

# Future of **Online and Digital Learning** in Post-Secondary Art Institutions

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# Abstract

This research project explores the current state of online and digital learning in Post-Secondary Art (PSA) institutions and highlights some of the key challenges and opportunities for change within an institution. The paper aims to visualize possible future scenarios for learning in art institutions and provide recommendations to assist in planning for the future of these organizations.

The project draws on the theories of learning, a history of transformation in higher education, elements of online learning, and current trends in the field, to build a foundation for possible futures. By using foresight methodologies, the project generates four scenarios that take readers to 2040 and provide them with alternative learning landscapes through technology.

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# Terminology

**Adaptive Learning:** An educational method using computer algorithms to organize and plan interactions with the learner. It aims to deliver customized resources and activities - addressing the personalized needs of each learner.

**Artificial Intelligence (AI):** The simulation of human intelligence in machines.

**Augmented Reality (AR):** A live, direct or indirect view of a real-world environment whose elements are supplemented by computer-generated sensory input.

**Blended Learning:** Combines opportunities for interaction online and traditional classroom methods. Uses online and in-person educational materials. Also known as Hybrid Learning.

**Distance Learning:** A method of studying in which lectures are broadcast or classes are conducted by correspondence or over the internet, without the student's needing to attend an institution.

**E-Learning:** Learning conducted through electronic media, typically on the Internet.

**Extended Reality (XR):** An umbrella term for all the immersive technologies including augmented reality (AR), virtual reality (VR), and mixed reality (MR).

**Learning Management Systems (LMS):** A software for the administration, documentation, tracking, reporting, automation and delivery of educational courses, or learning programs.

**Machine Learning (ML):** The use and development of computer systems and algorithms and statistical models that are able to learn and adapt without following explicit instructions.

**Massively Open Online Courses (MOOCs):** An online course aimed at unlimited participants and open access from anywhere through the Internet.

**Mixed Reality (MR):** The merging of real and virtual worlds to produce a new environment where physical and digital objects are able to interact with one another. Also known as Hybrid Reality.

**Online Learning:** A method of studying that involves courses offered by an institution that are completely virtual. These are virtual classes offered over the internet.

**STEAM:** STEAM (Science, Technology, Engineering, Arts, and Mathematics) are teaching disciplines in education. The addition of 'A' is an emphasis to incorporate creative thinking and applied arts into the Education Criteria.

**STEM:** STEM (Science, Technology, Engineering, and Mathematics) are teaching disciplines in education and were introduced into the Education Criteria to cater to the dire, future, need of the education system.

**Virtual Learning:** A learning environment that uses computer software, the Internet or both to deliver instruction to students. Also known as Digital Learning.

**Virtual Reality (VR):** An immersive experience that uses technologies to generate realistic sounds, images and other sensations to replicate a real (or hyper-realistic imaginary) environment. Also known as a Computer-Simulated Reality.

# Introduction

# Introduction

A university studio space. The instructor is circling the studio providing students with feedback on their projects. Students are spaced out around the room, sharing sculpting tools and collaborating on not only the class assignment but ideas for a community design competition. Organic conversations pop-up about how weekends were and what TV shows are being watched. Later that day, students are notified that they won't be returning to school due to a campus closure - education has been forced to continue online for the unforeseeable future.

What happens when institutions shift to an online learning environment? An environment that many are not prepared for, trained in, or have access to?

Conventional learning institutions have not transformed since Charles Eliot's critique "The New Education" of North America in the late 1800s (Davidson, 2017). The majority of institutions have been following a traditional lecture room style for decades. Slow to adapt, to innovate, and to integrate newer forms of technology in their environments. This slow-paced change makes learning institutions predictable, or so one may think.

This is where post-secondary art institutions have differed from conventional learning, albeit in a small way. Art institutions aspire to centralize student-focused learning, emphasize the importance of small classes and studio space, and integrate hands-on learning. These types of institutions have tried and challenged traditional post-secondary education for decades. However, due to the Covid-19 pandemic, the changes we have witnessed post-secondary institutions undertake over the last few months have been transformative, for better and worse in some instances, and this is just the beginning.

After years of emphasizing in-person schooling and hands-on learning, art institutions are left to redesign and re-assess their modes of teaching to survive during the pandemic. Many institutions are rallying up their resources to transition into online learning at the moment, however, we need to be planning for the future of education as well. Anticipating the future is risky but necessary. It can assist us in planning, preparing, innovating, and bettering ourselves and those around us. Considering this,

what may the future entail for post-secondary art institutions?

This project assesses current practices of online and digital learning in post-secondary art institutions across Canada and uses strategic foresight methods to develop four possible scenarios to answer:

## How might post-secondary art institutions re-imagine online and digital learning over the next 20 years?

The research project provides recommendations that discuss various ways for arts institutions to improve faculty support systems, further develop student services and resources, and to better learning outcomes. It aims to provide over-compassing recommendations that arts institutions are able reference and use to best prepare for whichever future scenario comes to fruition.

Education can shape our relationships, communities, society, and future. Although we cannot predict the future, our ability to imagine possible futures can assist in problem-solving; working towards creating a better, more accessible route to higher education for all.



# Methodology

# Methodology

This project utilized foresight methods to explore the question at hand, develop possible future outcomes, and ideate potential interventions to improve art institutions' responses to the predicted possible futures. Foresight enables us to analyze both the micro- and macro-level of students and the post-secondary art institutions system. This type of analysis assists in interrogating the relationships and interactions between the two levels while tackling future challenges.

The key question this research addresses is:

## How might post-secondary art institutions re-imagine online and digital learning over the next 20 years?

In order to answer this, the following additional questions needed to be addressed:

1. How might understanding future needs and realities change current policies and practices?
2. How will an institution's internal system need to adapt to provide a relevant, encouraging, and useful experience to students?

To answer the overarching research question, the post-secondary art institution landscape was explored through secondary research and then assessed through the use of foresight methods.

The report begins with a Literature Review and an Environmental Scan of the current environment to identify the major trends that are shaping higher education, art institutions, teaching, online learning, and access to education. It was integral to ensure an expansive view of factors influencing the future of art institutions; the STEEP Analysis framework assisted me in broadening my search on the topic through Social, Technological, Economic, Environmental, and Political trends. This method allowed for expansive research to more explicitly define trends and potential trajectories in each of the five categories.

I use the Environmental Scan and STEEP Analysis alongside a method known as the Innovation Sourcebook (Kumar, 2013) which focused on classifying and highlighting different areas for emerging and existing technologies and tools in

institutions. This method of research assisted in the analysis of these tools and allowed for a structured approach to assemble a list of best practices and innovation success in the field of e-learning and education. I used this research method to further classify and highlight different areas for emerging and existing technologies and tools in institutions. Furthermore, it assisted in the further development of my alternative futures and recommendations.

Based on the trends developed, I thought it appropriate to use Dator's (2009) "Four Generic Futures" alongside Backcasting for each scenario developed. The use of four Generic Futures, with the alternatives being continued growth, collapse, discipline, and transformation, illustrates that there are similarities and variances in the futures. However, this tool does not present a 'preferred future'. This tool illustrates that there are a variety of different outcomes that may occur, and those discussed within this report are a small pool of what may happen. The use of this tool is to emphasize that "in the long run, all four generic forms have equal probabilities of happening, and thus all need to be considered in equal measure and sincerity" (Dator, 2009). These four alternatives include topics relating to the impact on learning outcomes, faculty and student receptiveness, concerns of equity, accessibility and inclusion, and financial investment.

**Background**

# Background

## Transitioning from Distance to Online Learning

Online learning is not a new phenomenon. Although the technology we know and understand today is relatively new, the concept of distance learning was first recorded over 170 years ago.

The first recorded instance of distance learning occurred in Boston, wherein in 1728 'Caleb Phillips' advertised private correspondence courses in shorthand in the Boston Gazette (Pappas, 2017). 80 years after this instance, distance learning was further developed in Great Britain when Sir. Isaac Pittman, an English Instructor, sent and received completed assignments through the mail. Throughout the 1840s, Sir. Isaac Pittman developed and led correspondence courses to teach students around the country his system of shorthand known as Pitman shorthand (Pappas, 2017). Almost 20 years later, in 1858, the University of London was the first post-secondary institution to offer a distance learning degree.

Online learning is the modern version of distance learning that we see in the 1700s and 1800s, of course, with a few adjustments. From today's viewpoint, online learning can occur asynchronous or synchronous, encourage social networking and collaborative engagements amongst students, and incorporate digital technologies and applications into its learning environment.

However, how did distance learning transform into what we know today as online learning?

Since the inception of radio, the two primary functions have been to entertain and to inform. However, starting in the 1920s American, Australian, and Canadian radio would begin educational programming. The Canadian National Railways (CNR) now known as the Canadian Broadcasting Corporation (CBC) led the shift to provide educational radio programming in Canada. Programmes were created for Kindergarten-12 as well as post-secondary education institutions (Haworth, et al., 2009). Students who were placed in traditional classrooms or were situated at home (distance education) were able to listen to programmes. "If students were privy to have transceivers, they could interact with radio programmes as well. Following

CBC's lead, other educational radio broadcasts took place through various provincial ministries of education via local radio stations" (Haworth, et al., 2009).

Then came the introduction of educational television. In the mid-1950s, CBC branched out from educational radio and led experimental educational television broadcasts in collaboration with five provinces: Nova Scotia, Quebec, Ontario, Saskatchewan, and Alberta (Canadian Communications Foundation, 2020). "These television broadcasts, as with radio, were designed to be used by students and teachers in the classroom, and were instructional or formal educational programmes, tied directly to provincial curricula" (Canadian Communications Foundation, 2020). A technology that would still be used today.

This brings us to the introduction of virtual learning.

Although the Internet would not be created for another nine years, this factor did not slow down the University of Illinois and computer learning (Andrews, 2019). In the early 1960s, the University of Illinois created an intranet, Programmed Logic for Automated Teaching Operations (PLATO), for its students. PLATO was the first computer-based learning system at the University and the first generalized computer-assisted instruction system (Illinois Distributed Museum, 2020). PLATO was a precursor to today's online world. The University of Illinois led the introduction to computer-based learning, online networking (a model for social networking), interactive touch screens, and more.

The first two institutions in Canada to make strides in the field were Athabasca University (AU) in Alberta and the Télé-Université project at the University of Québec. In 1972 AU and Télé-Université were developed as separate pilot projects to test the concept of an accessible, open, distance learning institution (AthabascaU, 2020; Université TÉLUQ, 2020). These pilots transformed them into leaders of distance learning.

AU began their distance learning with printed course materials and student-tutor interaction via telephone (The Canadian Encyclopedia, 2013). By the late

1970s, AU participated in the educational Telidon project that focused on the effects and influence of Telidon in classrooms. "This tool was an alpha geometric videotex information system used set-top boxes with TV sets, or subsequently software decoders running on Apple II, MAC, and PC to display text and graphics" (Institute of Electrical and Electronics Engineers, n.d.). In other words, Telidon was able to produce high-quality graphics. In the 1980s, AU transformed their education model of delivering post-secondary education to students anywhere, any time, and pioneered the use of computers to provide virtual courses in Canada (AthabascaU, 2020).

Building off of these innovations, 1984 was the introduction of the Electronic University Network (EUN) developed by TeleLearning Systems' Ron Gordon. Gordon was interested in creating an accessible online education network. He and his team developed mobile learning tools and resources and learning management systems. By 1985, the EUN gained a large following and attracted several large universities as partner institutions. The Network had almost 15,000 students in an array of classes, with over 1,500 post-secondary institutions participating in EUN's offerings (Etherington, 2018).

EUN offered counselling and mentoring services to assist students in their course selection. This was an important aspect considering EUN worked with partner institutions to issue degrees. EUN's strength was its demographics; focusing its marketing efforts on 'non-traditional' students, those who were caregivers, full-time employees, mature or marginalized students (Etherington, 2018).

Meanwhile, in 1985, Canada offered its first online degree through OISE (University of Toronto). OISE was "offering graduate-level courses online, using computer conferencing as the principal mode of delivery. Students would log on to designated computer conferences to participate in class discussions, debates, seminars, individual and group assignments, and virtual 'cafes' and libraries" (Harisim, 2000). A significant development in distance learning. Students were able to interact in real-time with their classmates and instructors.

In the mid-1990s, there was a shift in policy to refocus education and combine the efforts of Information and Communications Technologies (ICT) and education in Canada. This shift resulted in allocating financial resources into two programmes in Canada: "SchoolNet Project (1994-2007) sought to create an education network connecting schools, museums, and Indigenous communities. TeleLearning Network of Centre of Excellence (TL-NCE) (1995-2002) focused on the development of pedagogical know-how in telelearning, technology as a tool for learning" (Lehmann, 2016). This shift in funding priorities illustrated that Canada was preparing for a transformation in education and learning.

