# BEYOND ENTERTAINMENT

## THE TRANSFORMATIVE POWER OF VIDEO GAMES

Nordicity

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Video games have transcended their traditional role as interactive sources of entertainment and have emerged as powerful tools with far-reaching positive impacts on various aspects of our lives. Games have reshaped how educators teach and physicians train.
They have changed the way psychologists treat patients and how seniors stay active with limited mobility. Industries have embraced video game technology for prototype development and indigenous communities are using the power of online games to prevent isolation an improve connections among Northern youth.

## Education

One of the most significant contributions of video games to society is their potential to enhance education. Prodigy Gaming, for example, has revolutionized the learning experience by seamlessly integrating mathematical concepts into an engaging gaming environment. Through interactive challenges and rewards, Prodigy Gaming not only makes learning math enjoyable for children but also fosters a deeper understanding of fundamental concepts. This innovative approach to education has the potential to reshape how we teach and learn various subjects.

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## Community and Connection

Video games have proven to be a powerful tool in keeping marginalized communities connected and less isolated. For indigenous youth, gaming provides a virtual space where cultural exchange, communication, and collaboration can thrive. By participating in online gaming communities, indigenous youth can maintain a sense of connection with their heritage, break down geographical barriers, and build supportive networks that transcend physical boundaries.

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## Rehabilitation

As our population ages, maintaining the well-being of seniors becomes increasingly crucial. Video games, such as those developed by Ludica Health, offer an effective solution to keep seniors active and engaged in the comfort of their homes. These games leverage motion-sensing technology to provide virtual rehabilitation exercises, enhancing physical fitness and cognitive function. This not only contributes to the overall health of seniors but also addresses issues of isolation and boredom often associated with aging.

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## Mental Health

The intersection of video games and mental health has led to the emergence of initiatives like the Games for Emotional and Mental Health Lab (GEMHLab). Video games are being harnessed as therapeutic tools to address various mental health issues among children. Through carefully designed experiences, these games help children manage stress, anxiety, and other emotional challenges. The immersive nature of gaming provides a unique platform for therapeutic interventions, offering a promising avenue for mental health support.

- Ludic Mind (QC) | *Therapeutic Games and Coping with Mental Health through Video Games*
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## Industrial

Beyond personal well-being and education, video game technology plays a pivotal role in shaping the future of industrial processes. Companies like Unity Technologies provide game development tools that are not only used for entertainment purposes but also serve as a foundation for creating immersive simulations and virtual environments. This technology is increasingly employed in industries such as manufacturing, healthcare, and training simulations; driving innovation and efficiency in ways previously unimaginable.
Video games are emerging beyond entertainment; they have become catalysts for positive change across diverse sectors. From transforming education and fostering community connections to enhancing seniors' well-being, supporting mental health, and driving industrial innovation, video games are proving to be invaluable assets with the potential to shape a brighter and more interconnected future for society.

- Unity Technologies (AB) | *Business in Real-Time 3D: Interfacing with Gaming*

# Studying as a Tactic: Levelling Up Through Learning

Shoelace Learning – Lakeside, Nova Scotia - shoelacelearning.com

One of the biggest educational challenges facing teachers and parents today is getting children to engage with—and ideally enjoy—their education. In the case of struggling students, stress, discouragement, frustration, and boredom can cause them to disengage with their education and exhibit disruptive behaviour in the classroom. In the case of exasperated teachers, attempting to teach unwilling students and continuously policing classroom behaviour can cause them to burn out and quit the profession altogether. For parents, their child's lack of engagement can be a worrying sign for their future academic and personal success. Ultimately, tackling disengagement is a primordial concern. The consequences of student disengagement and resistance to traditional educational approaches can have drastic implications for core competencies such as reading, math, and critical thinking.

**Video games present new and novel avenues for addressing student disengagement and educator burnout related to the modern education system and its curricula.**

During the COVID-19 pandemic, there was a noted shift in traditional classroom education approaches and a growing reliance on technologically mediated learning solutions. Consequently, teachers turned to new ways of delivering content and assessing students through virtual classroom platforms, but also began embracing polling, quiz, and interactive online tools. Educators found that while teaching virtually made it more difficult to keep students engaged, students greatly enjoyed reviewing material through game formats, such as gamified quiz platforms and language-learning programs.[1]

Educational entertainment products (also called edutainment) or video games with a secondary educational value have been a staple of the video game market. However, many educational video games have struggled to be as enticing and fun as their traditional counterparts; these products may use game-like features, or gamified content and activities, but don't tend to maintain attention and engagement beyond their in-class context or limited, repetitive content.

**Meet Shoelace Learning, a Canadian company that develops learning-oriented game solutions for students and educators.**

Shoelace Learning founder Julia Dexter attributes the "raison d'être" of the company and its educational game platform to two key issues: student disengagement and the need for personalized learning. When her son Max was struggling to meet expected reading levels in elementary school, Dexter began shadowing the teachers in his classroom, and she realized that these students were having behavioural and comprehension problems in large part because the students had "checked out" of their own learning; they were disengaged, frustrated, and bored. Dexter realized that there was an opportunity to address this larger issue by leveraging existing technology and appealing to the kids' favourite activities: playing video games.

Shoelace Learning, founded in 2014, develops educational games on a specially designed learning platform. Rather than creating simple gamified educational content, Shoelace Learning's offerings integrate learning into gameplay that is already familiar to children, mirroring several existing popular games, and inserting educational questions like the advertisements found in many mobile games which students must answer to continue. Its two marquee titles, Dreamscape and Dreamseeker Drift, provide learning-infused alternatives to Clash of Clans and Endless Runner-style games respectively. As native mobile gamers, younger students are already accustomed to this kind of interruption in the games they play recreationally, thereby making them less objectionable or obtrusive in these more educational offerings. They are also highly motivated by the in-game rewards and progression systems, further incentivizing continued and engaged play with both the game and its educational content.

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[1]Siegle, D. (2023). Turning lemons into lemonade: Technology teaching tips learned during COVID-19. *Gifted Child Today 46*(1), 60-62. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9708529/
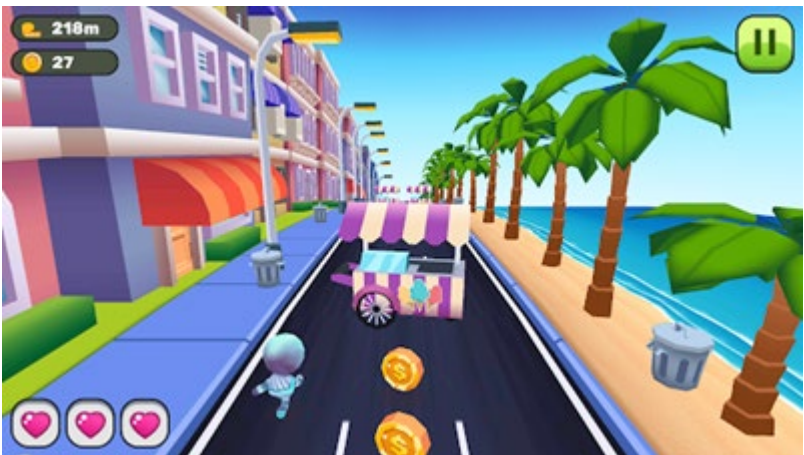
In-game screenshot of Dreamscape, Shoelace Learning's base building game. Resources and advantages can be obtained by answering reading comprehension questions at a player-personalized level.

Moreover, Shoelace is currently working towards becoming a dedicated learning platform provider, with the intention of opening up the platform to 3rd party developers through their API. Indeed, at the core of Shoelace Learning's success are their game-agnostic learning recommendation engine and their platform's compatibility with culturally responsive content. Across Dreamscape, Dreamseeker Drift, and other future titles, Shoelace's platform provides the ability to understand where a learner is situated in their reading comprehension levels, determine the next best content for them, and deliver that content in a personalized manner.

The platform has close to seven million registered users from over 100 countries and has a primary subscriber base of teacher. For teachers specifically, Shoelace Learning provides a two-fold advantage: it enables them to easily engage students in their own learning and to monitor progress using real-time backend data and assessment protocols. Ultimately, deploying Shoelace as part of their lesson plans addresses the persistent issue of teacher burnout and exhaustion stemming from student disengagement. Teachers can also set up group challenges and provide additional rewards to students as incentives, empowering their role as a game facilitator.
By taking inspiration from popular mobile games, Shoelace's offerings have the potential to draw kids away from existing games and focus them instead on enjoyable learning. As a parent, Julia sees this as a huge selling point of the system; it allows parents to feel less guilty about the amount of screen time their children have because they can trust time spent playing is time spent learning.

