VR Story-Experiencing: Vivifying Diversity & Inclusion Training for Military Leaders

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ABSTRACT

Immersive technologies hold great promise in the development of cutting-edge training and performance support for military application and have therefore been a justifiable and enduring interest among the Department of Defense services and industry. An ever-increasing array of immersive tools – including head-mounted displays and virtual simulation environments – enables warfighters to understand and operate complex military systems to great tactical advantage. While aligning its education and learning strategies closely with the evolution of warfare technologies, the Department of the Navy has also prioritized the development of superior leaders to ensure tactical and operational advancement. Strategic and inclusive leadership is a key tenet of the Navy's educational strategy: "[L]eaders generate success and achieve unparalleled performance when they tap into the energy and capability of an actively inclusive team… to improve warfighting capacity and readiness (Vision and Guidance for Ready Relevant Learning, 2017)." To foster superior inclusive leadership skillsets, and consequently, psychological safety for personnel throughout the organization, immersive technologies can be used to train Navy leaders in a realistic, interactive, context-sensitive manner that allows for the effective transfer of learned practices to the field environment; this paper will investigate the application of immersive learning technologies, and specifically the use of head-mounted displays in conjunction with immersive storytelling techniques, to achieve that dynamic with specific regard to diversity & inclusion concepts. Through virtual narratives with targeted leadership themes, learners can access these profoundly important, far-reaching concepts that often fall to the fringes of the learning experience due to their abstract, non-technical nature. Adding to existing knowledge and research on how immersive storytelling fosters spatio-temporal recall, empathy, and increased awareness, we will explore how shifting leadership training away from the traditional and theoretical toward simulated experiences accelerates warfighter leadership competencies and cultivates skillsets closely aligned with Naval education strategy.

ABOUT THE AUTHORS

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INTRODUCTION

A direct, positive relationship exists between quality leadership within an enterprise and the success of that enterprise. In exploring some key aspects of what creates quality leaders, this paper will postulate two key points, with specific application to military leadership and success: 1) leadership development with a special focus on diversity and inclusion (D&I) propels mission success and fosters an environment of psychological safety for personnel, and 2) the use of virtual reality (VR) headsets to deliver immersive storytelling training presents an advanced and educationally robust format to foster D&I literacy. In light of both recent and historic national events fueled by the call to end systemic inequities across various facets of our country's social structure – ranging from racial discrimination and violence to gender discrimination, opportunity and wage gaps, and implicit and explicit biases – the need for diversity- and inclusion-minded leaders has never been more pressing or more important to the nation's sense of unity, security, and political/social/economic health. Not only is a culture of D&I morally and ethically sound, but research shows that it promotes organizational effectiveness; according to Hunt et al. (2021), gender-diverse organizations tend to have greater financial returns than their more homogenous peers, and ethnically/racially diverse organizations show a tendency toward even greater returns (p. 2).

On an organizational level within the military, D&I is a deep-seated value that underscores nearly every aspect of operations. Given the importance of the two terms to which D&I refers – that is, "diversity" and "inclusion" – it is imperative that we define these terms clearly at the outset of this paper. Roberson (2006) distills institutional diversity as "the hiring and utilization of personnel from different cultural and social backgrounds" (p. 214). She acknowledges that an embrace of *diversity*, by itself, is not sufficient to properly foster an enterprise with true cultural sensitivity and awareness because it focuses "on the advantages of employing members of different identity groups in organizations" (such as the financial advantages noted above by Hunt et al.) and therefore "largely ignores the dynamics and consequences of exclusion" lurking within those groups. For this reason, institutional implementation of *inclusion* is integral:

> Inclusion [is the] extent to which individuals can access information and resources, are involved in work groups, and have the ability to influence decision-making processes. Rather than emphasizing difference as an organizational commodity that has exchange value in terms of economic performance, inclusion is focused on the degree to which individuals feel a part of critical organizational processes. Thus, inclusion represents a person's ability to contribute fully and effectively to an organization (Miller, 1998; Mor Barak & Cherin, 1998; as cited by Roberson, 2006, p. 215).

The Navy, and the Department of Defense (DoD) at large, have formally, unequivocally endorsed and embraced the importance of D&I. According to a statement published in January 2021 in the Task Force One Navy team memo, "To recruit and retain the high-performing and innovative workforce required to sustain today's Navy and the Navy of the future, deliberate efforts must be made to cultivate and champion an environment that promotes respect and inclusion across ranks and celebrates the competitive advantage gained from a diverse force" (p. 44). In both DoD and commercial workspaces, D&I training is recognized as a strategic component of business and workforce success.

The DoD points to three goals in the makeup of a framework for successful D&I efforts:

1. Ensure leadership commitment to an accountable and sustained diversity effort
2. Employ an aligned strategic outreach effort to identify, attract, and recruit from a broad talent pool reflective of the best of the Nation we serve

3. Develop, mentor, and retain top talent from across the Total Force (Department of Defense Diversity and Inclusion Strategic Plan, 2012).

