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Predicting the future of experiential and adventurous learning in the metaverse

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ABSTRACT

This essay defines the metaverse and its many uses. It then draws parallels to adventure and examines the elements that make adventure a unique learning medium. Next, it predicts the future based on the present and the past and discusses the drawbacks of this process and its outcomes. Finally, it concludes with a few observations and expectations around adventure not being easily replaced by the metaverse in the near future, but long term advances might tell a different story.

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The metaverse

Coined by Stephenson (1992) in the science fiction novel, Snow Crash, the 'metaverse' is an old term recently joining the modern lexicon of the technology explosion (Sparkes, 2021). The **metaverse** is an Internet-based and simulated 3-D digital world, where users interact and immerse themselves in this replicated setting through Social Media, Augmented Reality, and Virtual Reality (Seidel et al., 2022). **Immersion** has a gaming quality to it, where users become players. **Interactions** range from making genuine social connections, through learning about foreign cultures, to conducting actual financial transactions. **Involvement** requires the use of a personal avatar: a figurative, symbolic, or iconic representation of self that can be based in reality, fantasy, or metaphor (Narin, 2021; Rospigliosi, 2022).

So far, the current metaverse has several uses:

(1) **GAMING** is the largest and fastest growing sector, where users play without consequences in teams or alone (for example, first-person shooter and war games). The recent addition of added-in DeFi (decentralized finance) means professional and amateur players can reap monetary rewards (Kiong, 2021; Kshetri, 2022).
(2) **SOCIAL NETWORKING** is more than maintaining friendships. This should lead to new creative expression, cooperation and collaboration with trust, but without miscommunication or disinformation. Unfortunately, the true potential of social networking is being obscured by the user hungering for 'likes' (Veszelszki, 2018).
(3) **COMMERCE** involves business transactions in cryptocurrency: digital money verified and recorded by a decentralized blockchain cryptography system, not a centralized authority like a bank (Osivand, 2021). This financial freedom allows for trying products online before purchasing and shopping in any store without barriers or borders (Joy et al., 2022).
(4) **ENTERTAINMENT** includes attending archived concerts, visiting amusement theme parks, gambling, and inserting yourself into your favorite movie or music video (Niu & Feng, 2022).

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(5) **RECREATION/TOURISM** in the metaverse provides bucket list activities without leaving home. Climb Mount Everest, deep sea dive, travel the world, go into outer space, overcome physical limitations without suffering, and tour a hotel's facilities before booking (Bayram, 2022).
(6) **EDUCATION** in the metaverse offers social and emotional learning through virtual field trips and class co-browsing (Hwang & Chien, 2022).
(7) **DEVELOPMENT** in the metaverse allows you to improve yourself and how you work with others through deliberate simulations (Park & Kim, 2022).
(8) **THERAPY** in the metaverse means healing yourself or under therapist supervision by practicing a coping strategy before needing it in the real world and most often involves 'flooding' or progressive exposure to desensitize around fears or phobias (Riva et al., 2021).

As shown in Table 1, the latter four metaverse uses have value directly related to the purposes of experiential and adventurous outdoor learning, where the outcome of the experience is **uncertain** (due to an inherent presence of risk, conflict, or challenging difficulty in nature) and the learner is encouraged to manage that **uncertainty** by using their personal competence to overcome personal risks, to resolve group conflicts, endure difficult exercise, and surmount challenging difficulties (Priest & Gass, 2018).

The adventure

Several unique and important factors further define these adventurous experiences (M. A. Gass et al., 2020).