While Shoelace Learning was already seeing success pre-COVID, the increased inclusion of devices in the daily lives of children (as well as the growth of remote and hybrid learning) erased one of the biggest obstacles to success for the company. As teachers and parents have gained a greater understanding of the value of device-based learning to support both synchronous and asynchronous teacher-student education, and as teachers have had to learn to effectively instruct full classes from a distance, the value of learning tools such as Shoelace's games has become more and more evident. Shoelace Learning studies have shown that 30 minutes of play per week over the course of 15 weeks can measurably improve the literacy skills of all learners. Ultimately, Shoelace Learning's platform and games demonstrate that in the current educational landscape, video games are a viable and enriching way for students to further their learning and develop core competencies in important areas such as reading and critical thinking.



In-game screenshot of Dreamseeker Drift, Shoelace Learning's endless runner game. Correctly answering reading questions tailored to the player's level enables them to keep their run going, upgrade their avatar, or unlock new levels.

# Accommodating an Aging Population Through Rehabilitative Gaming

Ludica Health – Montréal, Québec - ludicahealth.com

Aligned with its *2030 Agenda for Sustainable Development*, the World Health Organization (WHO) emphasizes the importance of rehabilitation and physical health as a key component of universal health coverage, falling under the Sustainable Development Goal to "ensure healthy lives and promote well-being for all at all ages."[2]  As the global population ages, the need for improved rehabilitative and preventative care is steadily increasing, aiming to minimize the impacts of chronic health conditions on both individuals and healthcare systems. Rehabilitation gives patients strategies and assistive products to let them take an active role in the maintenance of their ongoing care, thereby contributing to healthier aging.

**Video game technology can help provide engaging rehabilitative care to an aging population in a way that is cost-effective, responsive to the varying abilities of patients, and viable within the current healthcare ecosystem.**

As a patient-driven aspect of healthcare, it is especially important that rehabilitation be made physically, mentally, and emotionally accessible to patients with a wide range of abilities and life experiences. The medical industry has increasingly shown a desire to embrace innovative technologies that allow for new ways to treat and support patients. The Canadian Institutes of Health Research (CIHR) advances that as our understanding of health has advanced, so too have the tools to diagnose, treat, and prevent illness. As part of Pillar Two initiatives, CIHR supports clinical research into advancements in care, asking the question: "Could video games and online puzzles improve rehabilitation programs?"[3]  Indeed, the introduction of video game principles into rehabilitation is at the forefront of publicly funded health research.

This coheres with broader trends related to the aging population in Canada. According to the Canadian Institute for Health Information, Canada's senior population (age 65+) is expected to grow by 68% by 2037. Moreover, the 75+ age group is expected to double. As such, there is likely to be a growing demand for accessible, cost-effective, and clinically viable rehabilitation services for this senior population, presenting the challenge of circumventing an already overburdened healthcare system. Seniors already play video games. According to ESAC's Essential Facts 2022 report, both men and women from ages 55-64 spend an average of 7.4 hours a week playing video games.[4] This same report notes that this segment plays games to pass time (57%) and to use their brains via logical or strategic problem-solving (50%).

In the past, video games have been used as tools to improve cognition and mental wellbeing, with social and puzzle games encouraging critical thinking, engagement, and problem-solving. Movement-based video games, as a way of physically gamifying care, introduce new ways for patients to carry out their rehabilitation treatment, as well as making the process more playful and enjoyable. Video games systems can provide versatile and engaging patient solutions using key gaming mechanisms such as set objectives, consistent inputs, interactivity, and immersion.

**Meet Ludica Health, a Canadian company at the forefront of interactive rehabilitative care.**

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[2] United Nations. *Sustainable Development Agenda.* https://www.un.org/sustainabledevelopment/development-agenda-retired/

[3] Canadian Institutes of Health Research. *Clinical research (Pillar 2).* https://cihr-irsc.gc.ca/e/53148.html

[4] Entertainment Software Association of Canada. *Bringing Canadians Together through Gaming: Essential Facts 2022.* https://theesa.ca/resource/bringing-canadians-together-through-gaming-essential-facts-2022/

**Ludica Health** is the brainchild of Mark Evin. Evin previously worked in interactive digital media, using technology and media to create interactive experiences in performing arts and science centers. When Evin's business partner's father suffered a stroke, he recognized an opportunity to provide alternative or improved stroke rehabilitation solutions. Using the same affordances that make video games engaging and participatory, Evin set about creating rehabilitation systems, including LudoFit's predecessor, Jintronix.

Montréal-based Ludica Health developed LudoFit to create physical therapy experiences that "don't feel like physical therapy." Utilizing motion sensing technology available on camera-embedded devices, LudoFit frames evidence-based balance and strength exercises as interactive games, by emulating skiing, climbing, cycling, and rafting movements in immersive virtual locales. Feedback and motion tracking mechanisms, both characteristics of modern video gaming systems, are utilized to create clinically tested and physically engaging experiences. The application is available around the world and can be downloaded on computers (Mac and Windows) and iPads.



LudoFit understands and interprets the existing literature on physical therapy and rehabilitation and translates it into an interactive framework. LudoFit's games, as exercises, are informed by clinical protocols such as the Otago Exercise Programme[5] and the Tai-Chi Cardiac Rehabilitation Program , and clinically validated by an advisory board of physiotherapists. LudoFit's development cycle ensures that its games have gone through a rigorous process of evidence-based conceptualization, prototyping, validation, testing with clinicians and patients, and adjustments made with feedback. LudoFit is recognized and regulated by Health Canada and is listed by the FDA.

> "It's like a video game. But the difference is that… you are the guy, you are the person in the video game. And so there's no console. It's your body that you're moving, not your thumbs on a console. So that's way different. You're actually engaged in it. It's a very encouraging game to play. For me, it's more the coordination between movement and how quickly I can respond. So that's a mental thing. […] I have some family history of dementia, not a lot, but I do have some of that. So my ultimate goal is not to just arrest any kind of decline, cognitive decline, but actually increase, you know, my neuroplasticity. It's fun and it's helpful and I do feel better after I do it." **– Bud Williams, LudoFit User**

The inclusion of video games into a healthcare setting has the potential to make a substantial, positive difference for patients and practitioners alike. From a logistic and technical perspective, the presence of motion controls, feedback systems and automated customization can vastly change what activities practitioners can provide to patients, tailored to their specific needs and updated to incorporate new literature and best practices. From an emotional and cognitive perspective, the impact of unique and engaging experiences on the emotional wellbeing and dedication of patients cannot be understated.

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[5] Campbell J., & Robertson, M. (2003). Otago exercise programme to prevent falls in older adults. *AAC Wellington, NZ.* https://www.livestronger.org.nz/assets/Uploads/acc1162-otago-exercise-manual.pdf

[6] Ma, J. (2020). Safety and effectiveness of a Tai Chi-based caridac rehabilitation programme for chronic coronary syndrome patients. *BMJ Open 10(7)*: e036061. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7337900/

# Therapeutic Games and Coping with Mental Health through Video Games

Ludic Mind Studio – Montréal, Québec

The impact of video games on adolescent and early adult mental health has been — and continues to be — a hotly contested issue. Video games have been subject to myriad instances of moral panic since the medium's mainstream prominence, pointing to parental concerns around violence and addiction. However, video games have continuously proven to have positive effects on players: a balanced perspective that considers the cognitive, motivation, emotional and social implications of games demonstrates that video games can improve critical thinking skills, can promote relaxation, can foster creativity, and can enable social connections, among a host of other benefits.[7] Further, the affordances of video games, namely their social, interactive, and narrative features, have proven to be especially effective in providing coping mechanisms for depression and anxiety, with games playing a role in recovery as a distraction from stress and a way to re-establish self-control.[8]

**Video games can be used to address mental health issues when developed and deployed with care.**

Nowhere has this phenomenon of video games and improved mental health been better exemplified than at the outset of the COVID-19 pandemic. Studies demonstrate that for many teens and adults, video games helped mitigate stress, anxiety, depression, and loneliness during stay-at-home restrictions[9]; headlines and reports alike have highlighted the role of games like Animal Crossing: New Horizons and Among Us in helping alleviate anxiety and social isolation, with positive impacts on overall mental health.[10] While the pandemic may have been a unique circumstance under which to demonstrate this potential for video games, there are those who are working towards developing video games as bona fide clinical tools for psychological treatments of anxiety, depression, psychosis, and PTSD.[11]

**Meet Ludic Mind, the McGill-based digital media studio exploring the implementation of multimedia technologies in mental health services.**

Ludic Mind's broader mandate is to advance digital mental health interventions that privilege play, making their research findings actionable and impactful for the wider gaming sector. More specifically, Ludic Mind "supports the creation and adaptation of e-mental health technologies and interventions that are user-generated and based on co-design processes that promote shared decision-making, continuity of care, and overall quality care and cultural safety."[12] Ludic Mind is housed at McGill University's Douglas Mental Health University Institute and its various initiatives are led by Dr. Manuela Ferrari and her team. The studio-lab hybrid was inspired by Dr. Ferrari's desire to make therapeutic games; when she joined the Douglas Institute as a researcher, she connected with many students who were very engaged gamers and began acquiring grants and funding to research and develop games aligned with mental health and wellness.