In 1994 CALC Online Campus (formerly known as CALCampus) and online learning took a historical step. This organization was the first to implement a completely online-based school. CALC Online Campus was a school that was operated and accessed through online means. The institution was able to have "administration, real-time classroom instruction, and materials provided, originating with its QuantumLink campus" (CALCampus, 2020).

The next few years were tumultuous for online learning.

Jones International University became the first fully accredited virtual university in the United States in the late 90s. An accomplishment for online learning, but not without protest. This act was immediately condemned by the American Association of University Professors, arguing that online schooling only "weakens the very definition of higher education" (Mendels, 1999). Online learning was still a newer model of learning; it was clear that there was a lot to be learned about online learning ventures. Instructors and institutions were wary of this non-traditional campus and what was yet to come. Many were fearful of online learning downgrading higher education or losing their positions to technology, a recurring concern over the next two decades.

Parallel to concerns of technology taking over higher education, MIT created OpenCourseWare (OCW) in 2000. Building off of Gordon's beliefs of accessible education in the 80s, OCW was a course lesson first created at MIT and published for free via the Internet.

In 2002 MIT OCW published its first 50 online courses and by 2007, the majority of the curriculum was published online (OpenCourseWare, 2020). With the emergence of online content and the rise of materials and resources openly available on the Internet, also emerged debates about “open content, open access, and open software.” All of which became more prominent as a response to the Internet’s popularity and commercialization (Lehmann, 2016).

The late 2000s introduced the years of the Massive Open Online Courses (MOOCs), a turning point for online education. Often credited with the popularization of the term MOOC was the University of Manitoba in 2008. Two Canadian researchers, George Siemens and Stephen Downe, offered a course “Connectivism and Connective Knowledge for credit and non-credit students. This meant that anyone within the institution or outside of it was able to participate in the course (Lehmann, 2016). Soon after, arose the creation of MOOC platform providers such as Coursera and MITx, leading to their partnerships with Universities and the massive switch to online learning during the mid-2010s. A time where many people thought that MOOCs would overthrow institutions and online learning would be the future of education.

This brings us to the present.

As illustrated through the history of distance and online learning, it has taken almost three centuries to get to where we are today. And while MOOCs contain enormous potential for students, employers, and teachers, many institutions were not prepared for the rapid switch to entirely online learning in March 2020. Due to the Covid-19 pandemic, this not only brought mass panic and physical distancing measures, but it forced institutions to close their doors and turn on their screens, to continue teaching.

Although there were talks of MOOCs taking over traditional education in 2012, institutions were still taking their time to adapt and innovate with newer technologies. The rapid switch to digital education caught many institutions off-guard. Institutions rushed to apply digital learning applications without proper research or foresight of what these tools entailed or how they might aid or hurt students and faculty. IT

departments across the country and world were sent into overdrive to plan out digital tools and improve digital security for the unforeseeable future.

## Post-secondary Art Institutions

The value of the arts in education is largely debated. The rationale for the inclusion of arts in curriculums is rarely based on the value of learning arts themselves, but rather their relevance to economic development in our society (Rabkin, 2014). Over the last two decades, there has been a 20% decline in enrollments in arts programmes across the country (Universities Canada, 2016). Alongside this decline, there has been an increase of misconceptions about graduates’ employment prospects, creating a false narrative revolving around arts education (Universities Canada, 2016). These false narratives influence students. These influences create cultural and societal shifts that can push students into other fields of study.

The pressures of rising tuition fees are a large factor for many students as well. As articulated by Mr. Higgins in Design Week (2017), “students seem more inclined to study STEM (Science, Technology, Engineering, and Math) subjects at university as they have more tangible, predictable career options, whereas art and design courses have a less predictable outcome.” In the arts, many alumni must pave their path in the job market. There is not always a set of steps or processes for these graduates to follow; it is more open-ended.

What may be more worrisome is that post-secondary institutions have seen a decrease in government funding across the country. In the province of Ontario, there has been a decrease of 4% in post-secondary funding over the last four years (Canadian Press, 2019). In addition to this decrease, the Ontario government has recently implemented performance-based funding. This means that 60% of public funding for institutions will be based on their ability to meet key performance outcomes that are to be determined by the Ministry of Training, Colleges, and Universities. These metrics have yet to be outlined, but the Ministry has noted that they will evaluate institutional performance based on a set of 10 metrics tied to skills, job outcomes, economic and community impact.

For Ontario institutions specifically, this may be detrimental. The performance-based funding model's goal is to meet the needs of the government, rather than students and the institutions. "This funding model is particularly concerning for small, remote, and/or northern institutions which are at a major disadvantage when competing for funding and employment outcomes with large institutions in urban centres" (Canadian Federation of Students, 2019).

Art institutions are struggling. There is no way to hide this, but the situation was made worse in March 2020. Art institutions pride themselves on centralizing student-focused learning, emphasizing the importance of small classes and studio space, and hands-on learning. All of which, students expect to attend in person. Because of this reality, enrollment and performance-based funding may decrease.

Although Covid-19 precautions and measures may not stay in place forever, our world is rapidly changing – economically, socially, politically, technologically, and our education centres will need to adapt. These current gaps and weaknesses found within arts institutions must be further explored and planned for because if it is not, the fear of losing arts education in Canada may become a reality.

Art institutions have spent decades emphasizing in-person schooling and hands-on learning but are left to redesign their modes of teaching. This is not to say that digital learning was not incorporated into some curriculums such as animation, 3D designing, digital futures, etc., however, throughout the last few months, institutions have made concentrated efforts to transition the majority (if not all) courses to e-learning formats.

This massive, unprecedented shift to e-learning has been difficult for all parties involved. The loss of the in-person community has the possibility to manifest in worsening mental health for students. Because of the rapid and massive switch to online learning students are losing in-person peer-to-peer interaction, events, and access to communal study and studio spaces (Policy Response, 2020). Under these conditions, students are more likely to experience a growing sense of isolation. This negative effect on mental wellbeing can seep into their personal, work, school,

and social life (Policy Response, 2020). Meanwhile, many instructors and staff were overworked and underpaid during this transition. Instructors and staff members of institutions have been expected to work above and beyond to manipulate in-person programming to fit the means of digital learning without proper experience or timely training sessions with various platforms and technologies (Pomerantz, 2019).

Considering the rapid switch to digital education in art institutions, is e-learning here to stay and if so, what does its future look like?

# **Innovation and Trends in Education**



# Innovation and Trends in Education

## Environmental Scan and Trends

For the purposes of this project, I began my research with an environmental scan. To ensure that I identified a wide array of signals, I explored five categories: social, technological, economic, environment (outside and inside the classroom), and political (otherwise known as STEEP). By conducting a scan in conjunction with the STEEP method, it assisted in providing a holistic overview of signals. These signals were then categorized thematically and further developed to reflect trends in the field of study. These trends assisted in assessing and preparing for alternative futures.

The following STEEP trends were collected for their potential to impact the evolution of art institutions as they move towards online and digital learning. This section summarizes the trends I discovered in each of these categories. In the appendices, you will find a detailed description of the anticipated impacts of and evidence for each trend.

Trend	Description
Accessibility in the Classroom	Accessibility in the Classroom consists of more than just the designing of courses and developing a teaching style to meet the needs of the students. However, it does and will continue to envelop access to technologies, the internet, as well as adjusting to various students' abilities and learning styles. There will be more onus on institutions and instructors for ensuring that students are able to participate in the classroom with minimal barriers.
AI in the Classroom	AI integration in the classroom transforms the way in which students and teachers interact with one another. The introduction and further use of AI aids teachers in grading, tracking performance and test scores, data analysis, emotional observation, and more, aiding a teacher in learning about a students' learning habits. Overall assisting teachers in personalized lesson creation and adaptive learning.
Art Schools Lose Funding	Public funding for art institutions decreases because of the implementation of performance funding, the emphasis on STEM over STEAM in the workforce, and a continual decrease in student enrollment.
Blended Learning	Institutions fully incorporate blended learning practices into their pedagogy. Working in collaboration with digital tools, online learning, and in-person teaching to allow flexibility and control for students and their development.
Credentials the New Wave	An economic collapse, a pandemic, and rising student debt led to the emergence of PSE credentials. Learning companies and educational institutions band together to break colleges' monopoly on degrees by creating a new form of credentialing. Students are no longer spending their time on four-year degrees but working on retaining online credentials for a quarter of the cost.
Data Pollution	Although online learning may be seen as more accessible and less wasteful, the further digitalization of society does produce negative external effects on the environment - leading to a different kind of pollution, data pollution. The over manufacturing, use, and disposal of gadgets create increased demand for energy, produce toxic waste, and contribute to air pollution.

Table 1. Trends

Trend	Description
Decolonization of Education	While colonized history and teaching methods have been the dominant viewpoint of educational content for the last few centuries, shifting demographics, means this dominant position in curriculums may be abandoned.
Democratize Education	Institutions are more invested in fighting for students' rights to access education; arguing that students should have access to technology, the Internet, support, and resources while attending higher education. Institutions focus on representing the most vulnerable students rather than the most able and wealthiest.
Digital Divide Rescinds	The Northern Policy Institute has outlined a timeline to provide Northern Ontario with access to the Internet (high-speed) by 2025. While the federal government is already planning the implementation of 5G networking by 2030. Creating accessible, affordable Internet access for all.
Free Education for All	Higher education is no longer seen as a luxury, we have hit the point in time where PSE is viewed as the only available next step and, indeed, the only hope for those who want a middle-class life (timeline, 2016). High school graduates are more convinced than ever that their only viable option for a better life in college. High schools used to charge tuition at one point, and we now consider this to be a right, Canada implements policies and legislation to begin down the road of free and accessible higher education.
Future of Faculty	Instructors no longer teach material for a one-size-fits-all model but work in collaboration with their students and digital learning tools to create a more personalized curriculum.
Gamification Takeover	A classroom that contains some elements of gaming can be considered a "gamified" classroom. In 2040 we can see an integration of gamification in all classrooms. One that creates sustained engagement, considers the unique needs of the learners, and does more than solely points and levels to motivate and engage its students.
International Students and Online Learning	With the increase of online learning, there are fewer international students travelling overseas. This turn of events leads to institutions lobbying government officials to implement regulations that allow international students who are studying abroad to be able to apply for their work permits, permanent residency applications, etc.
Isolation, what is a Community Anyway?	With the increase of online learning, students get further away from social interactions and gatherings, organic collaboration, and community building. This isn't only an issue with students, but faculty as well. Faculty members lose organic collaboration and feedback from colleagues and students. Leading to deteriorating materials, research and products produced by the community.
IT Infrastructure and Security	While institutions are using more online resources and services for their students and staff, there is a large concern for the security of online data and services. Their budgets will need to accommodate and incorporate these fees; future planning will need to incorporate more staff to assess and organize this infrastructure.

Table 1. Trends, Continued

Trend	Description
New Normal	People are likely to continue working from home or remotely. After seeing the benefits (costs and personal wellbeing) that hybrid work entails many organizations opt to continue to have their employees work remotely for a large portion of the work weeks.
New Paradigm of PSE	As a result of the recent forces and factors affecting education, four major paradigm shifts have occurred in higher education in recent years: The development of lifelong learning as a human right, The global democratization of knowledge, the infringement of online learning, and the development of the global knowledge society.
Outdoor Schools	While online learning is still prevalent, Wi-Fi and internet connection will be available around cities and rural environments (deemed a human right in the future) and considering a lack of space and infrastructure for many schools; they will opt to work outside. Focusing on environmental learning - working with the world around them.
Performance Funding	Ontario has begun to move into a Performance Funding model. This is outlined in the government's annual budget and projected to annually rise after 2025. Although this is not a trend itself, it will lead to a trend of Performance focused schooling and institutions. Therefore, creating more inequities across the university system and pitting schools against each other for funding.
Privatization of Education	A decline in public funding will force Institutions to rely on private funding from donors. Places of learning will be subject to corporate values and practices (efficiency, secrecy of institutional budgets and operations, the erosion of collegiality), threatening university autonomy.
Rising Inequality	Although access to higher education has become more democratized, accessible, over these past few decades, there remains an unequal barrier that's locking in a certain level of social stratification. Although there has been a push to accept students from different backgrounds into various higher status schools, if they cannot afford to be there, inequality rises.
STEAM is the new STEM	It is becoming more prevalent that without A in STEAM, students are leaving higher education without the soft skills and communication tools to flow through society, work in teams and even find a job in some instances. New Education Criteria's will emphasize the Arts to ensure the development of well-rounded students.
VR Classrooms	Virtual Reality (VR) is one technology that can assist in relieving the limitation of digital learning. It can be expected that with the rate at which digital learning is taking over, top PSE institutions will integrate some form of VR into their curriculum, and by the late 2020s, it may be seen as a serious training and simulation tool.
Wellbeing and Mental Health in PSE	Studies are showing heightened issues of depleting mental health, and this is a trend that seems to be growing. Wellbeing and mental health initiatives at colleges and universities, are and will continue to include emerging technology and application solutions. Ranging from online therapy and counselling to VR engagement.

