augmentation Systems**
  - Precisely addressing gaps in performance and forming true human-machine partnerships

- **Learning and Training Systems**
  - Delivering the right experience at the right time to foster development both within single learning events and over time
The AR fit for Training

A constructivist learning environment that allows learners to physically interact with the environment and discover new knowledge on their own.
Realistic models that help the learner to build mental models by “seeing” physical equipment and schematics in 3D.

Learner performance increases when *how-it works knowledge* is provided with *how-to-do-it knowledge*.
Sensorimotor feedback allows learners to interact with equipment using their body, especially their hands - critical for maintenance-related tasks.
An inquiry-based learning environment that provides freedom and support to think critically through problems without requiring an instructor.
Why Align with Science of Learning?

• Instructional designers are generally less familiar with the unique affordances and limitations associated with AR technologies.

• A considerable gap exists between the published literature on AR and the larger science of learning community.

• The inappropriate selection or implementation of augmented reality can hinder learning.
Use Case – Navy CVN 78 Training

- Selected instructional strategies aligned with objectives for military maintenance training
- Focused efforts on training using XR technologies
- Applied to training for davit operators and maintainers
Strategy: Visual Orientation

- Visual Perception
- Anticipation
- Highlighting
- Scaffolding
- Highlight Frapping
- Lines of RHIB
- Visual Cues
- Expert Narration
- AR/VR
- Batch Script in Rapid Succession
- Practical Guidance
- Skills
- Instructional Approach
- Core Mechanics
- Use Case

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Strategy: Contrasting Cases

- Discriminate Subtle Patterns for Decision Making
- Problem-Based Learning
- Deep Learning
- Stimuli, Process, Feedback
- Use Case
- Core Mechanics
- Practical Guidance

Comparison between wind speed and load weight

Demonstrate or animate concept before scenario

Instructional Approach

Skills
Strategy: Stress Exposure

- Stress Exposure Training
- Present Factual Information, Practice, Increase Stress
- Perform Several Dry Runs to Dial in Stress Factors
- Perform Task Under Time Constraint
- Maintain Performance Under Stressful Conditions

Skills

Core Mechanics

Use Case

Practical Guidance
AR Learning Design Pitfalls

1. Distraction – extraneous information, clutter
2. Disruption – flow is impeded with unintended or jarring transitions
3. Seduction – enticing details inadvertently guide a learner in the wrong direction
4. Gratuitous Gamification – gamification elements that inadvertently shift learner motivation away from the training intent