As one ponders the challenge of systematically instilling values of D&I among military leaders (or people of any rank and role, for that matter), it is difficult to ignore certain questions that arise: Given that all people have unique experiences, complex interactions, varying agendas, and differing personalities, how can D&I training be formulated dynamically, and contextualized on a personal level for each trainee? How can such training be designed to ensure that trainees are not programmed robotically en masse with mere prescriptive language and actions for prefigured scenarios, but rather genuinely enlightened about D&I concepts to inform and empower them in their various leadership styles and circumstances? How can this training reliably target leaders' overall perspectives and awareness about D&I matters so they demonstrate attitudes and practices that will influence those they lead and set the tone for D&I culture within their divisions? These questions might initially seem like a hopeless probe into abstract and impenetrable aspects of human thinking and learning, but let's reframe them to something perhaps more palatable: How do people gain perspective in the world to a degree that allows for a clear understanding and embrace of core social values, and an ability to act efficiently and effectively in championing those values? On an anthropological level, we already know the answer to this question: through direct experience, and through narratives of those with direct experience.

The Importance of Narratives and Experience

The use of storyline narratives to package and disseminate past human experience and lessons learned has long been employed by the military to inform successive generations of warfighters. Debriefs, After-Action Reports, and informally told stories from the field serve as mechanisms to better prepare others based on the viewpoints and lived experiences of those with direct prior knowledge. Sharing expertise and reflections on field experiences to drive impactful and realistic tactical training has been a useful approach to this point, but with an increasing urgency to provide a wider array of meaningful and translatable leadership training across today's workforce, how can the military leverage the benefits of narratives to support the enhancement of quality leadership training? While storytelling is a critical tool in communicating important ideas, dangers, causal relationships, and more, in its basic form it is a passive activity on the receiving side of the communication exchange, with a one-directional information feed from teller to listener. Traditional storytelling has operated with this dynamic for centuries.

Advances in immersive technologies used for training enable an evolved dynamic which shifts passive story-listening to something far more active and participatory… something that we might call "story-experiencing." In this construct, an audience on the receiving side of a story is able to experience that story through the viewpoints of others, and play an active role in decision-making to see causal relationships supported by adaptive, story-branching technologies baked into the given training platform. When coupled with debriefs and structured reflection activities to process the virtual environment, trainees are provided with both the simulated experience and the time/space/guidance to assimilate the information and strengthen their leadership abilities.

D&I and VR in the Context of Leadership Training

If D&I fluency is important on an organizational level, how does its importance translate specifically to leadership training? When we pause to consider that cultural sensitivity and perspective are anchored more generally in a robust understanding of one's cultural atmosphere, we realize that such atmospheres are developed and sustained through leadership within households, communities, workplaces, nations... No matter the size of the domain, leaders are the shapers of culture, and it is for this reason that leadership training for D&I is of particular importance. If we are to progress in achieving an acceptance of its values then we must equip our leaders properly so they can build a culture of psychological safety in which individuals can "take risks, speak up, work creatively and innovatively, and generally be authentic in the workplace without fear of reprisal, discrimination, or retaliation" (Training Industry, 2020).

In the realm of leadership training, we believe the act of story-experiencing is an optimal learning mode for trainees to build a robust, meaningful, impactful embrace of D&I tenets. And to facilitate this learning mode, we believe that VR headset equipment enables an ideal perspective-based, immersive narrative experience with the capacity for intra-application story branching and adaptive scripts based on a user's deliberations and autonomous movements/actions within the virtual environment.

Even beyond creating opportunities for trainees to experiment and reflect in open-ended ways within a low-risk environment, this type of VR experience can be further enhanced with Experience Application Programming Interface (xAPI) technology to index and integrate trainee performance metrics that will influence the virtual narrative and gauge general proficiencies, maneuvers, reactions times, and decisions in the context of the Navy's mission and endorsed values. In arranging a training that allows for story-experiencing through virtual immersion and participation in an adaptive narrative construct, plus real-time data gathering and reflexive integration within the learning application, the training program is dramatically enriched for trainees and trainers alike.

Impacts of D&I Training on D&I Outcomes by Modality

We posit the following hypotheses which compare the impact of two distinct D&I training types on key D&I outcomes: 1) VR story-experiencing is a superior method of D&I training over that which uses traditional storytelling modalities, and 2) the introduction of either type of D&I training leads to increased inclusive leadership which results in improved psychological safety, with VR story-experiencing based D&I training yielding better results. These hypotheses are visualized in *Figure 1* and *Figure 2* where notional logarithmic plots represent improved psychological safety and inclusive leadership values by VR story-experiencing over traditional storytelling by a factor of *a*.

$$a = \frac{\text{Effectiveness of VR Story-Experiencing}}{\text{Effectiveness of Traditional Storytelling}}$$