[7] Granic, I., Lobel, A., & Rutgers, C. M. E. (2014). The benefits of playing video games. *American Psychologist 69(1)*, 66-78. https://www.apa.org/pubs/journals/releases/amp-a0034857.pdf

[8] Bowman, N., Rieger, D. & Jih-Hsuan, T. L. (2022). Social video gaming and well-being. *Current Opinion in Psychology 45, 101316*. https://www.sciencedirect.com/science/article/abs/pii/S2352250X22000264?via=ihub

[9] Pallavicini, F., Pepe, A. & Mantovani, F. (2022). The effects of playing video games on stress, anxiety, depression, loneliness, and gaming disorder during the early stages of the COVID-19 pandemic: A PRISMA systemic review. *Cyberpsychology, Behavior , and Social Networking 25(6),* 334-354. https://boa.unimib.it/retrieve/e39773b9-3279-35a3-e053-3a05fe0aac26/cyber.2021.0252.pdf

[10] Lewis, J., Trojovsky, M., & Jameson, M. (2021). New social horizons: Anxiety, isolation, and Animal Crossing during the COVID-19 pandemic. *Frontiers in Virtual Reality 2, 627350*. https://www.frontiersin.org/articles/10.3389/frvir.2021.627350/full

[11] Ferrari M, Sabetti J, McIlwaine SV, Fazeli S, Sadati SMH, Shah JL, Archie S, Boydell KM, Lal S, Henderson J, Alvarez-Jimenez M, Andersson N, Nielsen RKL, Reynolds JA and Iyer SN (2022) *Gaming My Way to Recovery: A Systematic Scoping Review of Digital Game Interventions for Young People's Mental Health Treatment and Promotion.* https://escholarship.mcgill.ca/concern/articles/zc77sw28f

[12] Ludic Mind Studio, *About.* https://www.mcgill.ca/ludicmind/about

In collaboration with McMaster University, Ludic Mind developed the title Harry's Journey - Back to Reality, framed around increasing knowledge about the risks of psychosis and regular cannabis use among youth. Players are given control of the titular Harry, who starts smoking cannabis and subsequently developing symptoms of psychosis. The player must navigate Harry through the process of accessing help and community services, while dealing with multiple social and systemic barriers to care. Using interactivity and narrative framing, the project "aims to increase mental health literacy on psychosis, substance abuse, and pathways to care, while increasing help-seeking behaviours in at-risk youth".[13]

Adapting the University of Auckland's SPARX (Smart, Positive, Active, Realistic, and X-Factor thoughts) game-based mental health intervention framework, Ludic Mind investigated the efficacy of such video games in improving symptoms of depression, anxiety, and quality of life. SPARX-R, translated and modified to cohere with the realities of Canadian youth, functions as a medium for players to access cognitive behavioural therapy (CBT) tools via an immersive virtual world and narrative. Ludic Mind is aiming to find a way to integrate these digital interventions into broader clinical practice.

Ludic Mind's biggest project to date is The Road Ahead, a role-playing game that features narrative and gameplay elements that encourage players to explore different mental health conditions and coping mechanisms. Inspired by and conceptualized during the COVID-19 pandemic, Dr. Ferrari's team sought to create a game that echoed the sentiments of isolation and the mechanisms used to deal with resulting mental health issues. SPARX and The Road Ahead are sponsored by The Douglas Foundation and the National Bank of Canada (NBC). [14]

The game is being developed in a participatory process that incorporates the lived experiences of youth to build a game that accurately reflects their mental health realities and shared stories. As





In-game screenshot of The Road Ahead, an RPG Maker game co-developed with youth to incorporate themes and stories related to mental illness in a fictional world emulating the isolation caused by the pandemic.

Dr. Ferrari notes:

> "All the visual assets, the music, the coding, the storylines, are developed by young people. We started, beginning in their own lived experience of mental illness, that's what the story of the game is based. There are multiple storylines, all of these different mental health conditions from anxiety, to depression, to psychosis, and at the same time, in learning to help people experiencing lockdown, we also deliver evidence-based coping strategies that people can learn through gameplay."

As part of its broader mandate, Ludic Mind has also worked with commercial video game companies to help ameliorate the treatment of mental illness in their products, in tandem with their own work in reviewing therapeutic games and validating gamified therapy frameworks. Dr. Ferrari and her team believe that in addition to using video games as mental health intervention tools, commercial video game companies can play an important role in destigmatizing mental illness by understanding and addressing the topic throughout the game creation pipeline.

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[13] Ludic Mind Studio. *Harry's Journey – Back to Reality.* https://www.mcgill.ca/ludicmind/projects/harrys-journey-back-reality

[14] https://fondationdouglas.qc.ca/en/news/250000-to-finance-youth-mental-health/

# Friendly Competition: Engaging Indigenous Youth and Remote Communities Through Esports

Manitoba First Nations Educational Resource Center – Winnipeg, Manitoba

Among the more remote and isolated communities, many reserve schools are facing major issues among their student population. An overall lack of interest in engaging with or attending school is exacerbated by a lack of sense of community, particularly among children and youth. Teachers also report low self-esteem and motivation among their students more broadly, leading to high dropout rates and low attendance.

The Manitoba First Nations Educational Resource Centre (MFNERC) is an organization dedicated to providing services and support to Manitoba's First Nations schools, with an emphasis on encouraging First Nations involvement in all aspects of educational change. Established in 1998 by the Assembly of Manitoba Chiefs, MFNERC manages education for 26 Manitoba First Nations, 11 of which are under the Manitoba First Nations School System (MFNSS). MFNERC provides a wide range of valuable supports to schools on reserves in the province, including programs and resources for teachers in a number of key subject areas, a virtual collegiate to help individuals complete their high school credentials, clinical services, operational services, and more.

Karl Hildebrandt, an educational technology facilitator in the MFNSS, has pioneered a project to bring esports into reserve schools as a way to bolster students' engagement in schools, build community, and help the students connect more with each other and both Indigenous and non-Indigenous communities outside their own. Schools that were willing and able to participate in the program were given a Nintendo Switch to allow their students to play competitive online games such as Rocket League and Brawlhalla, and are branching out into games like Pokémon Unite and Omega Strikers, which may bring more girls into a more male-dominated program.

**Esports, as a collaborative and competitive form of multiplayer gaming, has the same potential as traditional sports in schools: they foster a sense of community pride, improve self-esteem and motivation, and enable students to connect with others**.

In line with the MFNSS and MFNERC's mandate to emphasize First Nations culture and tradition in schools, Karl observes that the esports program is also in line with The Seven Teachings, a set of guiding principles towards restoring cultural values, beliefs and practices that were forcibly taken from Indigenous people in Canada through residential schooling and other acts of violent systemic discrimination. By engaging with and building community, relationships and improved sense of self and self-worth, participants in the esports program are unconsciously engaging with the principles of The Seven Teachings (love, respect, courage, honesty, wisdom, humility, and truth) and fostering a reconnection to their cultures and heritage.

**Meet George Saunders Memorial School in York Landing, one of several locations where MFNSS has launched its esports program, where the impact of esports has been profound.**

Teachers and students alike point to a wide range of improvements as a result of the program, including improvements to student lives, improvements within the school environment, better connection to the outside world, and greater engagement with the community at large.

> "York Landing is so isolated, esports has done something tremendous for both staff and students. You can see it in the way they talk about it and look forward to it…It made the students feel like they were part of something bigger."
> – Sandrea Lavallee, Principle, George Saunders Memorial School

The opportunity to take part in esports has drastically improved attendance among the students who are on the esports team. A star player on the team who teachers identified as having had extremely low attendance and engagement reports not having missed a day of school unless absolutely necessary since he joined the team. Their success on the team has boosted students' self-esteem, as well as helping them develop problem solving and social skills. Importantly, it has also given them a window into potential post-secondary and career paths they could take, as they become more aware of video games as a creative medium rather than just as entertainment, and consider programming and game design as potential fields of study.

Teachers and students alike also pointed to having built better relationships with the other, particularly teachers involved in overseeing the program. This in turn has led to better student engagement in class. Principal SL observed that the students taking part in the esports program have become a much more tightly knit group, with friendships between participants replacing conflict, particularly in the reduction of bullying between older and younger students. The success of the program has also been of value to the school in accessing funding for technology, with new grant funds allowing for the creation of an esports lab with gaming laptops for the students to better be able to practice and participate in tournaments.