Table 1. Trends, Continued

Trend	Description
We Work's University (Shared Space and Tools Between PSE's)	More often than not colleges and universities need to be creative with the resources and funding they are provided with. Post-secondary institutions funding and resources will continue to deplete while moving towards online learning. This leads to cost-saving measures of reducing physical spaces. These institutions will be collaborating with other institutions, community centres, and other businesses in their vicinity. Resulting in the shared collaborative spaces, resources, and tools.
Work after PSE	The workforce will determine what programs students enrol in. It's expected that more people will flee to the technology, engineering, and science fields, leaving art institutions with fewer students.
XR Technology	Powerful new platforms containing XR technology are beginning to emerge, and few institutions are experimenting with these in the curriculum, training tools, problem-solving activities, social engagement, creative work, and more. Further implementation will create new possibilities to modify learning environments and continue XR integration.
70 is the New 30	The average lifespan is expected to rise to 140 years by 2040. If this is the case, retirement at 65 is no longer feasible, and people will need to work for years after that. During that period, life-long learning and professional development will need to fill the gaps. People will need to educate themselves on new technologies, professions, and industries that arise over the years, forcing people into life-long learning.

Table 1. Trends, Continued

The process of conducting an Environmental Scan and Trends development allowed for a robust extrapolation of current trajectories in the creation of alternative futures that respect the realities of the present. Following these trends, I use a method known as the Innovation Sourcebook (Kumar, 2013). This method allowed for a structured approach to assemble a list of best practices and innovation success in the field of e-learning and education. These trends influence the alternative future scenarios developed throughout this research project and heavily reference this section.

### Innovation Sourcebook Trends

E-learning has become an essential channel for both formal and informal learning. It is necessary to outline the emerging and existing technologies used in higher education to fully understand what e-learning can transform into. It is important to note that for this section, the use of technology is not the priority; it is to outline that technology-based tools have the potential to transform teaching and learning in the classroom for art institutions.

The full outline and mapping of the Innovation Sourcebook found in the Appendix combines tools from a variety of post-secondary institutions such as OCAD University, Centennial College, Brock University, Centre for Digital Media, Emily Carr University of Art and Design, Nova Scotia College of Art and Design, University of Toronto as well as others. This list is not exhaustive but is used to highlight an array of tools used in online and digital learning.

## Adaptive Learning

Adaptive learning is an educational method that uses computer algorithms to manage the interaction with its user. It aims to deliver customized resources and learning activities to address the unique needs of each learner. In other words, “adaptive learning adjusts to the learner’s actual learning needs based on an intelligent algorithm” (McIntosh, 2020).

Arizona State University is an institution that’s decided to lean into the personalization of their courses with the introduction of adaptive technology. The institution made the decision to move away from mass production and into mass personalization. Arizona State University “used to teach everyone the same thing at the same time. Now, they’re connecting the right student to the right lesson... changing the structure of higher education from static to dynamic” (Leander, et al., 2019).

Adaptive learning may be a useful innovation in art institutions’ ability to accommodate and support students in more nuanced ways. Students’ accessibility needs are comprehensively assisted through adaptive learning technologies, it assists instructors and focuses on delivering customized resources and activities to learners, therefore, addressing the personalized needs of each learner.

The application of adaptive learning is still relatively new; because of this, there are challenges such as privacy, ethical issues, and promises by vendors of capabilities that cannot yet be delivered (McIntosh, 2020). In addition to these issues, there are costs associated with its implementation such as fitting the specific needs of the institution, training of faculty and staff, content creation and development, and the anticipated iterations of redesign.

## Artificial Intelligence and Machine Learning

Artificial Intelligence (AI) is the simulation of human intelligence in machines. More specifically, these machines are programmed to think like and mimic the actions of humans (Frankenfield, 2020). Whereas Machine Learning (ML) is the use and development of computer systems and algorithms and statistical models that can learn and adapt without following explicit instructions (Oxford Learners Dictionary,

2020). In other words, AI is the ‘big picture’ concept to create intelligent machines that can simulate human thinking capability and behaviour, whereas ML is the application of AI that allows machines to learn from data without explicit programming (Quora, 2019). These two technologies work hand-in-hand with one another and are leading in higher education.

Currently, the majority of educational institutions have some sort of incorporation of AI and ML in their institutions. These are often integrated into Learning Management Systems (LMS) such as Blackboard, Canvas, D2L, and others.

One of the largest uses of AI and ML in education is its ability to create more personalized learning. By reviewing student preferences these tools are used to develop recommendations and personalized learning resources (Larson, 2019). Additionally, AI can automate administrative tasks, freeing up instructors’ time, allowing them to spend more time with their students. “That’s because AI is basically good at two main things: processing huge amounts of data and automating repetitive tasks” (Larson, 2019). However, what makes AI and ML emerging technologies is the possible developments that these can lead to. As of recent, AI-powered chatbots is one of the latest tools to be integrated into post-secondary institutions to improve student relationships and experiences. For instance, Northwestern IT Teaching & Learning Technologies (Northwestern University) was able to develop a customized Chatbot to support their LMS, Canvas.

“The Chatbot specializes in enrollment-related inquiries, but it can also answer questions about other Northwestern-specific Canvas issues. Additionally, the Canvas Chatbot can search Instructure’s Canvas Guides and provide links to the most relevant information. If the chatbot cannot answer a question, it can create a ticket with the Northwestern IT Support Center and send a support request to the appropriate team for further help.” (Northwestern University, 2020).

Art institutions moving forward with the investment into AI and ML technology may create promising opportunities because of the already existing integration of AI and ML with LMS’s in various

institutions. This allows for ease of implementation. Additionally, the investment and use of these technologies will allow for the ability to create personalized learning environments by assisting instructors in grading, tracking performance and test scores, data analysis, emotional observation, and more; AI and ML has the ability to aid an instructor in learning about a students' learning habits and assisting them throughout their educational endeavours.

The incorporation of AI and ML technologies in higher education inherently creates cybersecurity risks. This technology not only has the ability to answer questions and 'converse' with its user, but it can also collect immense volumes of data. This means that with more institutions relying on AI and ML systems these are sure to become a major target for hackers (Parker, 2020).

### Class Engagement Resources

Since the inception of online learning, a question that has accompanied it is how do educators and technology create an environment where students can collaborate, engage, and connect with one another? This year has stressed the importance of community engagement even through digital means. Although online learning is convenient and flexible, much of it takes place in isolation. This can make it difficult to connect with peers.

Institutions have worked with third party organizations to develop and execute tools and resources for networking and group work. A number of schools have introduced open video call sessions on Microsoft Teams or networking breakout rooms on Zoom. To build on this, institutions are getting more creative. For instance, OCAD University, Emily Carr University of Art and Design, University of British Columbia Okanagan, and Toronto Biennial of Art collaborated this past summer to develop a virtual residency that used the application Milanote. Through this application, students were able to create pages for themselves and their research while connecting with their peers (OCAD University, et al., 2020). This tool allowed for the residency to build a network for individuals to converse, provide feedback to their peers, and relate to the programming

provided in the residency.

A similar example of this is an application called Parlay. This application is able to assist in the facilitation of live group discussions. Students are able to talk with one another about class programming in a roundtable fashion. Allowing students to discuss a topic live, and semi-organically (Parlay, 2020).

Class engagement, collaboration, critiquing, and feedback is essential for students to better their studies and continue developing themselves for their future. Art institutions are based on these critical features, therefore investigating various tools and resources that may encapsulate class engagement is essential for moving forward with online and digital learning.

There is an array of class engagement tools out there, however, knowing how to locate such resources and ensuring that this works best for your classroom remains elusive. Multiple tools and resources are emerging but knowing where to find the best discipline-specific resources and how to employ them in a course can be daunting and time-consuming.

### Extended Reality Technologies

Extended Reality (XR) is an umbrella term for all the immersive technologies. The ones included under this term are augmented reality (AR), virtual reality (VR), and mixed reality (MR) as well as those yet to be created. XR has the ability to provide experiences that are hyper-realistic. "Despite twenty years of research, XR has only gained momentum within the past five years; although there are still barriers to broad use of XR technology, it is an important innovation area for institutions to explore" (University of Waterloo, 2020).

Post-secondary education is beginning to experiment with XR technologies in the curriculum, training tools, problem-solving activities, social engagement, creative work, and more.

The Centre for Digital Media (CDM) in British Columbia created and integrated XR technologies into their classwork and collaboration projects. CDM

was able to develop a VR medical training module for a local doctor's office. Using AI and VR to create a training simulation allowing students to make decisions, experience success, make mistakes, and receive feedback in an environment that is void of patient risk (Campbell, 2020). For another project, the CDM was able to develop a Holocaust Memorial in Virtual Reality that focused on teaching students about the history and weight of the Holocaust.

Looking to the future, XR Technologies may be a core innovation in art institutions' ability to accommodate and support (international) students through distance learning. By incorporating AR, VR, and MR into online classrooms arts students may be able to participate in e-learning from wherever they reside. Students no longer need to travel across cities, countries or continents to access higher education, but are able to access distance learning as well as learn newer technologies in their classes.

The incorporation of XR technology in post-secondary education can be difficult. A few barriers to the implementation of XR technology include cybersecurity, pedagogy shifts, and cost. XR technologies are known to collect and process a large amount of detailed, personal data pertaining to what you do, how you react, what you look at, and depending on the tool, it can track your emotions (Marr, 2019). It is important that when institutions are looking to incorporate XR into curriculums, that they invest in a proper infrastructure to protect the data collected from their students. Next, XR must be moulded to current standards and practices in institutions. Technology cannot be added just for the sake of it but must be thoroughly thought through and integrated into current pedagogies. Lastly, as for cost, although the price tag for these technologies has been decreasing (and are expected to continue to do so) it is more than just the cost of technology that can be a barrier. The cost to train instructors and staff, incorporation of XR for students, and security.

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By creating the Innovation Sourcebook and cross-referencing it with the Environmental Scan and Trends, this allowed for further development of current trajectories in emerging and existing technology, therefore, assisting in the creation of alternative futures. It allowed for a thorough analysis of the Trends that were previously collected in conjunction with technology in the field of higher education.

This analysis influences the alternative future scenarios developed throughout this research project and heavily reference this section. The emerging and existing technology and their relationship to post-secondary art institutions have illustrated that there is the potential to foster active learning, student engagement, faculty and staff assistance, and accessibility for the majority.

# Alternative Futures



# Alternative Futures

## Four Generic Futures

Many people assume that there is a single future that can be accurately predicted and identified beforehand. However, planning for the future is complex and ever-changing. The challenges that are currently faced by a community, may not be the same tomorrow. Given the rate of change with technological advancements, globalization, dissemination of information, climate change and more, factors such as these are constant variants on possible futures. However, “the future that most people have in mind is usually a continuation of whatever is happening now will continue” (Dator, 2009).

Each scenario is written for the year 2040, reflecting on the course of post-secondary art institutions and higher education through the last two decades.

The use of Four Generic Futures for post-secondary art institutions is intended to assist in envisioning alternative futures while providing insights and recommendations for their possible trajectories. By using this method, I am able to emphasize that there is no ‘preferred future’ but various alternatives.

To arrive at the alternative futures outlined, I conducted a Four Generic Futures exercise with the trends discovered through the environmental scan. By separating trends into different categories and discovering trends that overlapped in the certain alternative futures categories (Growth, Collapse, Discipline, and Transform) I was able to work through the development of the separate scenarios. The core narrative of each scenario is accompanied by a backcasting exercise to organize a plausible timeline of events between 2020 and 2040. This assists in describing how each scenario may come to exist, therefore, creating a robust vision of each future.

## Access for Everyone

The Continued Growth scenario illustrates that learning environments are blended and there is an emphasis on personal wellbeing. Art institutions use adaptive learning in combination with blended and outdoor learning to conduct lecture and studio space. Throughout this, XR technology is slowly integrated into classrooms, reworking class curriculum and digital pedagogies. By forming hybrid classrooms, many smaller arts institutions have been able to avoid closure or absorption.

## Privatization and Prioritization

The Collapse scenario highlights art institutions no longer receive public funding and are forced into cahoots with larger organizations. They can no longer offer what it once could, creative freedom. Art institutions are almost fully privatized institutions and almost solely provide research and assistance with capital projects for the organizations that fund them.

## Education in Balance

The Discipline scenario highlights that art institutions offer blended study and studio spaces that run parallel to online asynchronous and synchronous lectures. Art institutions use AI to improve adaptive learning in combination with blended studio spaces to improve personalized learning for their students.