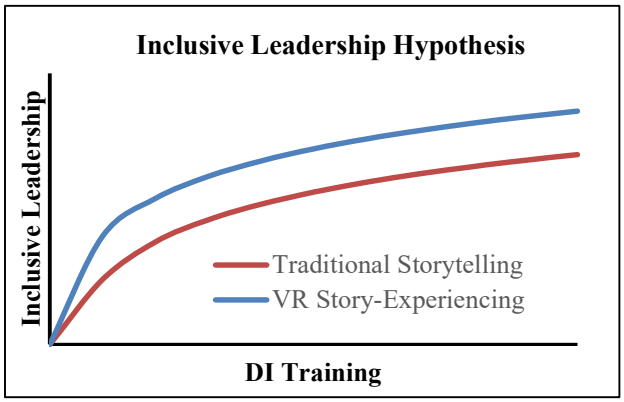

Figure 1. Inclusive Leadership Hypothesis

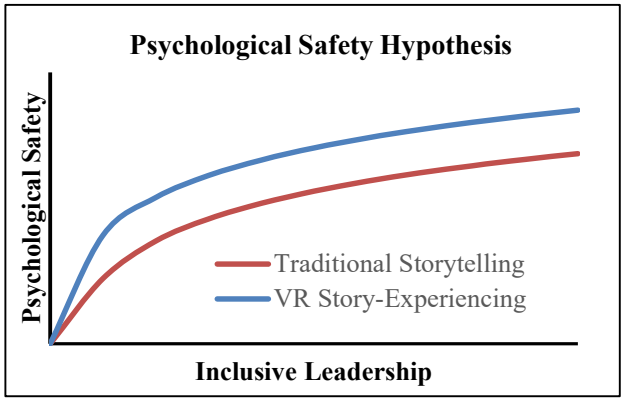

Figure 2. Psychological Safety Hypothesis

Through comparative analysis, and, supporting evidence from both the VR technologies and D&I interest communities as well as military leaders and influencers, we will examine the relationships of these variables and potential impacts of implementing VR story-experiencing as a modality of D&I training. Additionally, we will discuss the need for empirical, quantitative research to validate these hypotheses along with key considerations for the implementation of such research.

UNDERSTANDING VIRTUAL REALITY AS A CONCEPT AND A TOOL

What Is VR and How Is it Used?

Since VR is so integral in creating a circumstance where its users can understand environments along with actions and consequences in a story-experiencing manner, it is a concept worth defining and outlining clearly. Coburn, Freeman, and Salmon (2017) explain, "A very basic definition of a VR experience is the replacing of one or more physical senses with virtual senses." VR experiences have varying degrees and qualities of immersivity (how much of the realistic world is replaced by the virtual one) and fidelity (the level of realism of those replaced values). For example, the authorship describes a simple VR experience – listening to music on noise-canceling headphones – as a relatively basic example in which sounds of the physical world are replaced with the sounds of the virtual world, with a variable degree of immersivity and fidelity depending on the quality of noise canceling and nature of the replacement sounds (p. 031013-1). As immersivity and fidelity increase in a VR experience, of course, a user becomes more deeply involved – sensationally and psychologically – in the synthetic environment.

Given its ability to envelop users in tailored virtual worlds across such a wide and varied spectrum of immersivity and fidelity, the interest in, and application of, VR technology over recent decades has accelerated rapidly. From the use of headphones for leisurely music enjoyment to the utilization of advanced screens, rigs, and motion controllers for recreational gaming, communication, and professional training, formats are continually evolving to increase immersivity and fidelity to whatever extent is ideal for their intended purpose. Among all potential formats and uses for VR, however, Coburn, Freeman, and Salmon (2017) note that one particular arrangement holds special interest:

> Various types of hardware are used to provide an immersive, high-fidelity VR experience for users. Given the relative importance the sense of sight has in our interaction with the world, we consider a display system that presents images in such a way that the user perceives them to be 3D (as opposed to seeing a 2D projection of a 3D scene on a common TV or computer screen) in combination with a head tracking system to be the minimum set of requirements for a highly immersive VR experience (p. 031013-2).

The arrangement described here is the head-mounted display (HMD). Arguably the most notable and exciting hardware format in today's VR landscape, "[…HMDs are a type of VR display that is worn by the user on his or her head. […] These devices typically consist of one or two small flat panel screens placed a few inches from the eyes," and each eye is presented with a targeted portion of the screen image to formulate a three-dimensional view when visually processed. "[…These displays typically also track the orientation of the device and consequently the user's head. The orientation of the user's head can then be used as an input control for the VR application allowing the user […] to look around the virtual environment just by turning his or her head" (p. 031013-3).

From Facebook's Oculus series to Sony's Playstation VR to HTC's Vive lineup, the commercial popularity and center-stage stance of the HMD is justified by its ability to create the deepest immersive experience of all available VR options. Apart from the visual immersion and head-aligned field of view within a three-dimensional environment, HMDs can also be supplemented with motion controls attached to the user's hands or feet, headphones or audio input/output hardware that captures the full soundscape of the virtual environment, omni-directional treadmills to create walking and running sensation that aligns with the user's movement through the virtual landscape… the list goes on, and within the bounds of their basic technology and mechanical features, HMD experiences are in many ways only limited by the imagination of those developing the VR content and applications.