In extremely remote communities like York Landing, there are minimal opportunities for students (or residents as a whole) to engage with communities outside their own. Where students on the hockey team generally only get to compete against one or two other schools in the broader region, students on the esports team are able to take part in tournaments and compete against schools from all over the province. On the one occasion so far that students were able to travel to compete in an in-person tournament, the experience was an exciting and invigorating one, both for the students and for the faculty and family members back home who were receiving updates on their success.

That engagement from community is another significant outcome from the esports program. Parents and other community members (including leadership) who were entirely unaware of esports as a form of entertainment have come to strongly support the team, much the same way they would with a team competing in physical sports. All interviewees, from students to faculty to the MFNERC program facilitator, talked about the grade eight graduation the previous year, where members of the esports team were given certificates of achievement for their second place victory in a tournament, and were broadly celebrated by their peers and by community members in attendance.

With more and more students and schools showing interest in esports across Manitoba reserves, the future for the program looks bright. While funding is an obstacle, there are grant programs that can help support the purchasing of equipment. In an ideal future, Karl Hildebrandt hopes to have esports added as a course in school, given that esports and other video game-related jobs are increasingly viable career paths, including some Canadian colleges offering esports-based scholarships. Grants dedicated to supporting Indigenous populations and Indigenous schooling can also be leveraged to help these programs grow.

This esports program and the ways that it helps Indigenous students engage with the world have a greater impact than many of the participants know. "These kids don't realize, but they're engaging with truth and reconciliation in small ways," Karl Hildebrandt says. Not only are they building bridges with non-Indigenous schools and students, and making a name for their communities, but they're quietly challenging anti-Indigenous bias, just by their presence in esports spaces. When the York Landing team's name "Flying Niskak" was banned by Rocket League for being potentially offensive, an appeal to Rocket League resulted in the team name being permitted. By putting Indigeneity in the spotlight, this esports program is not just helping the students and their communities, but ushering in systemic change as well.

# Virtual Reality Therapies: Pediatric Rehabilitation through Video Games

PEARL Lab, Holland-Bloorview – Toronto, Ontario

On a national level, modern healthcare systems are overwhelmed by demand for pediatric rehabilitation services for children experiencing challenges with fine motor skills; meanwhile, the ability to meet this demand is constrained by a lack of available healthcare practitioners and the required facilities and resources. Specifically, unmet needs are related to availability (physical, geographic, or resource-based) and acceptability (matched expectations for care between patients and healthcare providers).[13] As a result, professionals and caretakers alike are turning to alternatives that could provide this same specialized type of pediatric rehabilitation therapy by using new consumer technologies in the convenience of the child's home.

While alternative at-home solutions provide an answer to the question of access, there remains the issue of ensuring that these therapies, which privilege the role of engagement and motivation in the success of rehabilitation, are just that for the children using them. Children born with or living with motor disabilities are accommodated by therapists in engaging and clinically specific rehabilitation activities but may find that this does not translate to other modalities. Thus, there is another emergent issue of ensuring that these therapies can be successfully administered where engagement and clinical oversight may be limited.

**Video games present a way to make pediatric rehabilitation accessible, needs-based, and engaging for children.**

The process of gamification can thus play an important role in rendering at-home therapies more palpable and effective. Gamification in pediatric healthcare has had demonstrable benefits with regards to the reduction of anxiety, an increase in engagement and participation, the incentivizing of positive behaviours, and an improved understanding of their own health complications. [14]However, there has been a tendency to develop physical or occupational therapy "games" that are tailored more specifically to seniors and are more akin to computer-guided activities. Children, as digital natives, are more likely to be engaged by video games that meet their expectations for characters and narratives, short- and long-term goals, fun mechanics, and interactivity.

**Meet Dr. Elaine Biddiss and the PEARL Lab team, who are creating video games aimed at making pediatric rehabilitation accessible and engaging to children and their families.**

Through the PEARL Lab (Possibility Engineering and Research Lab), Dr. Elaine Biddiss and her team utilize an interdisciplinary, user-centric, and participatory design approach to build rehabilitative tools that address the specific needs of children and young people with disabilities. So far, the team has published two games through PEARL Lab's commercialization arm, Pearl Interactives: *ScreenPlay* and *Bootle Band*. *ScreenPlay* is an interactive waiting space, an accessible and touch-free game for children proven to reduce anxiety in a healthcare setting. *Bootle Band* is a hands-on interactive musical game that engages children's motor skills and creativity by playing with musical instruments as peripherals.

PEARL Lab's current project leverages movement tracking technology in games to make therapy exercises more fun for young patients. Early on, Dr. Biddiss tapped into the excitement around the use of video game technologies like the Wii and the Kinect, finding that its motion tracking games and controls both appealed to children and provided opportunities for integrating movement

[15] Lyons, M., Stokes, A., Parker, J., Hanna, S. & Wojkowski, S. (2019). A scoping review of the unmet needs for physiotherapy services for the pediatric population in Canada. *Journal of Critical Review 6(6)*, 15-23. 10.22159/jcr.2019v6i6.35257

[16] Harshadbhai, M. M. (2023) Gamification in pediatric healthcare: Making healthcare fun and engaging for children, iCliniq. https://www.icliniq.com/articles/parenting-and-childrens-health/gamification-in-pediatric-healthcare#:~:text=Gamification%20in%20pediatric%20healthcare%20engages,health%20literacy%20and%20decision%2Dmaking

into clinical contexts. Biddiss notes that while previous initiatives using the Kinect or the Wii had worked to a certain degree, the technology didn't yet provide the needed level of customization and focus for the purposes of specific therapy needs. However, with increasingly accessible game-making tools and advanced consumer technology for motion tracking, Dr. Biddiss and her team saw an opportunity to create a game around personalized, targeted therapy for pediatric patients.



Promotional image for Bootle Blast, presenting the variety of game types available to play and the Orbbec Persee+ camera peripheral it uses.

Pearl Interactive's title *Bootle Blast* can be described as a health-tech therapy solution that combines the fun and engagement of games with specific and configurable therapeutic exercises. But it is, at its essence, a very fun video game! In Botley's Bootle Blast, players are tasked with collecting Bootles, little helper bots, and keeping them happy by playing mini games. Using the Orbbec Persee+ camera computer, Bootle Blast uses motion capture and mixed reality to provide distinct upper limb and fine motor skill exercises. In some games, players use real-world objects (like building blocks) to practice fine motor skills; in others, a player's body, and its movements, are the controller.

Bootle Blast also interrogates assumptions about game design. Games needs to be built around a philosophy that frames disability as a spectrum of abilities rather than an all-encompassing set of limitations and restrictions. As such, games require variety, customization, and feedback to ensure games are continuously engaging and address the myriad needs of its players. The PEARL Team is continuously establishing evidence, running trials, and moving through the co-creation process to better understand how Bootle Blast can be better developed, how the data can be utilized to assist parents and caregivers, and how the game can be tailored to new social and cultural contexts. Dr. Biddiss and her team have also ensured that a game like Bootle Blast can be played collaboratively (featuring 2 player modes) and can be played outside of clinical/facility contexts, at home.

Dr. Biddiss recounts two instances that highlight the rehabilitative and access-oriented benefits of *Bootle Blast*. The first is when the PEARL team were conducting trials of the game in Costa Rica. A child in the trial really wanted to be able to button up his school shirt all by himself, a task that was difficult due to his fine motor skills. By the end of the trial period, he could do up one of the buttons, and a few weeks later, the team got a message from the child's mother that he was able to button up the shirt in its entirety; she attributes this improvement to playing *Bootle Blast*. The second is when *Bootle Blast* was installed in the home of a family new to Canada. The son was waitlisted for physical therapy, so the family used to the system for therapy exercises; the whole family ended up using the system to play together and engage the youngest son in doing all his needed activities.

PEARL Lab and PEARL Interactive are both continuing their respective research and commercialization efforts, developing new games, stories and exercises to add to the "Bootle Verse". The clinic version of *Bootle Blast* is currently being used by 16 sites and the research team is conducting studies to understand the family experience of using the game in "real-world" settings. But titles like *Bootle Blast* also demonstrate that video games can be novel and accessible use case for regular physical therapy and pediatric rehabilitation needs. The team is currently working through a research plan that aims to make Bootle Blast a household game by reducing the need for specialized or high-cost hardware and by identifying and remediating barriers to everyday home use.

# Turning fear-of-failure into learning fun, one virtual pet at a time

Prodigy Education – Toronto, Ontario - [prodigygame.com](prodigygame.com)

During the pandemic, Canadian parents realized how difficult it can be to keep kids engaged with educational content. The challenge can become even more significant for teachers facing a class of 20-plus students. It can be difficult to identify the students that not only struggle with concepts and skills but are also crippled by fear of failure. In fact, the educational ecosystem leaves little room for failure and the classroom does not offer many solutions to test various and personalized approaches to learning.