(1) **EXPERIENTIAL**: a philosophy that people learn best from real life engagement by direct experience or simulation, rather than reading a book, listening to a lecture or watching a video (Bisson & Bisson, 2019).
(2) **NOVEL**: an unusual activity in unfamiliar environment means 'group members do not always know how they are expected to act, which prevents them from hiding behind a false or "social" self' (M. A. Gass et al., 2020, p. 162).
(3) **METAPHORIC**: the analogous experience has a great probability of learning transfer to daily life. 'When clients are invited to kinesthetic metaphors, they have the potential to tap into affective, behavioral, and cognitive resources that promote healthy change' (M. A. Gass et al., 2020, p. 183).
(4) **CONSEQUENTIAL**: arising from the setting and not the facilitator, 'natural or logical consequences . . . help clients learn to choose more functional behaviors' (M. A. Gass et al., 2020, p. 66).
(5) **MULTISENSORY**: engaging all the senses (seeing, hearing, touching, smelling, tasting, etc.).
(6) **CHANGE-ORIENTED**: The purpose of programs is to change the way people feel, think, behave, and/or resist positive assistance to transform (Priest & Gass, 2018).
(7) **ACTIVE** (rather than passive) learning due to these four adventure activity elements:
   - Taking personal perceived **risks** (benefitting emotional and self-health)
   - Resolving group **conflict** and tension (benefitting social health)
   - Immersion in **nature** (benefitting mental and often spiritual health)
   - Movement and **exercise** (benefitting physical and physiological health)

Table 1. Four types of adventure programs with intent to change and experiential emphasis.

Program Type	Changes	Experiential Emphasis
Recreation	Feeling	direct and purposeful action: exercises, activities, events or experiences
Education	Thinking	followed by focused reflection so as to highlight the lessons learned
Development	Behaving	integration in order to transfer or apply learning back to daily life, and
Therapy	Resisting	continuation to support those acquired changes against erosive forces

For the past 40 years, the process of how and why adventure works has been a bit of a 'black box' (Ewert, 1983), where unknown, unexplained or mysterious events and procedures take place between input and output (Bunge, 1963). Now on the verge of better understanding pathways and mechanisms of change for adventure, here is what is currently known. The four adventure activity elements (risk, conflict, nature, and exercise) are present and used (input) in varying blends within experiential and adventurous learning programs to achieve different health-related outcomes (output). While each element is facilitated in a slightly different manner, but with very dissimilar foci, the 'black box' process is mostly similar for all and consists of the same seven steps (COTH, 2021). These are dissonance, practice tries, reflection, identification, learning, and change, followed by a pledge for next time.

Adventurous outdoor learning is one of the few professions that deliberately places people in awkward, uncomfortable, and occasionally dangerous situations. The reason for doing this is to create dissonance.

(1) **Dissonance** occurs when participants hold two opposing views in their minds at the same time (Festinger, 1957). A most obvious example involves the people who are frozen in the middle of an experience. They are unable to move (no exercise), while in a fear response to dangers (perceived risk), because they are focused on the difficulty (challenge) rather than their ability (perceived competence) despite being supported by the group (cohesion, not conflict) and protected by safety. At those times, participants are caught between two equally sensible and correct thoughts, but are unwilling to reject either opposite: 'I'll be okay, but I'm going to die!'
(2) **Practice tries**, also known as mastery attempts, are an effort by the participant to act in a way that will resolve the unpleasant distress due to the dissonance and lead to feelings of pleasant eustress (Terelak, 2019). In order to resolve the paradoxical dissonance, they will choose to test one of the views by either moving forward or giving up. Multiple setbacks lead into repeated efforts until success is eventually reached. Their motivational strength to address this attempt is partially a function of the dissonant gap between both views and the support of the group and competence effectance of the leader (K. Klint, 1992; Priest & Gass, 2018). Successfully resolving dissonance counters notoriously difficult-to-engage participants and provides them with high levels of new motivation (M. A. Gass et al., 2020).
(3) **Reflection** is the examination of one's own feelings, thoughts, and behaviors in the context of the experience or the comparison of past situations with the present (Kolb, 1984). Reflection has potential for learning and change, especially when shared with others for positive reinforcement or negative contradiction (Kolb, 2014). Reflection can take the form of group discussion or solo contemplation and can be facilitated by a leader or participants can be left to their own (Schön, 1987).
(4) **Identification** involves recognizing what has improved or increased as a result of the experience. The leader should typically facilitate this toward a gain in greater perceived competence for each participant (K. A. Klint, 1990).
(5) **Learning** is a summation and application of what was identified, compared, and examined to this point (Priest et al., 2000) and can be enhanced through metaphoric connections to daily life (M. Gass, 1985).
(6) **Change** involves participants expressing what they will do differently next time. Clearly, one of the next experiences should provide an opportunity for the participants to demonstrate their change.
(7) A **pledge** or commitment to continue that change in daily life ends the stepwise process, but is an optional step that is deliberately omitted if the participants are immediately plunged into the next experience. Promises for the future are more frequently included toward the end of adventure programs, before the participants depart for home. Nevertheless, this final step