VR and Episodic Memory

In the domain of long-term memory there are two types of explicit (that is, consciously formed) memory: episodic and semantic. While semantic memory is rooted in general knowledge of the world, language, and concepts, episodic memory is rooted in personal experiences and sensations. VR technology is specially equipped to cultivate episodic memory in its users because of its sensory stimulation and immersion capabilities.

The American Psychology Association (2020) defines episodic memory as "the ability to remember personally experienced events associated with a particular time and place." Because this type of memory is built within a spatiotemporal context, a VR user who experiences a particularly vivid event (e.g. a notable confluence of sounds, images, movements, etc.) in a simulated environment will encode a neural network of sense-based associations, primed reactions, and reflexes that prepare that user for any re-encounter of parallel "episodes" in the real world. Upon re-encounter, and provoked by the rush of familiar sensory stimuli, the episodic memory retrieval process swiftly summons learned ideas, actions, and appropriate responses in the host's mind and body. This equips the host with intuition-like abilities based on actual experiential wisdom – the more vivid the initial experience, the stronger the episodic memory and accompanying reaction.

Since VR experiences can be designed and delivered with variable degrees of immersivity and fidelity, episodic memory can be cultivated to greater or lesser degrees based on the level of realism and interactivity achieved in the immersive world. Coburn, Freeman, and Salmon (2017) advise that we should always evaluate and "consider a VR system in the light of the VR experience it provides"; form and function should be aligned (p. 03103-1). In the realm of VR training experiences meant to directly prepare trainees for field work, the function of building of episodic memory is often of key importance; thus, a more vivid, immersive training environment (that is, one that more closely resembles the actual field environment) will facilitate the strongest episodic memory formation in trainees and therefore the best subsequent field performance. HMD VR experience is ideal for this.

While VR technology can deliver to its users a unique sense of immersion and the cultivation of episodic memory to varying degrees, what special abilities does the medium have to influence the way its users think and feel? In an attempt to push VR use cases further into the more abstract, cognitive realm, researchers have rightfully explored the format's ability to build empathy in users.

Building Empathy Using VR Technology

On a basic level, individuals who are empathetic understand how others might think and feel in a given circumstance and exhibit compassion toward them. Empathetic ability is related to "familiarity and affiliation to a group," meaning we are most likely to experience empathy – and empathy comes easier to us – with those familiar to us; meanwhile, a lack of empathy is related to "negative bias and stereotypes at implicit levels as well as to more explicit forms of racism and aggression" (Bertrand et al., p. 2). Not surprisingly, several studies show that VR technology is well equipped to expand perspective and foster new thinking and feeling in users, and therefore to build empathy.

A growing body of research shows that VR training can and should be used to train empathetic skillsets; visuomotor synchronicity and visuotactile synchronicity are two particularly powerful phenomena fostered by VR experiences, and both have been well studied for their importance in generating empathetic responses. Visuomotor synchronicity involves "seeing oneself in the body of an avatar [i.e. a virtual representation of oneself] that mimics one's movement in real time." Meanwhile, visuotactile synchronicity supplies simulated tactile stimuli (in the VR environment) as matching stimuli are "applied to the hidden body part of the user with the avatar in a congruent posture with the subject" (Bertrand et al., p. 8). Researchers suggest that these stimuli, especially when combined with a congruent full-body first-person perspective, create the illusion of embodiment of another – another person, perspective, and experience. This virtual embodiment of a VR user enables thinking and feeling in new ways, and fosters empathetic responses and considerations that otherwise may have never occurred to the user. Additional research has shown that

> …individuals in a virtual environment who are represented by avatars […] come to have the illusion of ownership over the virtual body by which they are represented. In one experiment, light-skinned participants were shown to exhibit significantly less racial bias against dark-skinned people after the participants were embodied as dark-skinned avatars in virtual reality. A similar study showed that users who were embodied as an avatar with superpowers were more likely to exhibit prosocial behavior after the experiment ended (Coburn et al., 2017).

VR technology is specially situated to build empathy in a way that no other current mainstream technology or practice – other than genuine personal experience – can match. When we consider that the above studies do not directly necessitate the HMD format of VR and maintain validity even with lesser degrees of user immersion, we realize just how powerful empathy-building might be when delivered through the maximally immersive HMD VR experience. HMD equipment, however, is not the only factor in maximizing users' thinking and feeling. If we wish to affect users on the deepest neurological level, technology will not and cannot be the single solution; the more "human" aspect of understanding will be of key importance, and this level of understanding is appealed to through narratives and storytelling.