**Discover the world of Prodigy**
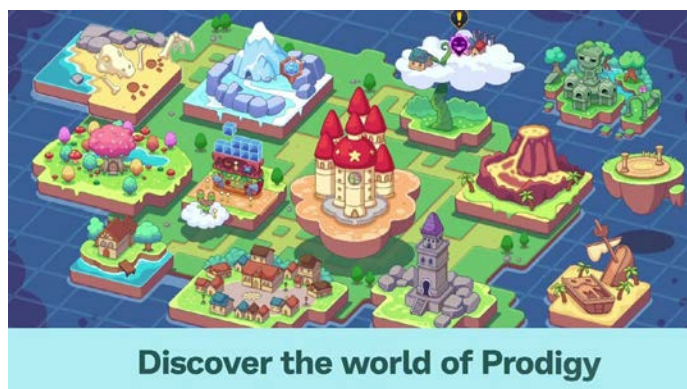
Math anxiety can develop at a young age and spoil the overall learning experience of young students. A cross-Canada study entitled, "Barriers & Bridges in Canadian Learning" reported that 64% of parents see their children battling anxiety when they struggle with subjects at school, and 33% say math is the top school subject that causes anxiety for their child. Moreover, parents who had a bad experience with math growing up can pass their anxiety and opinion onto their kids: according to the same study, about half of Canadian parents confessed to feeling intimidated by their children's math homework when home schooling during lockdown.

**Video games can be an exciting entry point into math and a tool to make learning an enjoyable experience.**

Growing up with a love for games and math, Alex Peters and Rohan Mahimker realized that failure is an essential part of video game mechanics. Losing a life, losing a versus fight or spending hours on a puzzle are all parts of the fun of playing a video game. These components create a learning experience that allows and encourages the user to grow and overcome increasingly complex challenges.

This is the core idea behind Prodigy Education, co-founded in 2011 by Alex and Rohan with a mission to help every student in the world love learning. The platform offers children an opportunity to think differently about math, replacing the dreadful pen and paper approach with an engaging and fun adventure.

Welcome to Prodigy Island, a fantasy world filled with magical creatures called pets, threatened by the nefarious plan of the Puppet Master. It is the students' job to stop the Puppet Master and help free the pets from his spell. Each pet belongs to a specific element and can get stronger by earning experience points in battles against other pets and foes. In order to cast a spell or use their pet in battle, children are given a math question they must answer correctly.

Supporting students from 1st to 8th grade, Prodigy Math teaches students confidence, even beyond the key math skills that they acquire as they progress. Powered by an adaptive algorithm, the gameplay is tailored to each child's curriculum and their individual skill level. As such, Prodigy's game works towards two types of outcomes.

On one hand, the academic outcomes are ensured by a team of educators with advanced teaching certification who develop the curriculum integrated into the game. In collaboration with the game development team, educators identify the key skills to maximize the educational impact.

On the other hand, Prodigy's staff is particularly attentive to attitude-related outcomes. Changing the vision that kids might have of learning, Prodigy's games help lower anxiety, bring fun into the classroom, and encourage kids to connect and learn at home. Mirroring game development techniques, Prodigy's staff has developed a larger narrative that support short, medium and long-term learning objectives while keeping students engaged and excited. Students can access the

game in the classroom or at home to complete their collection of more than 200 available virtual pets and use their knowledge to defeat the Puppet Master.

Studies have supported the potential positive impact of using Prodigy on these two fronts: increasing math enjoyment, faster mastering of math skills, etc.

**Ensuring triple buy-in: students, teachers and parents**

A key challenge in the development of Prodigy was to position their product as a solution that would appeal to kids, meet teachers' expectations, and reassure parent.

- Students – This playful medium opens doors to an enjoyable adventure, transforming a traditionally anxiety-inducing experience into a fun educational journey. Prodigy's team of experienced game developers monitors how the game is being played, making adjustments and improvements to ensure it stays fun and engaging for students—encouraging more math practice in the process.

- Teachers - Prodigy games not only offer various approaches to adapt to each teacher's style, but also allow for a more personalized experience for every student, therefore supporting targeted reteaching. Prodigy tools are free for students and teachers, and require limited training, thus reducing barriers to entry and facilitating the adoption of this technology, even for budget-conscious school boards.

- Parents - The platform invites parents to play a more hands-on role in the math education of their kids. With progress insights and report cards, parents can help their child grow confident in a certified safe and private environment.

Prodigy is completely free for all teachers, and its core gameplay experience and all educational content is all accessible at no-cost by students. In fact, approximately 96% of Prodigy's students play entirely for free every year, with this access supported by revenue generated by optional paid parent memberships. It is an approach ensuring anyone can learn with Prodigy, regardless of socioeconomic status. This is an important element of the company's mission to help every student in the world love learning.

Being a Canadian venture certainly helped along Prodigy's journey. Emerging from the vibrant innovation hub of Waterloo, Ontario, the founding team not only benefitted from the local talent and inspiring success stories, but also from the provincial and federal incentives that stimulated the company in its scaling phase. In 2021, Prodigy secured a $159 million CAD Series B round of financing, one of the largest rounds in global EdTech history.

The natural move for Prodigy was to develop another solution for English, another heavily tested and anxiety-inducing subject matter. This time, the game revolves around village building mechanics: students can improve and expand their world through reading and language practice. Prodigy now counts users across the United States, Canada, India, the United Kingdom and Australia.

In particular, the United States has proven to be a strong market of growth for Prodigy, with more than a quarter of 1st to 8th grade students in the US public school system playing Prodigy every year.

Prodigy continues to transform the way kids overcome their fear-of-failure in the education environment, the extent to which teachers can adjust their approach and the support that parents can provides to their kids. Weekly updates expand the core narratives, offer more learning options and customization tools to ensure these games are relevant, exciting and in line with the latest curriculums.

# Business in Real-Time 3D: Interfacing with Gaming

Unity Technologies – Calgary, Alberta

There has been an unprecedented move towards the digitalization of industrial processes, across  manufacturing, logistics, transportation, automotive, and construction, among others. The move has been marked by the implementation of platforms which provide real-time, networked solutions and collaborative digital tools. However, there is also a stated desire to make sure that these tools can reconcile the reality of industrial processes today: they need to address specific issues  resulting from international operations, remote teams, different expertise and occupations, industry  standards, and constant updates and licenses.

**Video game engines, and the development processes they support, can provide new avenues for improving industrial workflows**.

Especially where research, development, design, and operations are concerned, teams need to work across different platforms, different tools and software, different file formats, and different systems. In the video game development process, teams and their various roles are unified around industry standard design processes and the use of a specific game engine. Specifically, game engines allow developers to work under a shared software framework, which enables all the component parts of the game design process (from art to sound to technical work around animation and physics) to be completed in a more efficient and streamlined manner. This principle provides a novel solution to the disjointedness of industry workflows.

**Meet Unity Technologies' Industry division, who are bringing game engine technology to the forefront of digital transformations across non-game industries.**

Nick Facey was previously the Senior Director of Innovation at Vancouver-based Finger Food Advanced Technology Group, which delivered custom technology solutions for the automotive and manufacturing sector. Finger Food was acquired by Unity in 2020 and Facey moved into the Managing Producer role in Unity's Industry Solutions division. Operating out of Unity's Calgary offices, Facey works with a team of over 400 people across 4 sectors, building and refining Unity's industry-side tools.

Facey notes that one of the main prospects of using game engine technology in major  industries is that it can help bridge the disconnects that exist between various roles and processes in the product development workflow. For example, in the process of designing and developing a new  car, remote teams of designers and engineers may use different software (computer-aided design,  illustration, modeling, etc.) that produce various assets and outputs. This results in inefficiencies across the process, with designers and engineers working in a waterfall manner and dealing with delays in rendering and prototyping new iterations of the car design. Unity's engine enables both designers and engineers to work collaboratively in an immersive, shared, real-time 3D space. The simulated car developed in this environment becomes a game-like asset, which can also  be used in other contexts including public-facing virtual reality test rigs, demonstrations, safety simulations, and the production of marketing material.
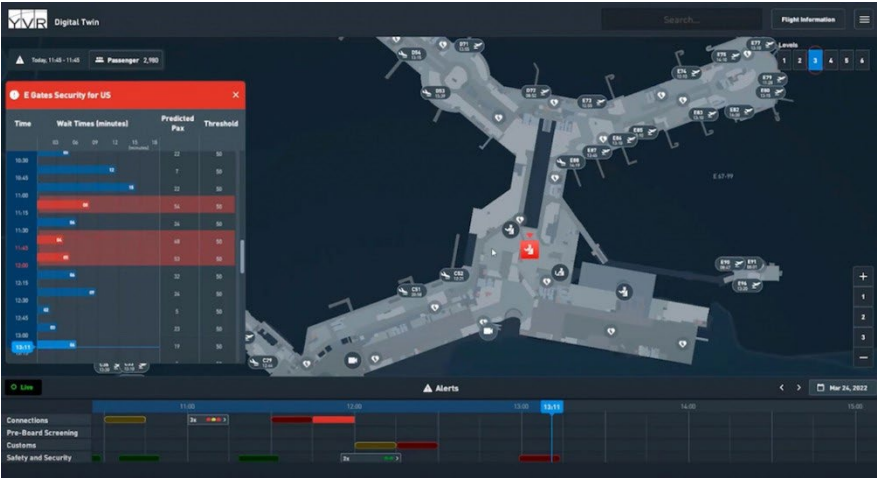


Screenshot of YVR's Digital Twin 3D build, mapped to the real-life counterparts of Vancouver International Airport.