## Read Beyond the Lines

The Transform Scenario highlights the integration of technologies to enhance learning environments for people of all ages. In this alternative future art institutions use AI and XR technology in combination with credential degrees to attract and retain students. By adapting and modifying their digital pedagogies, institutions have been able to stay ahead of the curve and avoid closure or absorption.

# Scenario One, Continued Growth

The first alternative future is Continued Growth. This scenario's purpose is to tackle the future of all modern governments, educational systems, and organizations. This scenario illustrates building a vibrant economy and aims to develop the people, institutions, and technologies to keep the economy growing and changing, forever (Dator, 2009).

## Access for Everyone

The Continued Growth scenario illustrates that learning environments are blended and there is an emphasis on personal wellbeing. Art institutions use adaptive learning in combination with blended and outdoor learning to conduct lecture and studio space. Throughout this, XR technology is slowly integrated into classrooms, reworking class curriculum and digital pedagogies. By forming hybrid classrooms, many smaller arts institutions have been able to avoid closure or absorption.

Before the Covid-19 pandemic, art institutions were strapped for cash. Many of these schools were struggling to attract and retain students, receive public or donor funding, and provide necessary resources for their faculty and students. The pandemic left them in a worse position. Public funding provided by the provincial governments was reduced.

Over the next two years, art institutions struggle to stay afloat. There is a resurgence of the 3rd and 4th waves of the pandemic that reinforce physical distancing regulations and travel restrictions. Throughout this time institutions invest more than anticipated into digital development, all while still paying their bills to keep campus lights on.

Due to their financial situation accompanied with online learning, institutions begin experimenting with adaptive learning. By creating adaptive learning modules that can be intertwined with LMSs, institutions are able to continue to grow and adapt alongside competitors in a digital learning realm without having to spend more money on newer technologies. Although adaptive learning may not be seen as the most technologically advanced, if integrated well this educational method can have the ability to adjust to a student's learning needs based

on an intelligent algorithm, creating a personalized education.

The development of adaptive learning in art institutions has a few advantages over other higher education institutions. The implementation and adaptation have the ability to be significantly simpler; because these art schools are somewhat specialized and tend to be smaller institutions, developers are able to work with faculty, staff, and students to redesign curriculums to work inside an adaptive learning classroom. Therefore, cutting the prototyping and implementation time in half. Art institutions use this moment to their advantage. During the period of 2021 to 2023, institutions further their digital learning efforts and invest in adaptive learning methods alongside the possibility of blended learning and studio spaces.

By 2025 institutions are prepared for the majority 'working from home' society. With the increase of online learning and the continuous travel restrictions, international students are staying home while studying abroad. This turn of events leads to institutions lobbying government officials to implement regulations that allow international students who are studying abroad to be able to apply for their work permits, permanent residency applications, etc. Considering this, even though art institutions have incorporated adaptive learning to create personalized learning environments, student enrollment has not improved. Because of this, art institutions invest in outreach to students abroad. Considering that art institutions have significantly improved adaptive learning mechanisms and online development for students, they have been able to develop a curriculum in which students can comfortably learn the arts from abroad while they apply for various permits.

By 2028 there is a shift in program enrollment. It is becoming more prevalent that without the A in STEAM, students are leaving higher education without the soft skills and communication tools to flow through society, work in teams and even find a job in some instances. Due to the digital advancements that institutions have made, the shift in employment and society demands for soft skills, and the outreach targeted at international students to art

institutions enrollment begin to steadily increase.

Factors such as scaling of adaptive learning, as well as the gradual growth of online learning, contribute to the redesign of lecture space into shared studio and study space. Because of the heavier investment into blended learning, there was more lecture space than needed. Institutions redesigned these spaces into studio space for students.

Progress in equity and inclusion has been made by the 2030s. Art institutions lead the charge in the decolonization of curriculums and personalized learning, but lack in XR technologies. XR technology improves in realism and accuracy while its costs steadily decrease; institutions begin exploring this. After years of infrastructure development, the digital divide between rural and urban rescinds in Canada. 2030 is when the Canadian government creates a free and accessible Internet infrastructure across the country, officially deeming access to the Internet as a human right.

By 2035, through the development of the Internet infrastructure across the country, institutions will begin exploring the possibilities of outdoor learning and further connections to decolonizing education. XR technology is slowly integrated into classrooms, reworking class curriculum and pedagogies.

Finally, nearing 2040, art institutions use adaptive learning in combination with blended and outdoor learning to conduct lectures. By forming innovative, hybrid classrooms, many arts (smaller) institutions have been able to avoid closure or absorption.

## Timeline of Events

### 2020: Lockdowns and Rushed Planning

- The lockdowns that occurred due to the Covid-19 pandemic put art institutions into difficult situations, forcing them to immediately increase online learning without the opportunity to properly implement a plan of action for students and faculty.
- Public funding for Higher Education is reduced due to the economic crisis of the pandemic.

### 2022: Experiments

- Art institutions begin experimenting with adaptive learning, digital technology, and studio space. They investigate the opportunity to further develop blended learning.

### 2023: New Normal

- Nearing the end of the Covid-19 pandemic, society has fallen into a new routine. The majority of society spends, at minimum, half of their time working from home.
- Art institutions have adjusted to a new normal, however, student enrollment has steadily decreased in the field over the last few years due to a shift in employment demands.
- Canadian governments make it a priority to provide rural areas with access to the Internet. Forcing officials to revisit the Canadian Connectivity Program - and attempt to fast-track the project.

### 2025: Exploring Tools and Methods

- Art institutions have had a static or slight reduction in their public funding, forcing them to investigate collaborative opportunities, increase tuition, and enforce (voluntary) lay-offs.
- Newly Implemented regulations allow international students to study (online) full-time abroad and have that apply to their work permits, permanent residency applications, etc. Because of this, art institutions shift efforts into developing adaptive learning technology.
- Institutions begin to slowly implement blended learning schedules to accommodate students studying in Canada, while also attempting to improve adaptive learning mechanisms for students abroad.

### 2028: Implementation

- To attract more students, Art institutions begin heavily implementing blended and outdoor learning environments alongside adaptive learning to better serve personalized learning.
- XR technology improves in realism and accuracy while its costs steadily decrease, making it available to a much wider array of institutions and students. Institutions begin exploring this.
- IT infrastructure and security will need to be assessed and continuously updated to accommodate possible security risks and new technology.
- Art institutions begin slowly experimenting with XR technology.

### 2030: Access across Canada

- Thanks to the Canadian Connectivity Program, the digital divide between rural and urban resounds in Canada.
- Shift in Program enrollment and needs. It is becoming more prevalent that without A in STEAM, students are leaving higher education without the soft skills and communication tools to flow through society, work in teams and even find a job in some instances. Enrollment in arts institutions and programs begin to increase.

### 2035: Equity

- With a goal to decolonize the curriculum, Art institutions explore outdoor learning and re-evaluating programs.
- Seeing the positivity that the Canadian Connectivity Program has had over the last few years and the need for the Internet, the Canadian government creates a free and accessible Internet infrastructure across the country, officially deeming access to the Internet as a human right.
- Enrollment begins to rise considering access to education has become more easily available, as well as the innovative classroom initiatives institutions have put into place.
- XR technology begins to slowly integrate into classrooms, reworking class curriculums and pedagogies.

### 2040: Alternative Future

- Art institutions use adaptive learning in combination with blended and outdoor learning to conduct lectures. By forming innovative, hybrid classrooms, many art (smaller) institutions have been able to avoid closure or absorption.

# Scenario Two, Collapse

The second alternative future is known as Collapse. This scenario's purpose is to illustrate a world in which the economy does not continue to grow in our finite world. There may be many and different reasons that people fear (or hope for?) collapse: economic, environmental, resource, moral, ideological, or a failure of will or imagination. Collapse and extinction are always a possible future for any community or organization, a possibility that should be actively recognized and explored. It is important to note that this scenario should not be portrayed as a "worst-case scenario" but rather one of many possible futures (Dator, 2009).

## Privatization and Prioritization

The Collapse scenario highlights art institutions no longer receive public funding and are forced into cahoots with larger organizations. They can no longer offer what it once could, creative freedom. Art institutions are almost fully privatized institutions and almost solely provide research and assistance with capital projects for the organizations that fund them.

During the Covid-19 pandemic, public funding for higher education is significantly reduced. Many of these schools are currently struggling to respond to the abrupt change to online learning, attract and retain students, as well as provide necessary resources for their faculty and students. Art institutions invest in the minimum necessities for online and digital learning to ensure they meet government requirements for physical distancing and while being able to continue to distribute services, resources, and classes. Based on current technologies that art institutions maintain (LMSs) IT departments investigate possible opportunities to integrate AI and ML into their platforms. This investigation is accompanied by the idea that these technologies will assist instructors in their assessments as well as assist staff with repetitive, tedious tasks; freeing staff and faculty time, while also reducing the number of staff and faculty needed in an institution.

The next five years are a struggle for art institutions. The devaluation of liberal arts and arts education undercut the field's funding; because of this, public funding is continually reduced for art institutions due to the implementation of performance funding models. Although performance funding is prominent

in Ontario during this time, this method of funding begins to trickle into implementation across the country. Because of increased financial instability, institutions that are not 'performing' to the liking of the government and the perceived, wanted future of society will receive little to no funding moving forward.

The decrease in funding leads to a decrease in the quality of education. Art institutions are unable to update their technology, in-person resources and services, employ staff, and etc. They begin exploring budget-cutting avenues; forced to increase tuition, cut capital projects, sell and rent out institution spaces, and enforce (voluntary) lay-offs. With the previous implementation of AI and ML technologies, institutions are able to reduce staff and faculty employed. Technology is able to take on some of the workload, however, is unable to be continuously updated in a timely manner.

In anticipation of continual financial instability, art institutions begin to merge with similar organizations to combine their efforts and resources. They create shared lecture space, studio space, and share resources and services.

By 2028 online education becomes a central part of learning for most students. Art institutions have taken a number of steps to reduce their costs, some of which have worked well, but funding restrictions are still a large factor that are holding institutions back from modernizing their educational methods and keeping up with technological advancements. Because of this, institutions begin reaching out to private donors and interested organizations. Art institutions work tirelessly to retain funding from private corporations who are interested in partnerships and supporting the arts curriculums.

The decline of publicly funded universities has led down the slippery path of privatization. Up until 2030, only one or two institutions closed every couple of years, however, the next decade is where institutions begin collapsing. By 2032 art institutions have been at the forefront of public funding budget cuts, however, this was anticipated. Art institutions have been able to create collaborative coalitions with one another as well as retain private funding. However,

because art institutions are now heavily privately funded, Higher Education Research Development (HERD) is manipulated by their partners rather than personal interests and academic freedom.

Over the next five years, art institutions are uplifted. Because of the assistance of privatization, institutions are able to modernize their resources and services. Institutions are able to work towards financial stability, explore XR technologies, adaptive learning, in-person (or blended) resources and services, employ staff, and more. Additionally, due to the cost-cutting decisions that were made in the last decade, institutions are able to move forward with a business mindset in their decision making. However, the research and product creation conducted by the institution works to benefit and assist their donors. Academic freedom is now restricted.

By 2040, art institutions have completely shifted in the last two decades. They can no longer offer what it once could, creative freedom. Art institutions are almost fully privatized institutions and almost solely provide research and assistance with capital projects for the organizations that fund them.

## Timeline of Events

### 2020: Lockdowns and Rushed Planning

- The lockdowns that occurred due to the Covid-19 pandemic put art institutions into difficult situations, forcing them to immediately increase online learning without the opportunity to properly implement a plan of action for students and faculty.
- Ontario begins the implementation of a performance funding model. Providing public funding for institutions is based on their ability to meet key performance outcomes determined by the government. Public funding is significantly reduced for art institutions as a result.
- IT Departments investigate possible opportunities for the future of tech in their institutions.

### 2023: Collaborative Initiatives

- Art institutions begin exploring budget-cutting avenues. Art institutions are forced to increase tuition, cut capital projects, sell and rent out institution spaces, and enforce (voluntary) lay-offs.
- Institutions begin to merge, to combine their efforts to survive. Creating shared lecture space, studio space, and sharing resources and services.
- Due to government budget cutbacks, British Columbia, Alberta, Saskatchewan, and Nova Scotia follow suit to performance funding. Manitoba, PEI, New Brunswick, resort to a reduction in government funding overall. Whereas the Territories, Quebec, and Newfoundland and Labrador slowly reduce government funding in post-secondary education.

### 2025: Left Alone

- In Ontario, 60 percent of public funding for institutions is based on their ability to meet key performance outcomes determined by the government. Funding is significantly reduced for art institutions as a result.
- The decrease in funding leads to a decrease in the quality of education. Art institutions are unable to update their technology, in-person resources and services, employ staff, and etc.
- AI and ML takeover tasks that previous staff and faculty took care of.
- Student enrollment has and continues to steadily decrease in the field over the last few years due to a shift in employment demands.