Utilizing HMD VR Capabilities with a Narrative Approach to Enable Story-Experiencing

While many HMD VR use cases involve targeted knowledge transfer of operational procedures for equipment, or basic spatial exploration of interactive environments, users can glean deeper degrees of understanding and greater perspective when narratives and storytelling are incorporated into a virtual experience. Harvard Business Publishing illuminates the reason for this:

> Storytelling works because it parallels the ways in which we receive, analyze, organize, and archive any information that comes into our brains. Facts enter as data points; stories connect the dots. When we hear a new story, we value it and attach emotions to it…Through new and updated stories, we absorb incoming facts, make connections, and interpret meaning. And changes to neural pathways actually happen. As a result, we're able to work from a larger story, one that offers greater perspective, enabling more options and more opportunities to try on new ideas or behaviors without external risk. And in that moment, sustainable learning occurs (Boris & Peterson, p. 2).

Because the human brain processes information in a narrative format, storytelling has been integral to human development, communication, and learning throughout history. In today's learning landscape, government agencies and private companies of all sizes often champion a storytelling approach when training employees or conveying important information to customers and clients; such stories are often told and transferred through written artifacts, presentations, videos, and Computer-Based Training (CBT). Compared to these long-used media formats, HMD VR opens the learning gateway much wider by pulling learners out of the common passive listening/receiving role (or, at best, the interactive yet non-immersive role) and propelling them into a full story-experiencing role. Learners in story-experiencing training scenarios are positioned to gather narrative context, process and consider real-time stimuli in that context, interact and react as desired, evaluate causes and effects of their actions, and reflect on the consequent narrative development.

The narrative component of the HMD VR story-experience is so important because it primes the brain to assimilate nuanced circumstances and carefully consider the people, motivations, objects, exigencies, sub-texts, and peripheral phenomena of those circumstances. Apprehending this web of interconnected and cumulatively evolving contextual factors is an act that often coincides with gathering sensory information and interacting with the environment, yet poses a very specific standalone benefit: it presents the user with a reason to examine a set of highly unique details that warrant keen attention and diligent response. Without cause to consider such details, a user's neural engagement is often rendered weak and subject to pre-programmed response. Neuroanatomist and author Jill Bolt Taylor (2006) explains that, unless we are able to muster a sense of enthusiasm and attentiveness in our activities, we are all inherently prone to mental stagnation by old, familiar stimuli:

> I define responsibility (response-ability) as the ability to choose how we respond to stimulation coming in through our sensory systems at any moment in time... What most of us don't realize is that we are unconsciously making choices about how we respond [to our environments] all the time. It is so easy to get caught up in the wiring of our pre-programmed reactivity (limbic system) that we live our lives cruising along on automatic pilot. I have learned that the more attention my higher cortical cells pay to what's going on inside my limbic system, the more say I have about what I am thinking and feeling (pp. 146-7).

While familiar environments and sensations have a tendency to lure our limbic system into "pre-programmed reactivity" (the very principle through which episodic memory operates to allow for experience-based reflexes), unique narrative contexts give our higher cortical cells cause to re-consider that which we may think we already know; and in motivating this sense of heightened "response-ability" and conscious examination, narratives spur us toward new thoughts and feelings where authentic, impactful learning can occur.

If narrative context is such a vital component of HMD VR story-experiencing, then the equipment component – the HMD VR headset itself – is equally indispensable in achieving a true story-experience. HMD VR has the special benefit of using sound, image, and movement – in a trifecta of sensory stimulation – to impress upon individuals a particular environment and sense of interaction; the narrative context is the complementary gravitas that surrounds those immersive elements to stimulate the user's formation of new neural circuits rather than the looping of old ones. These components work together to jolt a learner's limbic system into alert mode, disengage autopilot, and spur real thinking, feeling, interaction, and decision-making.

The Possibilities of xAPI to Enable Dynamic Training with Measurable Outcomes

Objective, quantitative measurement of the efficacy of VR training is possible through xAPI. While the Shareable Content Object Reference Model (SCORM) standards and specifications have allowed digital developers to assemble and deliver traditional eLearning experiences for decades, xAPI is an evolved software specification that permits real-time information exchange between learning content and a learning system in order to create an adaptive and fluid learning experience with constant event tracking and data-rich outputs for concurrent and post-training analysis.

Essentially, xAPI is a powerful enabler of VR assessment, measuring both presented stimuli in the training simulation and reactions/responsive neural mechanisms in the learner; the pairing of these two data pools opens analysis and measurement possibilities that simply are not possible when using more traditional assessment formats (Alcaniz, Parra, and Giglioli, p. 4). In the context of HMD VR training, xAPI can record any specified data about a user's head movements, navigation choices, specific actions, speech analytics, eye-tracking in response to virtual stimuli… the ways in which virtual stimuli and user response can play upon each other throughout the training sequence is virtually

unlimited, and all data points collected by the xAPI mechanism can be reliably used to foster discussion and post-assessment analyses of leadership choices, ethical guidance, emotional intelligence, etc.