is about the takeaways for each participant and how they will live their lives differently going forward into daily living.

Facilitation techniques used for the first two steps involve competence effectance: the belief that personal abilities, if correctly perceived and executed, will bring success or failure/temporary setbacks (K. A. Klint, 1990) and where the facilitator can act as a gatekeeper to ensure correct locus of control and proper attribution of those successes and failures (K. Klint, 1992). Facilitation techniques used for the last five steps include fundamentals, funneling, freezing, frontloading, focusing, and fortifying (Priest & Gass, 2018). Armed with these tools, a talented facilitator could use almost any app in the metaverse to design a meaningful and relevant learning experience (Seidel et al., 2022), provided reflection was a part of the experiential learning, and this combination could be utilized for adventure recreation, education, development or therapy.

The apps

In many gaming or simulation apps (applications), the source of uncertainty (a defining characteristic for adventure) varies from chance (roulette or fan-tan) through strategy (poker or mahjong) to sequenced moves (chess or go). For the purposes of experiential and adventurous learning in the metaverse, apps can be divided into five categories depending on main characteristics and the source of uncertainty.

(1) **Action**: shooter, combat, fighting, survival, criminality, stealth, jumping, climbing, etc.
(2) **Puzzle**: sudoku, wordle, crossword, pattern, matching, breakout, science, geography, etc.
(3) **Role-play**: rock star, athlete, singer, surgeon, pilot, driver, knight, monster tamer, spy, etc.
(4) **Strategic**: construct cities, build societies, obtain resources, control many characters, etc.
(5) **Other**: competitive sports, board games, casino gambling, memory trivia, logic tests, etc.

However, simulation apps can have multiple characteristics and may belong to more than one category. Variations in the number of players range from single, through multiple, to massive (thousands playing together) and can involve competitive player versus player (PvP) or cooperative player versus the environment (PvE). The apps can be stored and played on the same local device (smartphone, tablet, laptop or desktop computer) or be stored on an external server and played on a web browser regardless of the device (Seidel et al., 2022). Most apps may be commonly experienced in Augmented Reality (AR) or Virtual Reality (VR). A small group of related apps may also employ image or sound identification (ISID) and utilize crowdsourcing (CS). Here are explanations and outdoor examples of each.

AR is a real-time direct or indirect view of a real-world environment, but enhanced by the addition of an overlay of computer-generated information (Wu et al., 2013). Common examples of AR apps include PeakFinder, NightSky and the game of Pokemon Go! By looking at a mountain range on a device's screen as viewed through a built-in camera, PeakFinder matches the view to the device's built-in compass and GPS locator and draws an outline of the mountain range with all of the summits accurately labelled (Fedorov et al., 2016). A similar stargazing astronomy app, SkyView, matches a screen view of the stars with an overlay of constellations, planets, and satellites using the device's camera, compass, GPS locator, and calendar for seasonal adjustments to the night sky (Cercel & Iftene, 2021). Pokemon Go is a famous AR and PvP/PvE game, where hidden fantasy creatures are discovered only through the device's camera, while using the device's GPS locator to find them (Paavilainen et al., 2017).