### 2028: Privatization Takeover

- Online education has become central for most learners. Meeting students' needs for low-cost, flexible education that can be pursued on one's own terms, alongside other obligations and limitations. Art institutions struggle to keep up with this trend due to their own funding restrictions and the technological advancements that have occurred over the last decade.

### 2030: Slippery Slope

- The decline of publicly funded universities has led down the slippery path of privatization. Art institutions have been and are at the forefront of budget cuts, forcing them to lean on private funding and corporate collaborations to stay afloat.
- Institutions continue to merge with one another and corporations. Higher Education Research Development (HERD) is manipulated by their partners rather than personal interests.
- Up until now, only one or two institutions closed every couple of years, however, the next decade is where institutions begin collapsing, unable to fund themselves.

### 2035: Elevating Resources

- Because of the assistance of privatization, institutions are kept afloat but lose a lot of their academic freedom. Institutions are able to update their technology, in-person resources and services, employ staff, and etc.

### 2040: New Era of Education Freedom

- Art institutions can no longer offer what it once could, given their new constraints, other industries and organizations have stepped in to fill the gaps. Additionally, institutions are no longer provided with public funding and have resorted to 'selling out'. Providing research and assistance with capital projects for organizations that fund them.

# Scenario Three, Discipline

The third alternative future is labelled as Discipline. This scenario's purpose is to showcase an alternative future where precious places, processes, and values are threatened or destroyed by allowing continuous economic growth. This future aims to preserve or restore these places, processes, or values that are deemed important (Dator, 2009).

## Education in Balance

The Discipline scenario highlights that art institutions offer blended study and studio spaces that run parallel to online asynchronous and synchronous lectures. Art institutions use AI to improve adaptive learning in combination with blended studio spaces to improve personalized learning for their students.

The Covid-19 pandemic causes a recession and a severe depletion of mental health in society. Public funding for higher education is significantly reduced, whereas funding for wellness and mental health resources increases. However, many art institutions are struggling to transition to online learning, attract and retain students, as well as provide necessary resources for their faculty and students.

Over the next three years, art institutions adapt to fit within this new reality, focusing on the development of their online services and courses. Because of budget restrictions, art institutions investigate frugal opportunities that are student-centred and have an online learning element. Institutions continue executing online learning because of their previous investment in infrastructure, training, and technology. Moving forward, they further experiment with AI and ML technology and blended studio space.

In addition to these factors, students entering PSE, show heightened issues of depleting mental health, anxiety, and depression. With the assistance in funding for wellness and mental health, institutions are pressured to improve their mental health resources and services within the institution and their Health and Dental Plans.

Factors such as the rise of online learning, as well as the growth of mental health concerns, contribute to the emphasis on blended learning. By 2027, students are increasingly enrolling and studying online, however, they demand in-person studio and study space. Students demand more shared spaces to assist with issues of access and equity to resources and services, as well as tackling the increasing concerns of isolation, depression, and lack of community engagement on campuses.

Art institutions invest in the redesign of lecture spaces into studios and move forward with investigating shared cooperatives with similar organizations. By this time art institutions integrate AI in the classroom transforming how students and teachers interact with one another. AI aids teachers in grading, tracking performance and test scores, data analysis, emotional observation, and more; aiding a teacher in learning about a students' learning habits.

These institutions strive for longer-term sustainability and by 2030 institutions begin to merge on capital projects, shared lecture space, studio space, and sharing resources and services to alleviate costs.

Online education has become the default mode for course delivery, however, because of the high demand, institutions create in-person studio space for students to work on projects. During this time period, art institutions have integrated AI and ML into their everyday education model; essentially changing the role of faculty members in the classroom.

Instructors are no longer teaching material for a one-size-fits-all model but working in collaboration with their students and digital learning tools to create a more personalized curriculum. Because of this, the role of Teaching Assistant positions is significantly reduced, and assessment is redesigned to fit an AI and ML marking model.

By 2035, art institutions begin to slowly integrate XR technology into classrooms; focusing on redesigning class curriculum and the infrastructure of institution services to better educate and service students.



Over the next five years, art institutions offer blended study and studio spaces that run parallel to online asynchronous and synchronous lectures. The further integration of AI leads to a further investment into mental health resources, while also significantly reducing Teaching Assistant positions. Art institutions use AI to improve adaptive learning in combination with blended studio spaces to improve personalized learning for their students. By 2040 art institutions have been able to create a harmonious education environment of hybrid learning.

## Timeline of Events

### 2020: Lockdowns and Rushed Planning

- The lockdowns that occurred due to the Covid-19 pandemic put art institutions into difficult situations, forcing them to immediately increase online learning without the opportunity to properly implement a plan of action for students and faculty.
- General public funding for Higher Education is reduced due to the economic crisis of the pandemic, whereas funding for wellness and mental health resources increase.

### 2023: Frugal Wellbeing

- Students entering PSE, show heightened issues of depleting mental health, anxiety, and depression. An emphasis is placed on institutions to improve their mental health resources and services at the institution and within their Health and Dental Plans.
- Art institutions move forward with online learning because of the investment that has been put into its infrastructure, training, and technology. They begin further experimenting with AI and ML technology and blended studio space. Investigating frugal opportunities that are student-centred.

### 2027: AI Takeover

- More students are studying online, but still need shared and studio space. There is a redesign of lecture spaces into studios as well as moving forward with shared cooperatives moving forward.
- Art institutions integrate AI in the classroom transforming how students and teachers interact with one another. AI aids teachers in grading, tracking performance and test scores, data analysis, emotional observation, and more; aiding a teacher in learning about a students' learning habits.

### 2030: Merging

- XR technology is investigated and explored for in-class uses.
- Art institutions begin to merge on capital projects, shared lecture space, studio space, and sharing resources and services to alleviate costs.
- Alongside AI integration, the role of faculty members changes. Instructors are no longer teaching material for a one-size-fits-all model but working in collaboration with their students and digital learning tools to create a more personalized curriculum. Additionally, the role of Teaching Assistant positions is significantly reducing, and assessment is redesigned to fit an AI marking model.

### 2035: New Ways

- Wellness and mental health on campus is a main priority and service conducted by institutions. Administration works in collaboration with their students to further develop and improve these resources.
- XR technology is slowly integrated into classrooms, reworking class curriculum and pedagogies.

### 2040: Personalized Learning

- Art institutions offer blended study and studio spaces that run parallel to online asynchronous and synchronous lectures. The further integration of AI led to a further investment into mental health resources, while also significantly reducing Teaching Assistant positions.
- Art institutions use AI to improve upon adaptive learning in combination with blended studio spaces to improve personalized learning.

# Scenario Four, Transformation

The last alternative future is known as Transformation. This scenario's purpose is to focus on the "powerfully transforming power of technology – especially robotics and artificial intelligence, genetic engineering, nanotechnology, teleportation, space settlement, and the emergence of a 'dream society' as the successor to the 'information society'" (Dator, 2009).

## Read Beyond the Lines

The Transform Scenario highlights the integration of technologies to enhance learning environments for people of all ages. In this alternative future art institutions use AI and XR technology in combination with credential degrees to attract and retain students. By adapting and modifying their digital pedagogies, institutions have been able to stay ahead of the curve and avoid closure or absorption.

During the Covid-19 pandemic, public funding for higher education was reduced and institutions were forced to immediately increase online learning. The pandemic stressed a need for advancements in institutions for online and digital learning tools. This abrupt shift is what jump-started the dramatic advances and implementation of digital technology in higher education.

Over the next two years, mindsets shift to the need for digital advancements and access to the Internet for all citizens. The Canadian government focuses on further developing their Canadian Connectivity Program therefore focusing on improving digital infrastructure and overall access to the Internet. During this time, Art institutions adapt to digital learning, they focus on improving their online courses, services, and resources. Institutions continue executing online learning because of their previous investment put into the infrastructure, training, and technology. Due to some restrictions in funding, art institutions work within their community (with students and faculty) and alongside similar institutions to create a network of resources and further develop creative technologies. They begin further exploring the usage of adaptive learning, AI and ML, and XR technology.

There continues to be a heavy emphasis on technological advancements in society and higher education. This emphasis quickens advancements. By 2025, XR technologies improve in realism and accuracy while their costs steadily decrease, making them increasingly available to a wide array of institutions and students. Because of the heavy emphasis (and projected growth of) online learning, institutions rearrange their budgets to align with the development and use of technologies in classrooms.

To best prepare for potential security threats, IT Departments run routine checks and updates for institutions' digital infrastructures. In addition to this, these departments lead monthly trainings for staff and faculty on the updates and technologies of the institution. Ensuring access and safety for their community.

During this period of time, educators and students stress the importance of community engagement; because there are fewer in-person gatherings, the community needs another outlet for social interactions. Art institutions collaborate with third-party organizations to create engagement applications to encourage socializing amongst students.

Over the last 8 years, enrollment in four-year degrees has steadily decreased. Due to the recession caused by Covid-19, students are unable to afford these degrees. By 2028, students are looking for quick and flexible ways to further their professional development. They begin retaining online credentials for a quarter of the cost. To keep up with this demand, art institutions begin to reinvent and redesign their degrees into credential programs revolving around the technology they've invested in.

It becomes more prevalent that by 2030, people are retiring at a later age. This factor leads to an increase in and the encouragement of life-long learning and professional development into later years. People need to educate themselves on new technologies, professions, and industries that arise. The Canadian Connectivity Program has created better access to the Internet. Therefore, people and institutions in rural areas are able to properly attend and participate

in classes. Considering that art institutions invested in the development of credential learning and XR technologies this is attractive to mature students. Now all students of all ages are able to access higher education through online means. These institutions see an increase in older students and explore the additional creation of mature student resources and learning tools.

By the year 2035, Enrollment begins to rise considering access to education has become more easily available. During this time, Education is recognized as a valuable resource. Over half of the population is invested in life-long learning which encourages governments to invest in higher education, providing institutions with an increase in their public funding allocations.

By 2040, art institutions use XR technology in combination with credential degrees to attract and retain students. By adapting and modifying their pedagogies, institutions have been able to avoid closure or absorption.

## Timeline of Events

### 2020: Lockdowns and Rushed Planning

- The lockdowns that occurred due to the Covid-19 pandemic put art institutions into difficult situations, forcing them to immediately increase online learning without the opportunity to properly implement a plan of action.
- The pandemic emphasizes the need for digital tools across platforms for all.
- Public funding for Higher Education is reduced due to the economic crisis of the pandemic.

### 2022: Moving Forward

- Art institutions move forward with online learning because of the investment that has been put into its infrastructure, training, and technology. They begin further exploring the usage of adaptive learning, AI and ML, and XR technology.
- Due to some restrictions in funding, art institutions work within their community (with students and faculty) and alongside similar institutions to create a network of resources and further develop creative technologies.
- Canadian government emphasizes the need for bettering digital infrastructures across the country. Focuses on fast-forwarding the Canadian Connectivity Program to ensure access to the Internet for all.

### 2025: Advancements

- Society upholds technological advancements in high regard, supporting and funding various advancements in technology. There is a boom in tech companies, employment, and projects.
- XR technology improves in realism and accuracy while its costs steadily decrease, making it available to a much wider array of institutions and students. Institutions begin exploring this.
- Because of the heavy emphasis (and projected growth of) online learning, educators and students stress the importance of community engagement even through digital means. Institutions use third party applications, networking sessions, and group work to encourage socializing amongst students.
- IT infrastructure and security will need to be assessed and continuously updated to accommodate possible security risks and new technology.

### 2028: Reinvesting

- Students are no longer able to spend their time or money on four-year degrees but are working on retaining online credentials for a quarter of the cost.
- PSE institutions begin to reinvest in developing credential programs revolving around the technology they've invested into.

### 2030: Expanding

- Thanks to the Canadian Connectivity Program, the digital divide between rural and urban rescinds in Canada. Alongside this investment, the Canadian government creates a free and accessible Internet infrastructure across the country, officially deeming access to the Internet as a human right.
- People are retiring at a later age, encouraging life-long learning and professional development to continue. People need to educate themselves on new technologies, professions, and industries that arise. Art institutions explore the redesign and creation of mature student resources and learning tools.

### 2035: Rising

- Enrollment begins to rise considering access to education has become more easily available, as well as the innovative classroom initiatives institutions have put into place.

### 2040: XR Takeover

- Art institutions use XR technology in combination with credential degrees to attract and retain students. By adapting and modifying their pedagogies, institutions have been able to avoid closure or absorption.