By allowing developing leaders to react and respond freely to scenarios mimicking open-ended real-life decisions (rather than confining them to multiple choice questions on a page, or other "removed" and unrealistic assessment formats), an opportunity for authentic, fully relevant, applicable learning emerges. After witnessing the depth and immediacy of HMD VR training, trainers and trainees alike are prone to realize that anything less trivializes the learning experience and belies the complexities of leadership and critical decision-making in an operational, high-stakes military environment. Alcaniz, Parra, and Giglioli

> propose [VR] as a very promising tool to observe various leadership related behavioral patterns during dynamic, complex and realistic situations. By seamlessly embedding assessment methods into virtual learning environments, VR can provide objective assessment methods with high ecological validity. VR also holds unlimited opportunities for leadership training providing subjects with intelligent tutoring systems that adapt situations in real time according to the observed behaviors (p. 1).

In concert with an immersive storytelling method, an HMD VR training experience with integrated xAPI boasts not only cognitive and sensory immersion for trainees, but an experience that can tailor and track itself to mimic real cause-and-effect progressions while registering and indexing all user and machine states in parallel, on a timeline, for detailed analysis of the experience. The potential for a rich training experience and the accountability afforded by this combination of tools is significant.

CURRENT APPROACH TO NAVY LEADERSHIP AND D&I TRAINING

Naval core values lie at the heart of current leadership and D&I training efforts within the institution, and they are summarized in the Department of the Navy Core Values Charter: "[…W]e are dedicated to the Core Values of Honor, Courage, and Commitment to build the foundation of trust and leadership upon which our strength is based and victory is achieved." To emphasize and teach these core values to leaders of varying ranks, the Naval Leadership and Ethics Center (NLEC) employs the use of synchronous, seminar-structured training with lectures, facilitated group discussion, and case studies supported by assignments. One such training lecture related directly to leadership and D&I teaches Sailors that inclusive leaders support a culture of inclusion *through* their leadership, and that they should view D&I as integral to mission effectiveness, success, and decision making. The brief speaks to the specific benefits of D&I, including increased "teamwork and collaboration for operational and warfighting advantage" (Naval Leadership and Ethics Center, 2017, slide 3).

In November 2020, the Navy released a memorandum which affirmed the Navy's posture that

> Sailors are our asymmetric advantage in a complex and changing environment. Optimizing the performance of our Navy team requires us all to drive toward a Culture of Excellence, a culture focused on the high ideals espoused in our core values of Honor, Courage and Commitment, a culture that respects each of the members of our Navy team. When Sailors feel included, respected and empowered, they will be more ready to win wars, deter aggression and maintain freedom of the seas (United States Navy NAVADMIN 300/20, 2020).

The Navy has remained steadfast and vocal in its dedication to the inclusivity of its Sailors. There is perhaps no better time than now to further advance the Navy's commitment to fostering strategic and inclusive leadership using HMD VR storytelling as the ideal tool to achieve this.

As stated in the 2012 DoD Diversity and Inclusion Strategic Plan, valuing diversity and inclusion is "not simply the right thing to do. Leveraging diversity ensures we maintain the competitive advantage – an adaptable, innovative Total Force" (p. 4). The Department of Navy (DoN) has very recently doubled down on this push for D&I with an impending set of reviews and actions designed to recognize and address inequities within the Navy. Acting Secretary of the Navy Thomas Harker notes, "[…I]t is the policy of the Department of the Navy (DoN) to continue making transformative and meaningful steps that promote diversity, equity, and inclusion in our policies, programs, and operations across the enterprise." Chief Diversity Officer for the DoN, Catherine Kessmeier echoes this sentiment: "We recognize the need to understand the barriers that face our workforce, and we need to ensure our policies and processes are constructed

to support diversity, equity, and inclusion for every officer, Sailor, Marine and civilian" (Naval Air Station Patuxent River's Tester, June, 2021).

NAVY – LEANING FORWARD FOR D&I ADVANCEMENT

An oft-elusive yet important relationship exists between diversity (which is objectively discernable and metric-driven in nature) and inclusion (which is more subjectively manifested according to diversity metrics); namely, no enterprise can drive an effective institutional embrace of D&I without first fostering perspective, self-awareness, and empathy in leaders who will demonstrate and champion those values publicly within their organizations. The influence these leaders create sets the culture within their organizations for all personnel.

Rationale for Using HMD VR Story-Experiencing to Train Navy Leaders in D&I

Since any training seeks to replicate the circumstances/scenarios for which it trains, HMD VR storytelling is especially well suited to vivify Navy leadership training by virtue of its ability to approximate highly sensational surroundings and events. And with its capacity to build episodic memory in users, the format is exceptionally fit to equip leaders with experiences that will translate directly to the field, where they will need to make judgment calls in the heat of a mission, with their brains and bodies primed to handle multifaceted and infinitely variable situations.