VR is the computer generation of an entire symbolic and artificial environment, where the user becomes a part of this artificial 3D setting through the sensory use of goggles, gloves or handstick controllers, headphones, and other devices (Steuer, 1992). Simulated apps tend to be of two types: the 360 degree view (360) and the progressive motion (PM). The 360 view changes

as the user's head moves, but the PM view changes by the user stepping forward, backward or sideways, without moving the head. VR environments can appear realistic (filmed with high definition cameras) or cartoonish (developed with animation software). Some examples of VR apps include The Climb, Wander/Explore, and Nature Treks. The Climb is a cartoonish PM PvE game where the climber is a pair of hands disassociated from a body. Players move their VR gloves or handstick controllers to advance the disassociated hands, while climbing on, falling off a cliff face, or sliding along a zip line as viewed in a variety of environments through the VR goggles (Kosmalla et al., 2017). Wander and Explore are 360 views based on Google map and street images that place users in some amazing scenery including mountain tops, pristine beaches, famous trails, and the insides of some unique buildings (Gursoy et al., 2022). Nature Treks is a PvE PM view that allows users with VR goggles and controllers to relax, meditate, or contemplate underwater, in space, and immersed in wilderness with associated wild or ocean animals, all while controlling the weather or time of day and enjoying the soothing sounds of nature (Herman & Sherman, 2019). Although perhaps not fully realistic, these artificial settings are a few of the possible adventurous metaverse substitutes for place-based environmental learning (Beames et al., 2019; Wattchow & Brown, 2011).

ISID involves the comparison of an enormous database of samples with one image (taken by a device's built-in camera) or sound (recorded by the device's built-in microphone) in order to identify that image or sound through AI or artificial intelligence (Farnsworth et al., 2013). AI involves getting a computer to learn from its mistakes and to think like a human by accurately simulating cognitive skills such as decision making, problem solving, and moral reasoning (Dick, 2019). Search engines that anticipate user queries, systems that recognize faces or biometrics, speech comprehension by automated assistants (Siri/Alexa), and self-driving vehicles all run on AI. Well-known examples of ISID apps utilizing AI include Seek/iNaturalist and Merlin/BirdNET. Seek/iNaturalist simply takes a photograph of the plant or animal and sends it via data/wifi to a central AI server which returns an identification of the plant or animal (Jones, 2020). Merlin/BirdNET does the same for an audio recording of a bird's song or other wildlife call and identifies the bird or other animal by its sound (Wood et al., 2022).

CS engages a huge critical mass of people to send data to a central server that can be used to solve a problem or complete a task (Howe, 2006). For a mapping app that shows traffic flow and traffic jams (Google, Waze), the data are sourced from signals received from the speed at which many driver's mobile phones are moving. When a crowd of phones slow down in the same location, a traffic jam is identified on the mapping app. To add to information, users can register traffic accidents (Amin-Naseri et al., 2018). This is crowdsourcing. When thousands of citizen scientists record bird calls and photograph wildflowers, their data are registered by the AI server and a seasonally adjusted global range is mapped for that species. This crowdsourced information can be monitored over time for changes due to climate or other factors just by people using the mobile app (Mahecha et al., 2021).

The substitutions

With a rudimentary understanding of adventure and the state of the science, art and craft for apps (at this time of publication) the reader may compare adventurous simulations and reach some interesting substitutions for outdoor activities. Outdoor adventure activities are typically classified in five categories.

(1) "**Socialization games** are used to warm up and deinhibit clients by stretching, setting the tone, raising heart rates, learning about one another, and motivating or invigorating participation.
(2) **Group initiatives** are different team problem solving tasks: tools (focus on a single teamwork element) or tests (combine multiple elements).

(3) **Challenge courses** are obstacles suspended in the air between trees or utility poles and are divided into low (protected by spotters) or high (belayed by static or dynamic ropes) courses.
(4) **Outdoor pursuits** are human-powered 'sports' divided by movement (fixed or mobile), activity location (place-based or remote), and duration (single day event or multi-day expeditions).
(5) **Other simulations** include risky board games, computer models, and software applications" (Rohnke & Priest, 2022, p. 1).

Metaverse substitutions are possible in all categories. Consider the following simulation apps often used in online team-building and digital adventures.