## Patterns

The four alternative scenarios explored, highlight the benefits and challenges that art institutions may face over the next two decades of online and digital learning. Considering this, I wish to highlight the following patterns that arose through the scenarios. The patterns that emerged throughout the study may not be seen as unique to this discussion, however, their presence in this project is critical. These patterns showcase overlapping possibilities, obstacles or solutions. Patterns determined in this project include the following:

### Development of Technology

The four alternative scenarios have different levels of technological implementation. However, they all have some sort of implementation or further development of AI and ML technology. Considering the current use of this form of technology in many institutions, the further investment and development of the technology is illustrated throughout the alternative futures.

### Blended Learning

Throughout the four scenarios, we see a pattern that students are unhappy with sole online courses and sole in-person courses. In each scenario, there is a transition towards blended schools that overtake the brick-and-mortar education system. Blended learning is apparent with art institutions due to the nature of their need for studio space and hands-on learning. The introduction to blended learning may occur through innovations such as VR, AR, MOOCs, and AI.

### Faculty Training

A common pattern found is the lack of support in digital learning and online etiquette for faculty members. Therefore, lack of support from institutions leads to faculty members putting in more hours to learn various technologies, support students, manipulate class assessments, and redesign delivery methods. Art institutions will need to consistently train faculty members in technology updates and digital pedagogies.

### Personalized Learning

With the introduction of digital learning, a common trend throughout the alternate futures is that instructors are no longer teaching for a one-size-fits-all model. Instructors are working in collaboration with their students and digital learning tools to create a more personalized curriculum.

### Financial Instability

In all of the alternative futures, there is some form of financial instability. Whether it be an increase in performance funding, an overall decrease in higher education, or an economic collapse, art institutions are left to their own devices when it comes to funding.

### Shared Space

Lastly, a common pattern found was the need or want for institutions to share lecture, studio, and office space. Sharing space can be seen as a cost-saving solution to manage deteriorating budgets as well as sustainable building development for the future. Additionally, this was seen as a way to work collaboratively with similar institutions and organizations to create a greater community for learning and development.

The patterns that emerged throughout the study may not be seen as unique to this discussion, however, their presence in this project is critical. These patterns showcase overlapping possibilities, obstacles, or solutions between the plausible futures. It is important to recognize that although these futures will seemingly use technologies in some capacity, art institutions will need to plan and prepare for more than just technological developments to fully prepare for challenges ahead. Considering the patterns highlighted across the possible futures, I was able to create a set of recommendations that may build resilience and sustainability for art institutions.

## Recommendations

# Recommendations

From the patterns uncovered through my research, I suggest five recommendations for the future development and innovation of art institutions. These recommendations were not developed for a preferred future, however, built on the patterns found throughout the alternative scenarios as well as the research conducted throughout the project. This section includes suggestions for art institutions in regard to the implementation of online and digital learning. It discusses approaches that are necessary to improve faculty support, student services, and learning outcomes.

## Invest in AI and ML technology

The results of my research demonstrate a need for investment in AI and ML technology amongst institutions. By focusing on the further development and implementation of AI and ML technology will allow for multiple opportunities for the advancement of institutions. Investment into AI and ML technology may create promising opportunities for institutions because of the already existing integration of AI and ML with LMS in various institutions. This allows for a certain amount of ease for implementation. Additionally, this technology is not restrictive, it allows for a large amount of growth and opportunity for institutions to evolve with. The investment and use of these technologies will allow for the ability to create personalized learning environments by assisting instructors in grading, tracking performance and test scores, data analysis, emotional observation, and more; AI and ML has the ability to aid an instructor in learning about a students' learning habits and assisting them throughout their educational endeavours.

## Rethink how we communicate to staff and faculty

The results of my research illustrate that institutions need to rethink how they communicate with staff and faculty on digital and online learning platforms. An institution's ability to respond to these gaps in communication and provide training and capacity building on emerging instruction methods is central to the growth and betterment of an institution. There is an emphasis of importance for emotional and psychological support for this group during the transition to online and digital learning. As seen

throughout the Covid-19 pandemic, employees of institutions are overworked and unsupported in the transition to online learning. Many were left to their own devices, causing a trickle-down effect leading to a lack of support from staff and faculty to students. By providing staff and faculty with the opportunity to engage with training in digital tools in a safe environment to test, ask questions, and make mistakes before teaching, creating confidence in the employees, which leads to confidence in the classroom. Accompanying these efforts with follow-up meetings for feedback and questions as well as consistent communication efforts amongst IT departments may ensure that staff and faculty members are best equipped to enter the digital classroom.

## Convert in-person and online learning spaces

This recommendation tackles two concepts. First, it is recommended that art institutions continue to offer online courses, but in a blended learning format. Throughout the research project, we see a pattern that students are unhappy with sole online courses and sole in-person courses. By blending these formats, it allows for flexibility and hands-on learning. Looking forward, the continued use of online learning has the opportunity to leave some lecture halls vacant. However, illustrated throughout this research project was the need for students to have hands-on practice with their projects and assignments; accompanying this necessity is the need for proper workspace. Recognizing that many art institutions lack studio, office, and study space on their campuses, the second recommendation is that these empty lecture halls be renovated to fit the needs of studio, office, and study spaces. By converting some in-person lecture styled courses into an online learning format, institutions are able to manipulate spaces they currently possess into studio, office, and study spaces for staff, faculty, and students.

## Generate funding from different streams

This is not a new concept; however, it is an important recommendation. As seen through the trends development and alternative scenarios it becomes increasingly apparent that art institutions may continue to lose public, government funding and enrollment revenue. Therefore, I recommend that

art institutions invest their efforts into raising funds through fundraising, donor outreach, collaborative projects, and paid external work. By expanding alumni outreach and fundraising positions within institutions allows for the opportunity to expand their personal funding campaigns, rather than needing to rely on government funding. Another opportunity to raise funds is to work on collaborative community, research, and external projects as another source of income for a given institution.

### Increase partnerships amongst similar institutions and organizations

Lastly, this recommendation addresses partnership building, sustainability, and financial stability. I suggest developing a sharing and collaborative relationship with similar institutions and organizations. A partnership where similar institutions are able to share space and resources. A stronger and more visible network of partnerships would allow institutions and similar organizations to connect with one another, allowing them to work together, build community, save resources and work together to develop their own sustainable future. This can be seen as a cost-saving solution as well as sustainable building development for the future. Additionally, working collaboratively with similar institutions and organizations may create a greater sense of community allowing for innovative learning and development amongst students, staff, and faculty members.

These recommendations discuss various ways for arts institutions to improve faculty support systems, further develop student services and resources, and to better learning outcomes. Building off of the research conducted and scenarios developed in this project, these recommendations were not developed for a preferred future but are offered as a resource for arts institutions. However, these recommendations are derived from the patterns discovered throughout the project. By providing over-compassing recommendations, arts institutions are able to best prepare for whichever future scenario comes to fruition.



## Limitations

# Limitations

While every effort was made to create and execute a comprehensive research project, the following study limitations are acknowledged:

## Time and Resources

This project was executed over a short period; no primary research was conducted to analyze current student and faculty relationships with online learning and art institutions. Additional funding and a longer study would have allowed for collaborative research and co-creative workshops to uncover possible futures collaboratively.

## Lived Experiences

My lived experiences are a limitation, as I do not have the lived experiences of many others. Although I do my best to conduct secondary research that reflects voices that are not mine, my research heavily relies on Western perspectives of education and online learning.

## Assumptions and Biases

Lastly, while conducting this study it was important to recognize my assumptions and biases toward online learning before conducting research. I did not want to cause biases that would impact the validity of my research, or inaccurate information to be gathered in the research process.

## Conclusion

# Conclusion

This research project is a starting point for post-secondary art institutions.

The project set out to explore current practices of online learning in post-secondary art institutions and uses strategic foresight methods to develop four possible future scenarios. As a result, this project aimed to answer the following research question:

**How might post-secondary art institutions reimagine online and digital learning over the next 20 years?**

In developing these scenarios, it became clear that today's immediate shift to online learning may play a significant role in the future that art institutions will experience. This may be seen through the patterns of institutional changes in technology, blended learning environments, training of staff and faculty, development of personalized learning, financial instability, and shared resources amongst institutions.

Throughout the Literature Review, I explored theories of learning, a history of transformation in higher education, elements of online and digital learning, and current trends in the field, to build a foundation for possible futures. This research assisted in confirming the possible trajectories of online and digital learning in art institutions. The Literature Review in combination with the Innovation Sourcebook brought to light four different areas for emerging and existing technologies that will impact their futures including adaptive learning, artificial intelligence and machine learning, class engagement, and extended reality technologies. The analysis of these trends was further addressed through foresight practices including STEEP Analysis, Four Generic Futures, and Backcasting.

Following the creation of these alternative scenarios, I found five patterns that should be planned for, no matter the alternative future. My findings suggest that art institutions should prepare for blended learning environments, increase faculty training, development of personalized learning, combating financial instability, and developing shared spaces; all alongside the improvement and incorporation of technology in the classroom.

As a result of this research project, I believe technology will be at the forefront of change in higher education, for better or worse. However, there is no way to know what the world will look like in 20 years. The development of these four alternative scenarios allows for a further exploration of the possibilities of what the future for art institutions could look like in 2040. These scenarios challenge predetermined assumptions about the future and assist us in reimagining our understanding of institutions as a whole.

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# Appendix



# Appendix A: Innovation Sourcebook

The use of the Innovation Sourcebook (Kumar, 2013) allowed for a structured approach to assemble a list of best practices and innovation success in the field of e-learning and education. This list combines tools from a variety of post-secondary institutions such as OCAD University, Centennial College, Brock University, Centre for Digital Media, Emily Carr University of Art and Design, Nova Scotia College of Art and Design, University of Toronto as well as others. This list is not exhaustive but is used to highlight an array of tools used in online learning.

Category	Tool and Description	Advantages
Suites	<p><b>Microsoft 365</b></p> <p>A productivity cloud designed to bring together productivity applications with device management, and advanced security.</p>	<ul style="list-style-type: none"> <li>• Microsoft Teams:</li> <li>• Max, 10, 000 accounts. As of January 2021: up to 20,000 attendees in a meeting or virtual event and up to 16 hours of simultaneous broadcasting. Individuals are able to record meetings.</li> <li>• Allows for virtual meetings accessible through electronic device or phone.</li> <li>• Ability to create and manage teams and channels, chat - work collaboratively in this space.</li> <li>• Ability to share documents and app workflow.</li> <li>• Allows for personalization - background, name and account feature.</li> <li>• Live closed captioning (English only).</li> <li>• Rearranging individual videos, Multi-spotlight, and multi-pinning individuals.</li> <li>• Compatible with accessibility software. Such as screen reader, diction software, eye control, voice control, switch access, and screen magnifiers.</li> <li>• Microsoft Workflow applications:</li> <li>• Including Word, Excel, PowerPoint, SharePoint, One Note, Whiteboard, Outlook and OneDrive.</li> <li>• These applications allow for cross-collaboration and workflow in school and business environments.</li> </ul>
Suites	<p><b>Google Education</b></p> <p>A collection of cloud computing, productivity and collaboration tools, software and products.</p>	<ul style="list-style-type: none"> <li>• Virtual classrooms with up to 250 participants and allows for Livestream events with up to 100,000 in-domain participants.</li> <li>• Feature to record meetings, automatically save to Drive, and then share the recordings. Meetings allow for polls and surveys in house and provide the organizer with the results.</li> <li>• Google Suite includes Meets, Chat, Mail, Slides, Docs, Excel, Calendar, Jamboard, Forms, and Cloud. This allows for same-time collaboration and editing.</li> <li>• Google applications Assignments and Classroom allow for instructors to lead sessions or track term work.</li> </ul>
Video Conference, Video Editing, or Slideshow	<p><b>Zoom</b></p> <p>Offers videotelephony and online chat services that are used for teleconferencing, telecommuting, distance education, and social relations.</p>	<ul style="list-style-type: none"> <li>• Allows for virtual meetings for up to 1,000 participants that are accessible through electronic device or phone. Registration feature - mandatory or freely accessible.</li> <li>• Ability to assign or randomize breakout rooms for smaller sessions. Polling feature within meetings.</li> <li>• Allows for personalization - background and name. Allows for a raise hand feature.</li> <li>• Allows for integration with other applications (i.e., slack, teams, panopto).</li> <li>• It has a chat function - message all and private message is available. Transcripts can also be saved. Font sizes can be adjusted.</li> <li>• Accessibility Features:</li> <li>• 3rd party closed captioning providers through our Closed Captioning REST API.</li> <li>• Rearranging individual videos, Multi-spotlight, and multi-pinning individuals.</li> <li>• Screen Reader-supported.</li> </ul>