These very same tools and interfaces can be used to facilitate real-time operations in major hubs of activity and technical complexity. A digital twin is a digitalized representation of a real-world system, which allows users to use historical and real-time data to better understand ongoing operations and their component systems as well as conduct simulations and track potential outcomes.

As an example, Unity's Industry Solutions team partnered with the Vancouver Airport Authority to create a real-time "digital twin" of Vancouver International Airport (YVR). For YVR, the Unity team created an interface that unified airport operations across their terminals and their airfield so that YVR personnel, across departments, can more easily visualize and understand the airport's real-time situation.

Unity and YVR stressed a "people-first" design approach, as to ensure that the digital twin could be "intuitive, secure, and easy to use by YVR's frontline workers". The interface would be familiar to anyone who has played a real-time strategy, simulation, or city-building game; the bird-eye view, the menu systems, and real-time updates and alerts are all reminiscent of desktop games like Sim City or RollerCoaster Tycoon. Using the intuitive nature of game-style interfaces, the YVR digital twin provides a birds-eye view of the terminal:



Screenshot of YVR's Digital Twin 3D build, mapped to the real-life counterparts of Vancouver International Airport

"For example, YVR programmed their cameras to detect if a vehicle has been parked at the terminal  curbside for an extended period of time. Once detected, an alert is generated, and a user can click  into the signal to see a live feed of the situation. They can then work with the operations and security  team to address the issue."

Thus, Unity's process takes its gaming expertise, both in terms of development tools and games as a medium, to make complex systems manageable and accessible. Facey notes the amusing development at the intersection of gaming and industry: while automakers used to lend the likeness of their cars and their brand for racing and driving games, these same automakers are using video game engine technologies and interfaces to design new cars.

# Connecting to Community: Indigenous Game Streaming

[Moose Tree Gaming](#) – Brochet, Manitoba

Video game live-streaming has recently left its niche on Twitch.tv and become a worldwide phenomenon; across platforms like Twitch, YouTube Gaming, Facebook Gaming, Kick, and SmashCast, video game live-streaming has reached an international audience of over 920 million people.[15] The practice of streaming video games to live audiences online has a two-fold appeal: viewers can watch and interact with personable streamers playing their favorite games, while connecting with other like-minded viewers in the virtual audience via chat functions. As a result, video game streaming can be an effective conduit for community building: "Live streaming can provide an important sense of community and connection for broadcasters and viewers alike, bridging the physical gap of distance by beaming real-time footage from the home of one individual to the home of others… and also offers meaningful opportunities for self-expression."[16]

**Video game live-streaming has enabled gamers, streamers, and content creators to forge new relationships and build accessible, diverse, and inclusive communities around gaming and shared interests.**

While game streaming has been an established practice for many years, the onset of the COVID pandemic highlighted the value of video games as a way to interact with others virtually and it created an appetite for more accessible and synchronous social engagements around gaming. The scope of video game streaming expanded and more diverse streaming communities emerged.

**Meet Jon-Ross Merasty-Moose, a First Nations Cree streamer building an online community around video games and Indigenous connection.**

Hailing from the O Pipon Na Piwin Cree Nation in Manitoba, Merasty-Moose streams under the name Moose Tree Gaming on Facebook's dedicated video game streaming service, Facebook Gaming. Merasty-Moose uses the platform to broadcast himself playing games such as *Call of Duty: Warzone*, chatting with and entertaining viewers with his commentary, stories, thoughts, and rez humour.

Via Facebook Gaming, Merasty-Moose has been able to connect with many Indigenous viewers across North America, who regularly tune in for the channel's distinct Indigenous presence. But Moose Tree Gaming also reaches many non-First Nations audiences, which Merasty-Moose celebrates as an opportunity for him and other First Nations gamers to share their stories, culture, and distinct sense of humour with others.



Jon-Ross Merasty-Moose in his streaming space; his distinct online identity, Moose Tree Gaming, has becomes a recognizable Indigenous presence in the video game live-streaming space.

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[17] Newzoo. [https://newzoo.com/resources/blog/gamings-live-streaming-audience-will-hit-one-billion-next-year-1-4-billion-by-2025](https://newzoo.com/resources/blog/gamings-live-streaming-audience-will-hit-one-billion-next-year-1-4-billion-by-2025)

[18] Ruberg, B., Brewer, J., Cullen, A., and Persaud, C.J. (2023). The revolution is streaming live: Cultural perspectives on the age of live-streaming. *In Real Life in Real Time: Live Streaming Culture*. MIT Press, Cambridge.

Merasty-Moose first started streaming at the outset of the COVID pandemic when provincial restrictions shut down all intercollegiate sports. As a physical education teacher and a basketball coach at the high school and university level, Merasty-Moose necessarily sought out other avenues to connect and maintain social ties in a fun and fulfilling manner. He tapped into his lifelong love of video games, specifically his childhood playing Nintendo, and set up a dedicated streaming channel.

By the end of the year, thousands flocked to Moose Tree Gaming to hang out with Merasty-Moose. He notes that streaming filled a particular void left by the suspension of sporting events and powwows, events that traditionally bought members of Indigenous communities together. Moose Tree Gaming provided an alternative avenue for people to chat, play with and compete against each other via gaming.

When the restrictions started lifting and the world started back up, Moose Tree Gaming saw a decline in its overall viewership, but it has persisted as in Indigenous presence in an online space that makes finding and promoting these unique and diverse communities difficult. Video game live-streaming can be a precarious activity, since a streamer's visibility on a platform is often determined by a mix of algorithm-based discovery, user preferences, platform features, and larger community dynamics.



A screenshot of Moose Tree Gaming's stream. Merasty-Moose mostly plays Call of Duty Warzone with other players, both Indigenous and non-Indigenous. He simultaneously entertains and provides a running commentary of his gaming.

To thrive on streaming platforms, Merasty-Moose notes that it important to connect with other streamers and seek out that cross-community element. He points to the Twitch Team *The Four Directions*, which brings together and promote Indigenous streamers across the platform "to uplift Native creators and raise awareness on issues impacting indigenous peoples and give back to our communities through charity work."[17]  Similarly, Merasty-Moose hopes to network with other Indigenous streamers, with the goal of regularly co-streaming, running community events, and "passing the baton" to other would-be Indigenous streamers.

Merasty-Moose regularly shares his passion for gaming and streaming with others. He has shared his experiences and insights via Create to Learn, an online learning resource for featuring digital skills tutorials by First Nations, Inuit, and Métis creators. His four-part tutorial outlines what other would-be streamer need to get started with their own streams, emphasizing the importance of consistency, communication, and creating a connection with your audience.[18]

Merasty-Moose expressed his gratitude for the sense of community that his streaming has built. He notes that Moose Tree Gaming has been actively recognized by his local community, and that Indigenous youth have been meeting virtually as regular viewers and participants in his streams. Merasty-Moose explained that he tries to cultivate this sense of community further by coordinating and setting up real-time multiplayer lobbies in games like Call of Duty: Warzone, inviting viewers to boot up their own consoles and PCs to join the match. He recounts a time when he connected with other Indigenous streamers on Facebook Gaming and filled a lobby with over 150 Indigenous players for a friendly but competitive series of matches. It's something, he notes, that would have been hard to imagine before the pandemic, but it points to a promising future for Indigenous streamers, gamers, and content creators.

[19] The Four Directions – Twitch Team. https://www.twitch.tv/team/thefourdirections

[20] Create to Learn – Game Streaming with Jon-Ross Merasty-Moose https://www.createtolearn.ca/tutorial-episodes/game-streaming-4-whats-important

# Games as Transformative Tech: Unlocking the Emotional Benefits of Video Games

Games for Emotional and Mental Health Lab – Hamilton, Ontario

In 2014, Dr. Isabela Granic and her co-authors published a paper unambiguously titled "The Benefit of Playing Video Games." Against the backdrop of media narratives admonishing video games for their supposedly violent tendencies or as a banal detachment from reality, Dr. Granic's widely-cited paper refuted these narratives by framing video games as a medium with the potential to foster real-world psychosocial benefits.