Decades before the covid pandemic required experiential facilitators to move into online environments, a couple of pioneering books offered dozens of alternatives to in-person or face-to-face socialization games and team-building exercises (J. Chen, 2012; Priest, 2000). Among these, some socialization game substitutions included designing your own icon and using it in a name-toss, group juggle, line-up, and where in the world are you? Other examples, more common to the recent years of zoom meetings are describing one's self in a story and playing word games (Aniuranti, 2021) such as creating a word cloud formed from the descriptive adjectives supplied by meeting attendees' stories (Hearst et al., 2019).

'Keep Talking and Nobody Explodes' is an excellent example of a group initiatives substitution with a communication emphasis. The game has one group with instructions for defusing a bomb (hard copy or VR manual), while another group see (through VR goggles) multiple panels of a suitcase bomb that must be defused in the correct sequence of clipping wires and manipulating circuits (Dormer et al., 2017).

Substitutions for challenge courses include fear of heights simulators. Most of these simulate heights by having the VR-equipped person walk a wooden plank, actually placed at ground level, while viewing that plank as existing between two skyscraper rooftops (Krupić et al., 2021). These fear-based simulators are used to flood or over expose players to rationalize their fear of heights, flying, darkness, spiders, public speaking, and more (Rothbaum & Hodges, 1999; Shunnaq & Raeder, 2016).

Kayaking and skiing simulators can be substituted for **outdoor pursuits**. In kayaking simulators, the player sits in a kayak that pitches, yaws, and rolls according to the program that is synchronized with the flow of a VR river and the player's VR paddle position and body shifts in the kayak. The player views a VR river through goggles and can compete against a personal best time or with other players on the course. The skiing simulator works similarly for downhill slaloms in a VR environment (Jego et al., 2019).

Other simulations have ranged from escape rooms in VR through long treks during assault missions to expeditionary VR spacewalks to fix damaged space stations and spacecraft. This sequence progresses from none, though little, to lots of undesirable motion sickness for VR users, because the environments are fixed, movable, and motion dependent respectively. Obviously, experiencing motion sickness is a potentially fatal shortcoming of authenticity in most VR simulations. Motion sickness develops when the brain and body disagree on mixed signals about whether or not they are both moving (Ohyama et al., 2007). In an effort to reduce motion sickness, VR game developers include a stationary frame whenever possible, such as a cockpit display in a flight simulator. A low sickness simulation is 'I expect you to die!' It is a single PvE VR escape room simulation where the player is a super spy facing numerous challenges to survive, whilst attempting to avoid dangers and solve crimes by goggles and gloves in a single no movement setting inside a vehicle (Robinson, 2015). Most first-person quest VR games generate some sickness, like Skyrim that moves players among various locations by walking great distances to the next realm through multiple, complex, and constantly changing landscapes (Reinhard, 2018). SpaceWalk requires swimming movements from team players and simulates weightless motion in all directions and across various places, thus generating high levels of sickness in many players (Uchida et al., 2020).

The future

To paraphrase the famous European management consultant, Peter Drucker (2011), the future is vague and undecided. Trying to predict it is like driving backwards down an isolated road at night with no lights, while looking in the rear view mirror. So instead of predicting, the best way forward is to create the future! And to do this we often start by looking to the past.

However, the past can also limit our predictions, because this forecasting is based on the only knowledge available in the present, but imagined from the past. For example, a favorite 1985 film trilogy, Back to the Future, promised flying cars by 2015. Today, society is just beginning to drive electric and hybrid vehicles, but by no means have these yet been perfected.

So when we attempt to predict the future for experiential and adventurous learning in the Metaverse, we are hampered by an inability to imagine content we haven't already seen in the past. Any apps we might invent will be hindered by what we know today and we will miss out on imagining most of the special solutions that will actually be created in the future. Nonetheless, the quality of a good app for use as experiential and adventurous learning should be measured against these criteria derived from the earlier list of unique and important factors in adventure experiences (M. A. Gass et al., 2020).