Table 2. Innovation Sourcebook

Category	Tool and Description	Advantages
Video Conference, Video Editing, or Slideshow	<p><b>VoiceThread</b></p> <p>A collaborative, multimedia slideshow service that holds images, documents, and videos and allows people to navigate slides and leave comments by using voice, text, audio file, or video.</p>	<ul style="list-style-type: none"> <li>• Allows people to interact with the uploaded materials. It is able to offer an online interaction that lends itself to students presenting &amp; defending their work.</li> <li>• Features include commenting, doodle, voice notes, text conversations, video commenting, and comment moderation.</li> <li>• The application has a set of participatory features including text, video, audio, and closed captioning for users.</li> </ul>
Video Conference, Video Editing, or Slideshow	<p><b>Screen-O-Mastic</b></p> <p>A screen casting and video editing software tool.</p>	<ul style="list-style-type: none"> <li>• Allows for video recordings and video editing.</li> <li>• Supports video creation for flipped classrooms, bi-directional student assessments, lecture capture, and student video assignments.</li> <li>• Capture tutorials, training, or lectures so users can watch them anytime. Share the video links, add content to an online course, or create a discussion channel.</li> <li>• Integration with similar apps such as Google classroom, Microsoft teams, Canvas, various LMS and LTI, etc.</li> </ul>
Video Conference, Video Editing, or Slideshow	<p><b>Panopto</b></p> <p>A web-based tool that allows people to record, host, and share audio and video files.</p>	<ul style="list-style-type: none"> <li>• Securely centralize and stream videos, create playlists, optimize playback, and measure viewer engagement. Allows for online video editing.</li> <li>• Capture video feeds from any camera and any screen — even multiple feeds simultaneously.</li> <li>• Broadcast (live-stream) up-to ten thousand viewers.</li> <li>• Allows for a video library and the searchability across the entire video library and inside videos for any word spoken or shown.</li> <li>• Integration of quizzes and feedback forms on videos (as well as provides users with analytics).</li> <li>• Allows for connecting to LMS, CMS, SSO, internal portals, and more.</li> </ul>
Video Conference, Video Editing, or Slideshow	<p><b>BlueJeans</b></p> <p>A video conferencing tool.</p>	<ul style="list-style-type: none"> <li>• Can hold sessions for up to 50,000 attendees with immersive video, Q&amp;A, polling and large meeting controls.</li> <li>• Collects analytics and moderate live meetings from one centralized dashboard.</li> <li>• Ability to assign or randomize breakout rooms for smaller sessions. Features to poll attendees within meetings.</li> <li>• Allows for personalization - background and name. Allows for a raise hand feature.</li> <li>• Allows for smooth integration with other applications (i.e., slack, teams, Trello, google suite, calendar, etc.) additionally, allows for direct live streaming integration.</li> <li>• It has a chat function - message all and private message is available. Transcripts can also be saved. Font sizes can be adjusted.</li> </ul>
Video Conference, Video Editing, or Slideshow	<p><b>Skype</b></p> <p>A video conferencing tool with phone integration.</p>	<ul style="list-style-type: none"> <li>• Live subtitles, recording, and screen sharing abilities, able to have a maximum of 50 people on a video call.</li> <li>• Users receive cell phone calls, a skype phone number and account. Skype has the ability to send SMS messages and is connected to 26 countries for calling.</li> <li>• Sessions include a raise your hand feature and chat (ability to share links and photos).</li> </ul>
Video Conference, Video Editing, or Slideshow	<p><b>Echo360 (Universal Capture)</b></p> <p>A web-based tool that allows people to record, broadcast, and share audio and video files.</p>	<ul style="list-style-type: none"> <li>• Broadcast up-to ten thousand. Integration of quizzes and feedback forms on videos (as well as provides users with analytics).</li> <li>• Allows for a video library and the searchability across the entire video library and inside videos for any word spoken or shown.</li> <li>• Centralize streams or recorded videos. Allows for video editing.</li> <li>• Allows a confusion alert to presenters when students get lost in presentations. Allows for automated voice recognition. Allows for in presentation contextual notes for viewers. Questions can be incorporated and there is a chat function.</li> <li>• Allows for LMS Integration.</li> <li>• Ability to capture analytics on viewers and feedback.</li> </ul>

Table 2. Innovation Sourcebook, Continued

Category	Tool and Description	Advantages
Video Conference, Video Editing, or Slideshow	<b>Adobe Spark</b> Content creation tool.	<ul style="list-style-type: none"> <li>Assist in asynchronous teaching - editing videos.</li> </ul>
Video Conference, Video Editing, or Slideshow	<b>MediaSite</b> A desktop capture tool that can be used to record, edit, share, and manage lectures and upload recordings to university servers.	<ul style="list-style-type: none"> <li>Centralize and stream videos, create playlists, optimize playback, and measure viewer engagement.</li> <li>Broadcast live streaming or to a live class (videos are able to be recorded). Integration of quizzes and feedback forms on videos (as well as provides users with analytics). Allows for captioning and live captioning. Users are able to create meetings or virtual events. Data export and analysis is available. Editing tools available.</li> <li>Allows for a video library and the searchability across the entire video library and inside videos for any word spoken or shown.</li> <li>Allows for connecting to LMS, CMS, SSO, internal portals, and more.</li> <li>View videos from a mobile device.</li> </ul>
Video Conference, Video Editing, or Slideshow	<b>H5P</b> An open-source content collaboration.	<ul style="list-style-type: none"> <li>Create a presentation with interactive slides. Create videos enriched with interactions. Create dilemmas and self-paced learning.</li> <li>Allows for connecting to LMS, CMS, SSO, internal portals, and more.</li> </ul>
Video Conference, Video Editing, or Slideshow	<b>TechSmith (Knowmia)</b> Create and share videos that turn online classes into active student communities.	<ul style="list-style-type: none"> <li>Centralize and stream videos, create playlists, optimize playback, and measure viewer engagement. Allows for online video editing.</li> <li>Capture video feeds from any camera and any screen, allowing for YouTube integration. Speech to text captioning. ADA compliance.</li> <li>Integration of quizzes and feedback forms on videos and provides analytics.</li> <li>Allows for a video library and the searchability across the entire video library and inside videos for any word spoken or shown. Allows for video conversation and discussion.</li> <li>Allows for connecting to LMS, CMS, SSO, internal portals, and more.</li> </ul>
Proctors	<b>ExamMonitor</b> AI-driven remote proctoring solution.	<ul style="list-style-type: none"> <li>Ability to create and grade exams.</li> <li>AI-driven remote proctoring solution that observes exam takers with video and audio monitoring throughout the entire exam.</li> <li>Collect and organize assessment data in one place, analyze exam results, generate valuable reports on student learning that highlight individual strengths and opportunities, and provide students with detailed feedback to improve their future performance.</li> </ul>
Proctors	<b>ProctorU</b> A live, online proctoring service.	<ul style="list-style-type: none"> <li>A software-only identity verification and exam session recording solution paired with artificial intelligence.</li> <li>A live proctored launch, end-to-end recording solution with artificial intelligence, professional review and incident reporting.</li> </ul>
Proctors	<b>Examinty</b> A live, online proctoring service.	<ul style="list-style-type: none"> <li>Provide Auto and Live Proctoring. Including ID verification, challenge questions, and a digital signature.</li> <li>Test-taker authentication, and technology monitoring the test-taker for the entire duration of the exam.</li> </ul>
Productivity and Teamwork	<b>Padlet</b> An application to create an online bulletin board that users can use to display information for any topic.	<ul style="list-style-type: none"> <li>A tool to organize ideas and projects into visual boards.</li> <li>The application allows users to follow 3 templates or create their own 'cork' board of ideas.</li> <li>Users are able to write notes, upload all common file types including JPGs, PDFs, Word, Excel, and common design files, it allows users to save text, images &amp; links from the web, as well as maintain a 'parking lot' for materials.</li> </ul>

Table 2. Innovation Sourcebook, Continued

Category	Tool and Description	Advantages
Productivity and Teamwork	<b>Milanote</b> A web-based note-taking app.	<ul style="list-style-type: none"> <li>The application allows users to follow a large variety of templates or create their own 'cork' board of ideas.</li> <li>Users are able to write notes &amp; to-do lists, upload all common file types including JPGs, PDFs, Word, Excel, and common design files, it allows users to save text, images &amp; links from the web, as well as maintain a 'parking lot' for materials.</li> <li>Milanote has a flexible drag and drop interface that lets users arrange things in whatever way makes sense. Additionally, users can create private boards, share boards or work collaboratively on board.</li> <li>Boards allow for real-time commentary and editing. Retention is large.</li> </ul>
Productivity and Teamwork	<b>Slack</b> A communications platform.	<ul style="list-style-type: none"> <li>One platform for teams to work within, share files, calls (video and voice), break-off groups, and chat.</li> <li>Offers IRC-style features, including persistent chat rooms organized by topic, private groups, and direct messaging.</li> <li>Integration with similar apps such as Google classroom, Microsoft teams, Canvas, various LMS and LTI, etc.</li> </ul>
Productivity and Teamwork	<b>MatterMost</b> An open-source content collaboration.	<ul style="list-style-type: none"> <li>One platform for teams to work within, share files, calls (video and voice), break-off groups, and chat.</li> <li>Integration with similar apps such as Microsoft teams, Zoom, etc.</li> </ul>
Productivity and Teamwork	<b>Explain Everything</b> A virtual whiteboard.	<ul style="list-style-type: none"> <li>EE is an interactive whiteboard app for any platform. It allows users to move, animate, and interact with — no matter whether it's a video, document, or audio file.</li> <li>There is the option to screencast and record, live cast or share whiteboard access. Additionally, feedback can be collected.</li> <li>Record and assist with animating and editing - Allows for in-house rendering.</li> <li>Collaboration of single-use and video chat is built-in.</li> </ul>
Productivity and Teamwork	<b>Mindomo</b> An online collaborative mind mapping, concept mapping and outlining software for visualizing and organizing information.	<ul style="list-style-type: none"> <li>Use mind mapping in and outside the classroom to promote students' independent learning and study skills.</li> <li>Ability to set up assignments, record work sessions and grade work in the application.</li> <li>Allows for real-time collaboration and live-chat.</li> <li>Allows for integration and sharing of projects.</li> </ul>
Productivity and Teamwork	<b>Miro</b> An online collaborative whiteboard platform.	<ul style="list-style-type: none"> <li>Ability to lead online Meetings &amp; Workshops. Chat and video function.</li> <li>Build and develop ideas with distributed teams as if in the same room, anywhere, anytime. Co-create and align with cross-functional stakeholders on a collaborative, online whiteboard. Use set templates or make one.</li> </ul>
Engagement	<b>Involvio</b> A Student Engagement Platform, that uses AI technology to encourage student engagement & retention initiatives.	<ul style="list-style-type: none"> <li>Personalized Application for PSE Institutions.</li> <li>Messaging - Allow students to connect and network with their peers via video and messaging in groups or 1:1.</li> <li>Push notifications - keeps users informed of any changes or program updates with broadcast &amp; targeted push notifications.</li> <li>Allows for event creation, registration, and guide creations. Additionally, allows for in-house ticket purchases.</li> <li>Conduct surveys on the app to understand program impact, student sentiments and opportunities for improvement.</li> <li>Integration with D2L, Sakai, Moodle, Blackboard, and Canvas.</li> </ul>