While creating a realistic environment for military trainees is a powerful implementation of HMD VR, we have seen how the capabilities of the tool can be taken even further to build empathy in users; by facilitating deliberate thinking and feeling – that is, by promoting new thoughts, sensations, and emotions – HMD VR experiences allow users to build perspective and D&I fluency. Further yet, HMD VR story-experiencing – as a format that extends trainee immersion beyond the sensational and empathetic and also into the realm of the cultural, conceptual, and narrative – can serve to push experimentation, learning, and reflection to new limits in the training domain. With these storytelling components embedded in the experiential training, an opportunity is presented to have trainees participate in complex scenarios addressing D&I concepts; this is a current priority within the DoD, and particularly within the Navy.

Thus, we believe the Navy can push D&I training to greater heights by implementing HMD VR story-experiencing. The format presents an optimal modern training mechanism to deliver realistic, meaningful, and memorable training experiences while fostering D&I understanding, embrace, and enaction within leadership.

Considerations for Navy Implementation

Use Established Training as a Starting Point

In the design, development, and implementation of HMD VR storytelling for Navy D&I training, an appropriate starting point is the consideration of how content used in existing training and traditional storytelling can be ported to, and evolved within, the VR environment. Not only does this allow developers to create new training using an already-established body of work as a baseline, but it allows project sponsors to reap the benefits of past efforts and expenses in training development. With these initial development costs reduced by the reuse and conversion of previously developed D&I curriculum components, Navy Schoolhouse training – and especially eLearning activities that use scenario-based narratives to teach D&I concepts – serve nicely as the foundation for HMD VR story-experiencing material. Instructional designers can translate eLearning, or even classroom-based training, to the HMD VR platform and then evolve it using HMD VR-specific capabilities.

Incorporate Pre-Training and Post-Training Events

Training elements like pre- and post-training events are well studied best practices in the DoD and training development spheres and require little modification to incorporate into VR training curricula. For pre-training, pretests can be used to determine appropriate and specific programs scaled and tuned for varying dispositional empathy levels in participants; with pretest data, an instructional designer can create training sequences and narratives that appeal to differing levels of empathy among the learner group. To that end, Navy programs should consider whether the ultimate performance goal will be an improvement at the learner level (% delta between entry score and post-course score) or a more standardized proficiency score benchmark across a population, or both.

It is widely accepted that debriefing is the "heart and soul" of a simulation experience and presents participants with the opportunity to both solicit and respond to open-ended questions, self-debriefing/assessment, concept reinforcement, and a refreshed focus on learning objectives (Rall et al., 2000, pp. 516-517). Once an appropriate training sequence has been determined and delivered to a participant, post-training conversations between the trainee and experienced leaders/experts can be executed to analyze the trainee's thoughts, decisions, priorities, and the various complex components of leadership action taken in the simulated environment; this essentially serves as a constructive and reflective debrief for the trainee, aided by conversations and insights of those with relevant experience.

Leverage the Full Scope of VR Technologies: Story Branching and xAPI

Story branching in interactive narratives requires users to make a variety of separate decisions whereby their inputs and actions trigger unique outputs or consequences that influence the progression of the narrative. Details of the storyline (i.e., how the scenario "plays out") are dependent on a user's decisions in preceding checkpoints (Snegirev, 2021). Story branching is a key element in creating a sense of user empowerment through control and choice, and bringing the strategy to HMD VR allows for enhanced possibilities/interactivity between the user and the training program via xAPI integration – which, in turn, fosters meaningful experimentation, deeper understandings, and enhanced narrative perspectives.

An example of training using story branching is "Connect with Haji Kamal," an online scenario that Instructional Designer Cathy Moore and her team developed for the U.S. Army to serve as a pre-instructor led training (ILT) homework assignment to facilitate an in-class debrief about cross-cultural rapport and peacekeeping (Moore, 2007). To follow the "correct" narrative paths (i.e., paths that develop from user choices and foster respect and understanding between story characters, thereby leading to mission success), the learner must apply cross-cultural conversation skills in a fictional but realistic interaction between Lt. Harrill, the learner, and Pashtun leader Haji Kamal. At one checkpoint, the soldier initiates his meeting with the community leader:

> *[Soldier's First-Person Narration]*: I know Haji Kamal is going to offer me chai, but I hate chai, and I'm afraid it will make me sick. What should I do when he offers it?
> *[Haji Kamal]*: "Welcome! Please let me pour you some chai."

At that moment, the learner is presented with three narrative options and prompted to choose the best option in real-time, with each choice leading to a unique outcome that will impact the subsequent storyline and mission trajectory:

Choice 1: "No, thanks. I'm not thirsty."
Choice 2: "I wish I could drink chai, but unfortunately, I'm allergic to it."
Choice 3: "Thank you. I'd love some chai."

If Lt. Harrill responds with Choice 3, the interaction with Haji Kamal progresses to a few moments of small talk and an opportunity to change the subject, productively moving the conversation along. The first two choices result in alternate crossroads, wherein Haji Kamal makes a secondary offer of a meal of lamb. In effect, the lieutenant has a chance to redeem himself from the perceived rejection of Haji's hospitality: If the lamb is also rejected, the conversation stalls quickly and the learner fails; if the learner opts to accept Haji's offer, the potential affront is remediated and the learner arrives at the same point in the storyline as if Haji's initial offer of chai had been accepted.