Specifically, the immersive, engaging, social, and creative worlds and mechanisms innate to video games provide cognitive, motivational, emotional, and social benefits: examples reviewed in the paper include, but are not limited to, opportunities for critical thinking, trial-and-error problem solving, and acquiring an incremental theory of intelligence. Together, the initial findings from this research demonstrate the "potential that these games hold for interventions that promote well-being, including the prevention and treatment of mental health problems in youth"[19].

**While video games are a vehicle for unique stories and experiences, they can also be used as cognitive tools – the immersive nature of video games enables opportunities for experimentation and for players to safely explore new concepts.**

With the growing intricacy and nuance of game design, game makers and researchers alike are finding new ways to embed cognitive behaviour principles into video games, engaging and empowering players to meet their own mental and emotional needs in a novel way.

**Meet Dr. Isabela Granic and the researchers at the Games for Emotional and Mental Health Lab.**

Dr. Granic's professional interest in video games stems from her research into interventions for youth with mental health issues, including depression, anxiety and violent behaviour. She saw that school- or clinically-based interventions were not uniformly well-received; these contexts can result in boring, unengaging and anxiety-inducing experiences for some young people.

However, Dr. Granic saw that video games had youth actively engaged and that these games encouraged socialization and critical thinking through play. In her own playthrough of the 2012 indie adventure game Journey, Dr. Granic saw the potential for video games, in all their abstraction, to address and explore concepts such as fear, anxiety, and sadness as players navigate the game world. She saw that video games can be an engaging and compelling way to working through and overcoming fear, by tapping into the player's own curiosity and wonder.

Almost 10 years since the publication of her seminal paper, Dr. Granic remains committed to harnessing the motivational properties of video games and their ability to impart onto players meaningful and healthy experiences. Dr. Granic is the director of the Games for Emotional and Mental Health Lab (GEMH Lab) out of McMaster University in Hamilton, Ontario. The GEMH Lab's research centers on translating evidence-based psychological frameworks into video games, so that "games can be used for intervention purposes, as well as to study emotion-regulation processes more rigorously, in contexts that are motivationally compelling for children."[20]

The Lab not only produces their own games, based on empirical research and validated methodologies, but also produces and distributes tools for commercial game makers to test and integrate these concepts in their own games.

The work of the GEMH Lab is a culmination of social-psychological research and publication, game co-creation, and interdisciplinary collaboration, producing games like Mindlight and empirically validated game design toolkits like Bloombox.

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[21] Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American Psychologist 69(1),* 66-78. https://doi.org/10.1037/a0034857

[22] GEMH Lab. https://gemhlab.com/about#approach

This infographic from Mindlight's developer, Play Nice, presents the rationale behind the game. It also demonstrates how both game controllers and biofeedback sensors come together to allow for real-time inputs and interaction.

*Mindlight* is a multi-platform game designed for young people with anxiety. In the game, the player explores a dark mansion, with the goal of overcoming scary experiences and solving puzzles to turn the lights back on with Teru, the player's magical hat that shines when the player is relaxed. Played with an off-the-shelf consumer biofeedback sensor, Mindlight uses the player's emotions and transforms them into real-time inputs; in this case, the player must consciously overcome fear and anxiety and actively relax to progress through the game. By triggering authentically negative emotions in a controlled space, players necessarily learn how to regulate their anxiety and stay calm.

The game integrates exposure therapy, mindfulness and relaxation techniques, and attentional bias modification methods into its core gameplay loops but remains engaging and playful. For the GEMH Lab, it is important to ensure that their games are designed so that children want to play them, "not because they are good for them, but because they are fun games they enjoy."[21]

Over the course of its development, the GEMH Lab's research conducted 4 randomized controlled trials, testing the effectiveness of Mindlight as a mental health intervention. Results demonstrated that playing Mindlight was as effective as undergoing Cognitive Behaviourial Therapy (CBT), with comparable reductions in child- and parent-reported anxiety.[22,23] Mindlight was also developed in conjunction with game designers and artists, to ensure that the game was not simply a clinical practice with a coat of "game" on it. Mindlight is meant to be an engaging, immersive, and narratively resonant game first and foremost, with gameplay that is connected to scientific evidence to the ends of achieving mental health objectives. Ultimately, "fun, accessible game design links the body, mind and game into a training loop that feels fun while new emotional habits grow."



An in-game screenshot of Mindlight. The unique art style and worldbuilding adds an important element of immersion and engagement that makes the gameplay loop, and its therapeutic benefits, more effective.

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[23] Mindlight. https://playmindlight.com/

[24] Schoneveld, E. A., Malmberg, M., Lichtwarck-Aschoff, A., Verheijen, G. P., Engels, R. C., & Granic, I. (2016). A neurofeedback video game *(Mindlight)* to prevent anxiety in children: A randomized controlled trial. *Computers in Human Behaviour 63,* 321-333.
https://doi.org/10.1016/j.chb.2016.05.005

[25] Schoneveld, E. A., Lichtwarck-Aschoff, A., & Granic, I. (2018). Preventing childhood anxiety disorders: Is an applied game as effective as a cognitive behavioral therapy-based program? *Prevention Science 19,* 220-232. https://doi.org/10.1007/s11121-017-0843-8

The work of Dr. Granic and the GEMH Lab demonstrates the role of video games as an avenue for accessible and meaningful mental health interventions and as facilitators of emotional wellbeing. Specifically, well-designed video games allow for playful experimentation with identity, socialization in novel contexts, engagement with concepts of fear and anxiety, among many others.

Dr. Granic stresses that in contemporary contexts, the narratives around games need to encompass the reality of digital natives. Young people, who experience video games in a ubiquitous way through their consoles and mobile phones, see games as integral to their day-to-day lives, a medium they use to socialize, explore, and entertain. Video games are as formative as social media, books, games, or sports, and should be studied and treated as such; with care and a potential for human flourishing.

# Cognitive and Physical Health in VR: Democratizing Immersive Gaming Experiences for Seniors

Virtual Gym – Edmonton, Alberta

Most medical practitioners and researchers have reached a consensus about the role of physical exercise and active stimulation in the long-term health of older adults and seniors. The lingering challenge, however, is to ensure that there are ways to administer and frame this type of activity for older adults, especially where there might be limitations in terms of mobility, program offerings, or resources. Researchers have turned to video games as a potential solution: studies have suggested that interactive video gaming, games that require the use of body movements in relation to game inputs, may "enhance physical characteristics such as postural balance and muscle strength that may transfer to other cognitive domains."[24]

In the past two decades, different movement-based video game peripherals have been used to engage seniors and help improve both physical and cognitive health. The PlayStation 2's Eye-Toy, the Xbox 360 Kinect, and the Nintendo Wii have all been used to pilot "exergaming" interventions that are both engaging (via interactions with the game) and physical (using motion controls as inputs).

However, as the gaming landscape has evolved, and new consumer technologies have become mainstream, more intuitive approaches to promoting physical and cognitive health through video games have emerged. The use of virtual reality (VR) devices specifically "promises many benefits for older adults, such as promoting a healthy lifestyle with health-related gaming… supporting rehabilitation and aiding in everyday life tasks."[25] Like its earlier counterparts, VR offers the ability to make movement interactive and engaging, but at a level of immersive never seen before.

**Increasingly accessible consumer VR devices and their compatibility with immersive, game-like experiences is providing new ways to think about movement, engagement and play.**

Despite the fact that virtual reality is considerably less common as a consumer technology, and that it tends to be perceived as a more complex way to be play video games, it has proven surprisingly intuitive and easy for seniors to use; for Dr. Stroulia, the immersive nature of a VR headset, and the ability to emulate common or natural movement makes all the difference.

**Meet Dr. Eleni Stroulia, the University of Alberta researcher behind the VR exercise platform Virtual Gym.**

Along with postdoctoral fellow Dr. Victor Fernández and the support of the AGE-WELL network, Dr. Stroulia developed Virtual Gym, a customizable exercise platform for older adults played in virtual reality. The stated purpose of Virtual Gym is to support health practitioners in providing individually prescribed and customized exercises for older adults while engaging them in immersive and more cognitively challenging virtual environments.

Dr. Stroulia has always been keenly interested in the exploring how technology can be used to help older adults. As a computer scientist, her work is situated at the intersection consumer-side technology use and improvements to cognitive health and wellbeing. Ultimately, Dr. Stroulia's work with Virtual Gym stems from her desire to use video games to improve the physical and cognitive health of seniors, especially through guided exercises.