(1) Is the simulation or application close to or patterned after the real world or daily life?
(2) Does it take place in a novel or unfamiliar environment?
(3) Does it contain metaphors that aid in transfer of learning?
(4) Does it have naturally occurring consequences?
(5) Does it involve multiple senses and sensory learning?
(6) Is it designed to change feelings, thoughts, behaviors, or resistance to assistance?
(7) Does it actively engage learner participation rather than make them passive spectators?
(8) Does it include and combine exercise, nature, risk taking, or conflict resolution elements?

Patterning after the real world can sometimes be excessive and exploitive. At present, far too many VR simulations and games have been designed by young men for boys (Brey, 2014). This gender imbalance means the needs of women have often gone ignored (although more women are now entering the design workforce). In studies, men have 'reported a higher sense of spatial presence, more perceived realism and higher levels of the sense of actually being in the [VR} environment than women' (Felnhofer et al., 2012, p. 103). Women experience more VR motion or cybersickness than men, thought to be a function of VR headsets (Shafer et al., 2017). Despite these gender differences, the markets are flooded with male-oriented war, first-person shooter, and combat simulations (Grimshaw et al., 2011).

Consequences are very important in adventurous learning experiences, but are absent from most combat themed games. Philosopher William James (1907) called on educators to discover the 'moral equivalent of war!' While he detested war, as the vast majority of us do, he admitted that it satisfied certain primitive desires in young men, culturally imposed by their society over a hundred years ago, and allowed them to rally behind a common cause that ultimately improved their character. Although character building in outdoor learning has been rightly disputed in the literature (Brookes, 2003), Outward Bound was Kurt Hahn's response to this call for a moral equivalent, because adventure learning inculcated similar positive values, but without the biological and psychological cost of killing fellow humans. Hahn added service and rescue in place of combat. In VR, first-person shooter war themes appear to be an attempt to do the same, but these have no consequences, because players get new lives almost immediately after failing. Their genuine fear is absent and this element may be necessary for any hope of character development. Instead fear may be replaced by depression, anxiety, or other mood disorders that eventually can lead to online gaming addiction (A. Chen et al., 2020).

AR and VR environments are frequently novel and unfamiliar to all except chronic players and this adds to the uncertainty of adventure and encourages participants to show their true behaviors (M. A. Gass et al., 2020). Metaphors are strong in the metaverse, since most AR and VR environments are designed as metaphoric representations of the real world, but without the physical limitations of time and space (Seidel et al., 2022). However, these same settings lack real consequences. In the outdoors, decisions and errors have natural consequences. Fail to light a stove, pitch a tent correctly, or avoid shallows while paddling, and learning results from the natural ramifications of a mistake. In AR and VR environments the consequences are not real enough. If players 'die' in a game, they can easily get a new life and try again. While 'new lives' provide for unlimited practice tries (or mastery attempts), lasting change cannot result without logical consequences for the participant (Priest & Gass, 2018).

Both AR and VR, as well as mixed or extended realities (XRs), are multisensory (Rauschnabel et al., 2022). Visual stimulus is provided through personal device screens for AR or the screen inside a VR headset or goggles. Auditory information comes through VR headphones or AR device speakers. Tactile/haptic contact is made through VR gloves or handstick controllers. Taste and smell are not yet developed in AR or VR, but progress is being made. 'Digital smell is used in a limited range of training, therapeutic, and entertainment devices, while digital taste remains largely in the research stage' (Kerruish, 2019, p. 31). Season Traveller is a VR hot air balloon ride through the four changing seasons, where the arrival of each is signalled by scents sprayed under the player's nose, while Vocktail is AR accentuating the taste of water by electrical impulses to human tastebuds (Cheok & Karunanayaka, 2018; Ranasinghe et al., 2017).

These games are definitely designed to change feelings and be recreational (Aldrich, 2009). However, a talented facilitator may take a recreational game and utilize it for more than fun: they enable learning (Nicholson, 2012). In order to change thinking or behavior and be educational or developmental, immersive virtual environments must be employed to bridge the two gaps that often defeat efforts to transform: initially between intending to change and starting to change, and then between starting change and sustaining change (Wienrich et al., 2021). Immersive technologies appear to overcome the typical barriers that prevent bridging these two gaps by providing safe test environments in which to practice new coping strategies. Therapy has taken this a step further by reducing resistance to change through VR flooding exposure to fears (Riva, 2005), but has also experimented with VR for the remote delivery of psychotherapy (Tacca et al., 2022) and the treatment of criminality (Tereso et al., 2022).