The precedent for story branching in military training has already been established with great promise, and the concept could offer a relatively seamless and impactful translation to HMD VR, where xAPI becomes available to efficiently facilitate dynamic storylines with measurable inputs and outputs. Furthermore, the new format would add the benefit of increased realism and episodic memory formation through the learner's story-experiencing; the sights and sounds of a Pashtun village in an immersive environment, for example, would serve to acclimate personnel to real mission landscapes, people, and situations.

Limitations

While HMD VR story-experiencing boasts a wide array of benefits that serve to make D&I training more impactful, the format carries some limitations. First, VR learning experiences are not yet an output format that can be rapidly developed. If aiming to implement quick-turn training in response to a triggering event or "emergency training" protocol, VR training is likely not the ideal solution. High-fidelity experiences can certainly be awe-inspiring, but creating those experiences and developing in VR takes time. As new capabilities and policies come online to support the Navy's goals of faster development and deployment of training, this paradigm may change. For now, implementing

VR training requires well established timelines, likely consisting of months between conceptualization and implementation.

Additionally, though there are several benefits of xAPI as a powerful enabler of VR assessment and human performance measurement, the software technology does not measure emotion or empathy directly. Instead, it derives hypotheses and predictions about user emotions by allowing program algorithms to gather objective physical information that corresponds to emotional states. The indirectness of this computational, formula-based process necessitates a reliance on the efforts of creative and informed programmers who strive to discern what constitutes "best measures" of particular thought patterns in human subjects. While this limitation is not ideal, it is the best approach we have at our disposal (in the absence of true mind-reading devices), and promises to iterate cumulatively toward outputs with greater reliability and accuracy as research and experimentation continues. Just as medical tools like a heart monitor and blood pressure gauge do not directly measure stress in a human body, they do measure *indicators*; and in the realm of training, these indicators provide valuable data.

NEXT STEP: EMPIRICAL RESEARCH

With regard to the training solution proposed in this paper, we recognize the need for empirical research as a logical next step. Identifying quantifiable impacts and outcomes of implementing HMD VR story-experiencing D&I training for military leaders would establish a necessary body of relational data, support the justification for the adoption of such training, and further build the foundation for return on investment (ROI) projections.

Regression analysis would offer a means to identify the impacts of different types of D&I training against specific D&I training outcomes, such as psychological safety and inclusive leadership, with additional variables of interest that could be controlled for, or isolated and further examined. For example, while the primary variables noted in this paper include the deltas between D&I training using traditional storytelling methodologies and training using VR story-experiencing, and the impact of each training modality on D&I outcomes, we may also find value in exploring how these impacts vary based on factors such as trainee age, rank, and level of education. Moreover, from a technological perspective, investigating the relationships between HMD VR dynamics (immersive, synthetic world projection) and HMD 360-degree video dynamics (immersive, real-world footage) would inform technology adoption, experience design, and implementation.

CONCLUSION

The HMD VR story-experiencing format is remarkable in its ability to create rich, sensation-based, engaging, and thought-provoking learning experiences for users. Its incorporation into the Navy's D&I training approach bears a solid rationale and poses many profound benefits to the organization and its personnel. Though HMD VR development is not inherently low-cost or quick-turn, the format is unique in that it approximates more than any other learning mode the sensory stimuli, interactions, and narrative considerations of the field setting. It trains learners for actual experiences rather than hypothetical ones posed in a textbook or slideshow, and therefore breeds confidence in our leaders to take charge and ensure successful operations and outcomes. It presents a low-risk, tailored, targeted immersive environment that encourages experimentation and personal development rather than reticence, self-consciousness, and fear of mistakes that could cost lives in the actual mission field.

In offering realistic and interactive point-of-view narratives of the human perspective, D&I training through HMD VR story-experiencing holds tremendous promise within the Navy training community, where it can provide not only rising leaders but entire workforces with learning experiences that leave enduring impressions. These impressions have the potential to deeply improve understanding and empathy, and ultimately, to facilitate psychological safety across an entire organization.

Technology and Intention: A Final Thought

D&I is a complex topic that permeates every crevice of social life, both personal and professional. While the D&I training solution we pose depends heavily on the technological innovation and tool-based capabilities that permit the HMD VR story-experiencing format, it is important to note that technology cannot and will not ever stand by itself as

the core solution for more diverse and inclusive communities; human intention and intuition must guide the way. As lauded literary professor and anthropological researcher Joseph Campbell once noted from his studies of human narratives across myriad generations, cultures, and time periods, "[T]echnology is not going to save us. Our computers, our tools, our machines are not enough. We have to rely on our intuition," our sense of humanity, and ultimately our will to effect positive change (*The Power of Myth*, xiv). And if technology is not the actual solution, then we must recognize it as a tool through which a solution can be implemented.

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