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[26] Ramnath, U., Rauch, L., Lambert, E. V., & Kolbe-Alexander T. (2012). Efficacy of interactive video games in older adults with memory complaints: A cluster-randomized exercise intervention. *PLOS ONE 16(5)*: e0252016. https://doi.org/10.1371/journal.pone.0252016

[27] Seifert, A. & Schlomann, A. (2021). The use of virtual and augmented reality by older adults: Potentials and challenges. *Frontiers in Virtual Reality 2*. https://doi.org/10.3389/frvir.2021.639718

The first iterations of Virtual Gym were developed for use with the Xbox Kinect movement camera, but as the technology evolved and the team thought about the concept of immersion, the switch to VR became more promising. For Dr. Stroulia, the virtual reality paradigm has two very specific advantages: the immersion helps the player more immediately and intuitively identify themselves within a gameplay space, and the first-person perspective allows for more dynamic and expansive dimensions for movement. But more broadly, VR also allows for more immersive environments and experiences, which themselves make the cognitive-physical, mind-body, action-information synchronicity work.

Virtual Gym currently offers six games, each offering exercise mechanics that can be tailored by health practitioners to suit the needs of players. These games vary in terms of complexity and range of movement. For example, Virtual Gym Bubbles prompts the player to use their hands to stretch and reach pairs of bubbles in a simulated underwater space. Bubbles is described as the simplest game since it doesn't require the player to learn or use complex interactions. On the other hand, Virtual Gym Slice Saber emulates some of the gameplay of Beat Saber and prompts the player to use two distinct "light sabers" to break coloured blocks as they move towards the player. Slice Saber is a more robust and involved game, which can be modulated for an additional cognitive challenge (by configuring block position, speed, colours, and orientation).

Virtual Gym is a novel approach to exercise-based gaming for older adults, but it just as importantly challenges assumptions about its complexity and use. While the initial thought may be that a technology like virtual reality would be hard for seniors to use, the Virtual Gym team attest to the fact that it is actually more intuitive than other peripherals used in exergaming or with seniors. "Wearing a headset is like wearing glasses and that's already something natural" notes Dr. Stroulia, explaining that "when a player is present in a virtual environment and they reach out towards a balloon or a bubble, that is something everyone has done before and something that they can innately do even in that environment." The headset itself it less daunting for seniors to use than a mess of wires, cameras, and screens that earlier iterations of Virtual Gym, or older exergaming platform have used.



Images depicting the virtual environments and gameplay for Virtual Gym Bubbles (top) and Virtual Gym Slide Saber (bottom)

Eventually, Dr. Stroulia and Dr. Fernandez hope to deploy Virtual Gym more broadly as software-as-a-service for use by health practitioners in their clinics or by early adopter players in their homes. The goal is to explore pathways that combines team's expertise, decreasing price of devices, a need for engaging exercises of seniors, and increasing awareness about the benefits of video games overall. Virtual Gym, points to an exciting and unexpected democratization of VR among seniors, a demographic group you may not expect.

# Discovering the Future You through the Exploration of STEM Careers

[Play to Learn](#) – Vancouver, British Columbia

While there is no standard definition of STEM (Science, Technology, Engineering, and Mathematics) workers, research highlights the rapid demand for STEM skills observed over the past 40 years. Employment in STEM occupations has grown 79% between 1990 and 2018 whereas overall employment grew only 34%.[26] Similarly, STEM employment will continue to grow 11% between 2022 and 2032, against only 2% for all other careers.[27]

Canada has emerged as a world leader in many STEM fields, however, there is more work to do to raise awareness and increase inclusion and accessibility for these careers. Many initiatives have been put in place to increase science literacy and participation of Canadians in STEM. For instance, the Government of Canada has more recently invested in STEM careers through the lens of climate crisis:

> *Young people just beginning their careers in science and technology, engineering and mathematics bring a whole new perspective to problem-solving and innovation into a workplace. These graduates are keen to contribute to the solutions that will bring about change for our environment—change that is badly needed to stop the impact of global warming.*
> The Honourable Steven Guilbeault, Minister of Environment and Climate Change, July 2023

As such, STEM skills have become indispensable tools for the future generations of workers. It is thus critical to support them discovering and honing these valuable skills, while encouraging them to explore the numerous careers paths that STEM skills unlock.

The goal of STEM education is to prepare students for real-world challenges by fostering critical thinking, creativity, collaboration, and problem-solving skills. STEM education emphasizes interdisciplinary learning, encouraging students to see connections between different subjects and apply their knowledge in real-world situations. It promotes a holistic approach to education that reflects the complexities of our interconnected world and prepares students for career paths in industries as diverse as game development, healthcare and biotechnology, architecture and construction, telecommunications, design, robotics, finance, aerospace and energy.

**Video games can help build the first fully STEM literate generation and encourage STEM career exploration at an early age.**

Play to Learn is an interactive program designed for exploring the promising STEM careers for middle school students. The curriculum is built to empower students with the knowledge they will need to discover their career pathways.

The British Columbia version of Play to Learn started in the 2016-17 school year to inspire young people to work in the video games industry. While the attractions of this fun and creative sector might seem obvious, not every student feels it offers a career path that is right for them. Video games company Electronic Arts (EA) and program partners set out to correct this sentiment by bridging the gap between schools and the gaming industry.

DigiBC, a not-for-profit supporting the creative technology sector in BC, is the Project Lead for the Play to Learn Expansion Project, responsible for raising and managing funding for the program, managing project partnerships, facilitating and tracking program delivery. The BC Ministry of Education and Child Care, Learning and Education Programs Division has committed 50% funding to the program.

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[28] Pew Research Center, *Diversity in the STEM workforce varies widely across jobs.*

[29] US Bureau of Labor Statistics, *Employment in STEM occupations*

In partnership with education specialist EVERFI, EA developed an educational programme designed to inspire a lifelong interest in computer science and show children from different backgrounds the various career paths available in this field.

In fact, the program encourages students to go beyond the question 'What do I want to be when I grow up?' and ask themselves 'How will I get there?'. Through interactive sessions, the curriculum empowers learners with the knowledge they need to form and fuel their future career endeavors. The program specifically highlights seven industries:

- Designing the Ultimate Prototype: discovering the engineering process.
- Connecting the Home of the Future: getting familiar with the internet of things.
- Building the Perfect Playlist: exploring music algorithms.
- Medical Machines: applying STEM skills in healthcare.
- Data Champions: learning about statistics and data analysis.
- Game Development Studio: understanding how STEM skills support interactive digital media.
- Transportation Central: examining the science behind logistics and distribution.

Learners are immersed in a game design team using best practices in software development. Through the lens of a game producer, learners are asked to problem solve, apply and use tools to get work done, and to make decisions within defined limitations.

Developed by education experts following proven methodologies, the course covers today's key scientific issues including recommendation algorithms, big data, and the future of design through fun, interactive lessons and activities. This immersive simulation lets children experience how STEM skills would be applied in a real-life Game Design team.

**Play to Learn has met great success and opened new horizons for hundreds of students.**

As of June 2022, Play to Learn had supported more than 2,300 students in 78 schools across British Columbia. 87% of participants were grade 8 or younger.

Assessments before and after each lesson help measure what students have learned and track how their future career plans may have evolved. BC students who participated in Play to Learn reported being more interested in taking STEM classes, such as statistics or engineering. Surveys also showed increased knowledge of STEM careers. For instance, 39% of students were aware of career pathways in the game development industry before taking the course, against 78% post-course.

How students feel about STEM subjects at this age can dramatically impact future options and choices. After Play to Learn, 55% students saw careers that they could imagine having and 50% realized they were the type of person who could have a career in engineering.
A student notes the engaging approach: "I liked the creative part of it, and taking feedback to improve my game. I might apply what I've learned in this course if I decide to become a game developer."

Play to Learn is a fun, interactive and comprehensive look at fulfilling, in-demand careers that supplements the traditional training pipeline. Loc Dao, Executive Director of DigiBC notes: "We believe these are building blocks for skills that the next generation will be able to use in a rapidly changing world, whether it's making video games, programming a music algorithm or developing the next AI."

Initiatives like Play to Learn across Canada aims to encourage all students – even those who might not think a STEM career is for them – to see themselves in a scientific or technologic career, giving the next generation of talent the best chances to succeed.

## About ESAC

ESAC is the national voice of the video game industry in Canada. We work for our members – Activision Blizzard, Glu, EA, Gameloft, Ubisoft, Kabam, Other Ocean Interactive, Ludia, Microsoft, Nintendo, Sony Interactive Entertainment, Epic Games, Relic Entertainment, Roblox, Solutions 2 Go, WB Games, Eidos Montreal, Take-Two Interactive, Tencent, Codename Entertainment, Certain Affinity and NetEase Games – to ensure legal, regulatory and public affairs environments are favourable to long-term business development. For more information, visit theESA.ca.

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