Most participants are actively engaged in AR and VR simulations. This is particularly true for team simulations of multiple or massive PvP or PvE games, where social interactions are possible (Kolomaznik et al., 2017; Maloney et al., 2021). Ironically, the one exception to this generality is called 'adventure learning' in the context of online schooling, where it is defined as 'an approach for the design of digitally-enhanced teaching and learning environments driven by a framework of guidelines grounded on experiential and inquiry-based education' (Veletsianos & Kleanthous, 2009, p. 84). No mention is made of adventure or uncertainty, as the term is being co-opted much the way 'experiential' became about work internships and career apprenticeships. Examples include following and interacting with explorers and expeditionary members on social media websites such as a trans-Arctic dogsled journey (Doering, 2007) and a teacher's ascent of Mount Kilimanjaro (Moos & Honkomp, 2011). Clearly these examples are passive, since learners are not actively engaged in the actual adventures (M. A. Gass et al., 2020). Nonetheless, the language of the outdoor profession is slowly being hijacked by other disciplines.

Despite this, the key adventure activity elements of enduring exercise hardship, immersion in natural environments, taking perceived risks, and resolving group conflicts are absent in the metaverse. Without these critical components, healthy outcomes (such as fitness, emotional stability, personal resilience, and pro-social skills) will likely not be achieved, even in well facilitated metaverse

experiences. In outdoor adventures, especially expeditions to remote wilderness, ongoing exercise is often a requirement. Even when the participant is exhausted, the journey may require continuing to exercise under hardships. In a simulation, the player can simply rest by pausing or quitting without the consequences of having to endure difficulty (Yoo et al., 2017). In outdoor adventures, immersion in nature plays an important role in restoring and rejuvenating participants and may be a necessary interlude of parasympathetic nervous system relaxation as recovery from sympathetic nervous system excitation. This is one area where VR might effectively duplicate the outdoors, but the lack of sunlight (useful in vitamin D conversion) and the absence of other biochemicals are currently unknown for their human benefits (Anderson et al., 2017).

Adventurous outdoor learning emphasizes the growth of participants' intrapersonal and interpersonal relationships by their successfully taking personal risks and resolving group conflicts respectively (Priest & Gass, 2018). Metaverse experiences have limited risk taking and very little conflict resolution as a part of their intentional designs (de Juan-Ripoll et al., 2021; Hasler et al., 2021). While risks and conflicts may appear real in an artificial setting, the consequences of both are nonexistent in the real world.

The predictions

First, AR will remain the low-cost entry point to the metaverse, because most folks have devices, these devices are common, and a majority of AR apps are free. VR will continue to be the high-cost entry point for the metaverse, because the equipment and games are expensive, although prices may come down in time. Designers will continue to produce for both platforms (Seidel et al., 2022).

Second, the clumsy goggles and headsets of today will be replaced by cool looking glasses and other wearable technology, such as body biometrics powered by electricity generated from moving in fashionable clothes made of conductive thread (Iqbal et al., 2016). In the distant future, expect contact lenses to replace glasses, with brain implants to allow for multisensory input (DiPietro & Cresci, 2021).

Third, marketing and advertizing will take full advantage of the opportunities created by these new technologies. Unfortunately, in addition to the identification of restaurants and coffee shops in the AR games we play, product placement will pop up from time to time along with the augmented information (Heller & Bar-Zeev, 2021; Kadry, 2022). Expect spam, disinformation, and identity theft perpetrated in new ways, perhaps directly to and from one's cognitive memories (DiPietro & Cresci, 2021).

Fourth, when AR and VR become the mainstream means to interact and immerse in the real world, then playful avatars will be a commonplace part of our daily lives. They will direct many of our decisions and guide our behaviors. Reality and fantasy will begin to blur in an amusement park form of scary fun.

Fifth, players will spend more screen time on their devices, while remaining sedentary in their homes. In addition to providing for a greater need to get outdoors, the population will become less fit and more obese than today. To encourage them to exercise, movement in the metaverse will have to be designed with greater activity than today. Eating and moving about will have to be gamified with awards, stamps, or likes, in order to encourage and motivate participation (Sailer & Homner, 2020). In order to counter growing screen dependence, many will call for a return to the outdoors as respite from devices. Today's 'Outerverse' is an anti-metaverse campaign that uses technology to encourage people to return to the outdoors and track their adventures in rewarding and motivating manners (Weaver, 2022).

Sixth, in VR, more injuries will occur from punching walls, tripping over potholes, and stepping into traffic. To reduce injuries or foster greater and safer use of AR and VR, the world will need to be well mapped in three dimensions. Since many people will be playing at home, their living spaces will need to be mapped and this will generate a host of privacy and access issues (DiPietro & Cresci, 2021).

Seventh, unless specifically designed for the purpose, most simulations will not work for experiential and adventurous learning despite the best intentions of facilitators. The absence of one or more of the four key elemental pathways components that drive the mechanism of change will mean that beneficial outcomes will not be realized. The metaverse will not effectively substitute fully for adventurous learning, but it will remain the 'latest bandwagon' that clients want to jump on (Damar, 2021).

The conclusions

In summary, facilitators today are hard pressed to find metaverse experiences that satisfy all of the first seven criteria listed earlier and simply may not find ones that satisfy the eighth with a combination of enduring exercise hardship, immersion in true nature, taking perceived risk, and resolving group conflict. Nevertheless, useful and limited simulations are available and hundreds of new ones are being created every day. This means adventurous outdoor learning experiences are not about to be immediately replaced by adventures in the metaverse. Nevertheless, the metaverse provides opportunities to:

(1) practice cognitive or motoric skills, when doing so would be dangerous in the real world,
(2) access learning that would not typically be available due to scarcity, cost, time or distance,
(3) play roles that would otherwise not be engaged or rehearsed in normal daily life, and
(4) socialize or collaborate with others that usually would not get the chance to work together.

For these reasons, practitioners might want to prepare for facilitating in these artificial environments easily created by AR, VR, ISID, CS, and social media. While these may appear to be substandard today, technological change moves rapidly and the metaverse will likely catch up to reality in just a few years.

Finally, although the metaverse is evolving fast, it is not yet fully formed and is constrained by slow response times from distant servers that don't allow smooth avatar movement and artificial 3D graphics rendering (Liew, 2021). Right now, edge-enable computing represents a recent shift in data distribution architecture that moves key functions like data processing, storage and delivery closer to the user: at the 'edge' of their local 'fog' network instead of in a distant 'cloud' server (Lim et al., 2022). When this edge becomes commonplace in 6 G or sixth generation cellular, and combines with the metaverse, faster response times and lower bandwidth demands will result (Chang et al., 2022). This will allow VR to be delivered the way AR is currently enjoyed: rapidly and seamlessly in the outdoors (Dhelim et al., 2022).

Once outdoors, this stage of metaverse evolution will begin with a mixing of AR and VR in outdoor spaces, followed by extended realities (XR) and the creation of virtual adventure outdoors (Xu et al., 2023). Adventure experiences will eventually be conducted outdoors through the metaverse and the four key components (exercise, nature, risk, and conflict) will be fully present, albeit in AR or VR form.

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Notes on contributor

Simon Priest was a university professor of adventurous and environmental outdoor learning in Ontario, Canada. Internationally, he has been a Dean, Provost, Vice-Chancellor, Senior Vice President, President, Commissioner, and Advisor to a Minister of Education. He has received numerous awards and accepted over 30 visiting scholar positions around the world in outdoor learning. Now early retired in British Columbia, he spends his time hiking, gardening, researching, teaching, and writing.

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