Table 2. Innovation Sourcebook, Continued

Category	Tool and Description	Advantages
Engagement	<p><b>FlipGrid</b></p> <p>A video discussion and content creation tool.</p>	<ul style="list-style-type: none"> <li>• Users are able to write a prompt and include anything they would like responders to review prior to responding, such as videos and links. Learners are able to share their voice by recording a short video with Flipgrid’s camera! Editing abilities to include text, emoji, inking, boards, screen recording, the ability to upload clips, and others.</li> <li>• Integration and sharing abilities through applications such as Google Classroom, Microsoft Teams, and Remind.</li> </ul>
Engagement	<p><b>VirBELA</b></p> <p>A 3D virtual reality platform that allows users to connect with avatars, voice and text chat, collaborative web-browsers, and embedded learning simulations and games.</p>	<ul style="list-style-type: none"> <li>• Virbela maintains 3 options for users to interact with. However, all three maintain a 3D environment where personalized avatars are able to interact with spatialized voice chat, avatar customization, embedded web browsers, and the design of the world.</li> <li>• The Open Campus is a 3D campus where you can hold online meetings and come together with peers, students, and other people around the world interested in the future of work, collaboration, and distance learning. This is public and open to everyone.</li> <li>• The Team Suites provide an “always-on” 3D environment that gives any online group a way to collaborate + chat.</li> <li>• The Private Campus allows for personalized branding in the virtual world, virtual events and presentation space, breakout sessions and space to work with.</li> </ul>
Engagement	<p><b>Discord</b></p> <p>An instant messaging and digital distribution platform designed.</p>	<ul style="list-style-type: none"> <li>• Users have the option to talk over text, voice, or video. The video tech lets users share their screen directly with others.</li> <li>• Customize member access with Roles. Use them to create moderators, give fans special rewards, or create working groups that can message all at once.</li> </ul>
Engagement	<p><b>Donut</b></p> <p>A conversation and meet up simulation application.</p>	<ul style="list-style-type: none"> <li>• Donut will randomly introduce teammates for different purposes via direct message. Slack Integration available.</li> <li>• Used primarily for networking and engagement.</li> </ul>
Engagement	<p><b>Parlay</b></p> <p>A discussion platform.</p>	<ul style="list-style-type: none"> <li>• For an online (answer anytime) discussion: Users are able to browse the Parlay Universe, create their own topic, or create a custom discussion prompt just for a personal group or class.</li> <li>• Each user reviews the materials provided and submits a unique response to the discussion prompt. Users are able to join the discussion, provide constructive peer feedback, and build on each other’s ideas.</li> <li>• For a Live discussion: Students delve deeper and build verbal communication skills in a structured and equitable Socratic Seminar.</li> <li>• Data Analytics: Review engagement data with the class and reflect on how to improve discussions in the future.</li> <li>• Feedback: Organizers are able to provide personalized feedback to each participant. Parlay makes automated suggestions.</li> </ul>
LMS	<p><b>ItsLearning</b></p> <p>An online collaborative whiteboard platform.</p>	<ul style="list-style-type: none"> <li>• LMS integrations to create customized courses that support users. offers multiple ways of sending messages so communication can take place efficiently and in real-time.</li> <li>• Automated notifications alert the user to important developments and events, e.g., when an assignment has been assessed. News and announcements, scheduled or real-time, can be quickly broadcast to groups of users. Send instant messages in a text blast to large groups.</li> <li>• Live or recorded online classes available. Connect via various ways including Microsoft Teams and Zoom. Set collaborative assignments in Google and Microsoft documents from within Itslearning.</li> <li>• A space for collaboration groups where users can invite participants to work together, such as in study groups or clubs.</li> <li>• Multimedia tools for an immersive, interactive learning experience. Respond to tasks, assessments and quizzes through a central platform, complete with self and peer-assessment. Sections for quizzing, assessment, grade books and file management. A section for student reflections and commentary.</li> <li>• Data exports and analysis are available and a Plagiarism tool incorporation.</li> </ul>

Category	Tool and Description	Advantages
LMS	<b>Canvas</b> An LMS platform.	<ul style="list-style-type: none"> <li>• Application focuses on the management and organization of courses including course content, assignments, assessment, messaging, file management, announcements, profiles, accessibility features, and cloud storage.</li> <li>• Promotes online classes, professional development courses, continuing education programs, and more with Canvas Catalog, an institution-branded storefront. Ability to create student e-portfolios - The Portfolium Network.</li> <li>• Data exports and analysis are available.</li> <li>• Accessibility features include: Voluntary Product Accessibility Template, VoiceOver, Magnify, Color filters, Switch Control, AssistiveTouch, TalkBack - Screen Reader, Visual settings, Switch Access, and more - full breakdown is outlined on their website.</li> </ul>
LMS	<b>Blackboard</b> An LMS platform.	<ul style="list-style-type: none"> <li>• Application focuses on the management and organization of courses including course content, assignments, assessment, messaging, file management, announcements, profiles, accessibility features, and cloud storage.</li> <li>• Accessibility features include: Voluntary Product Accessibility Template, VoiceOver, Magnify, Color filters, Switch Control, AssistiveTouch, TalkBack - Screen Reader, Visual settings, Switch Access.</li> </ul>
LMS	<b>Banner 9</b> An LMS platform.	<ul style="list-style-type: none"> <li>• Banner assists colleges and universities in recording and maintaining information/data for their students, employees, alumni, and donors.</li> <li>• Allows for users to choose from SaaS, private cloud, and on-premise options based on their needs and strategic goals.</li> </ul>
LMS	<b>D2L (Bright Space)</b> An LMS platform.	<ul style="list-style-type: none"> <li>• Application focuses on the management and organization of courses including course content, assignments, assessment, messaging, file management, announcements, profiles, accessibility features, and cloud storage.</li> <li>• Promotes online classes, professional development courses, continuing education programs. Identify and track high-risk learners and let Brightspace proactively alert you when it's time to step in and offer help.</li> <li>• Data assessment included.</li> <li>• Accessibility features are fully aligned with Web Content Accessibility Guidelines (WCAG) 2.1 Level AA standards and Section 508 of the Rehabilitation Act, 1973.</li> </ul>
LMS	<b>Moodle</b> An LMS platform.	<ul style="list-style-type: none"> <li>• Provides a flexible tool-set to support both blended learning and 100% online courses.</li> <li>• This application focuses on the management and organization of courses including course content, assignments, assessment, messaging, file management, announcements, profiles, accessibility features, and cloud storage.</li> <li>• Multilingual capacity.</li> <li>• Integrated 'badge' assessment and marking scheme; in-line marking, competencies, and outcomes-based available. Encourage collaboration and discussions - the ability to group manage.</li> </ul>
LMS	<b>Whatfix</b> An LMS platform.	<ul style="list-style-type: none"> <li>• Ability to Convert Walkthroughs into Engaging Training Content - Auto-generate content in various formats, such as videos (YouTube, Wistia), slideshows and PDFs, to use across the enterprise for more effective training and help. Ability to gather feedback on each walkthrough to determine where the content creation efforts will give the best results.</li> <li>• Power to Create Microlearning Plans - Amplify training with microlearning plans, with tasks presented sequentially to escort the user through the lesson. Goal-based tasks are presented to users based on their competence and profile, and you can track completion.</li> <li>• Accessibility Accommodations: Whatfix complies with section 508 of the U.S. Rehabilitation Act, which lays out the guidelines for accessibility.</li> </ul>

Table 2. Innovation Sourcebook, Continued

Category	Tool and Description	Advantages
LMS	<b>Sakai</b> An LMS platform.	<ul style="list-style-type: none"> <li>Application focuses on the management and organization of courses including course content, assignments, assessment, messaging, file management, announcements, profiles, accessibility features, and cloud storage.</li> <li>Promotes online classes, professional development courses, continuing education programs, and more. Ability to implementation of the IMS LTI specification.</li> <li>The application's goal is to meet all of the W3C Web Content Accessibility Guidelines (WCAG) 2.0 Level A and AA Success Criteria.</li> </ul>
Gamification	<b>Poll Everywhere</b> A live voting engagement application.	<ul style="list-style-type: none"> <li>Choose from a variety of activity types that allow users to visualize responses in real-time, like open-ended Q&amp;As, multiple-choice, and word clouds.</li> <li>Create questions, send a link to participants and have users respond in real-time. People are able to see the responses as they come in or at the end.</li> <li>LMS integration available.</li> <li>Data export available.</li> </ul>
Gamification	<b>Mentimetre</b> A live voting engagement application.	<ul style="list-style-type: none"> <li>Build interactive presentations with the online editor. Add questions, polls, quizzes, slides, images, gifs and more to a presentation. Application allows users to use live polls, quizzes, word clouds, Q&amp;As and more to get real-time input - regardless if users are remote, hybrid or face-to-face. Visualize responses in real-time.</li> <li>Ability to share and export results for further analysis. Translation available.</li> </ul>
Gamification	<b>Quizlet</b> A virtual flashcard application.	<ul style="list-style-type: none"> <li>Users are able to create online flashcards to study with. Either for single users or groups.</li> <li>Quizlet offers free study sets, study modes, and in-class games, you can instantly create a more engaged classroom.</li> </ul>
Gamification	<b>Kahoot</b> An application that combines quiz questions with polls, puzzles and slides.	<ul style="list-style-type: none"> <li>A quiz platform for users to create questions with multiple choice answers. This can be done live, or with an external link.</li> <li>data analysis and export are available.</li> </ul>
Gamification	<b>Quizizz</b> Live quizzes and polls.	<ul style="list-style-type: none"> <li>A quiz platform for users to create questions with multiple choice answers. Assign quizzes and engage users on their own time or during a class session.</li> <li>Create user-paced assignments and share flashcards.</li> </ul>
Professional Resources	<b>Lynda (LinkedIn Learning)</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>Online learning platform with micro-credentials.</li> </ul>
Professional Resources	<b>Coursera</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>Users have the opportunity to build skills with courses, certificates, and degrees online from world-class universities and companies. Ability to earn a Course Certificate, Professional Certificate, MasterTrack™ Certificate, or diploma.</li> </ul>
Professional Resources	<b>Udemy</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>Users have the opportunity to build skills with courses, certificates, and degrees online from world-class universities and companies, maintain lifetime access and learn at their own pace.</li> </ul>

Table 2. Innovation Sourcebook, Continued

Category	Tool and Description	Advantages
Professional Resources	<b>ITPRO.TV</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>IT training for the real world. Received certifications. Access Virtual Labs and Practice Tests - as well as 'Hands-on' virtual machine labs with multiple instances of Windows Server and Desktop Clients on the users OSX, Linux, iOS device, and Windows platform. Ability to host team learning pages for groups of people (work or class).</li> </ul>
Professional Resources	<b>Edx</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>Users have the opportunity to build skills with courses, certificates, and degrees online from world-class universities and companies. Ability to earn a Course Certificate, Micro Bachelors, Micromasters, Xseries, Professional Certificate, Global Freshman Academy, Executive Education, or an Online Master's Degree.</li> </ul>
Professional Resources	<b>OntarioLearn</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>Online learning available through 24 colleges throughout the province. 24-hour, 365 days accessibility services call centre, virtual tutoring and Library access.</li> </ul>
Professional Resources	<b>Contact North</b> An online learning platform that assists with skill development.	<ul style="list-style-type: none"> <li>Assistance with the registration process for their program or course of choice, referrals to other local support services, and assistance with financial information.</li> <li>Free use of computer workstations and high-speed Internet access to complete their online courses.</li> <li>Free use of web conferencing and videoconferencing distance learning platforms to connect to, and participate in, their live online programs and courses</li> <li>Supervision of written exams and tests.</li> <li>Generate 62,000+ course registrations per year for Ontario's education and training providers.</li> <li>Deliver these services in English and French.</li> <li>Student Information Hotline and studyonline.ca / etudiezenligne.ca and e-channel.ca / apprentissageenligne.ca portals, which provide information and resources for students and prospective students.</li> </ul>
Professional Resources	<b>ECampus Ontario</b> Leads a consortium of Ontario's 45 publicly funded colleges and universities to develop and test online learning tools.	<ul style="list-style-type: none"> <li>Lead in research, development and sharing of exemplary practices in online and other forms of technology-enabled learning.</li> <li>Support member institutions in fostering innovation, collaboration, and excellence on behalf of Ontario students and faculty.</li> <li>Contribute to the evolution of teaching and learning by responding to emerging tech and the development of state-of-the-art online courses and programs.</li> </ul>
Assessment	<b>Turnitin</b> Matches text within an assignment by comparing a submission against an archived material.	<ul style="list-style-type: none"> <li>Application to assist in recognition of plagiarism.</li> <li>Provide feedback and assessment within the application.</li> <li>Integration with LMS. Standard compliance with VPAT.</li> </ul>
AR, VR	<b>Google Expeditions</b> An immersive learning and teaching tool that lets users go on VR trips or explore AR objects.	<ul style="list-style-type: none"> <li>Users have the ability to explore a world of places and things on their own with their phone, tablet or VR device.</li> <li>Organizers are able to guide classroom-sized groups of locally connected users from a phone or tablet. Join a guide in immersive AR or VR and let them walk you through one of our hundreds of VR or AR Expeditions.</li> <li>Over 800 Expeditions – each one is a curated set of VR imagery or AR objects, along with integrated descriptions, talking points and questions.</li> </ul>

Table 2. Innovation Sourcebook, Continued



Category	Tool and Description	Advantages
AR, VR	<p><b>Tour Creator</b></p> <p>An immersive learning and teaching tool that allows for 360° tours.</p>	<ul style="list-style-type: none"> <li>• Ability to upload multiple 360o panoramas with single drag and drop.</li> <li>• Unlimited storage.</li> <li>• Create personal virtual tours - Create interactivity through Portals, Hotspots, Maps, Welcome Screens, Sounds, etc. Ability to integrate into websites. Showcase the virtual tours in VR mode right from the browser.</li> </ul>
Text Message Learning	<p><b>Cell-Ed</b></p> <p>Provides microlearning through text-messaging.</p>	<ul style="list-style-type: none"> <li>• These courses have to do with reading, writing, math, community building, financial literacy, healthy living, and citizenship &amp; civics.</li> <li>• Cross-platform access: optimized for access across call-in, apps, WhatsApp, tablet &amp; computer</li> <li>• Offers 3-minute micro-lessons to develop skills in a fraction of time.</li> <li>• Credentials: badges, certificates and recognized awards.</li> </ul>
Administrative	<p><b>Ed Sight</b></p> <p>Chat Bot for administrative inquiries.</p>	<ul style="list-style-type: none"> <li>• A software application used to conduct an online chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent.</li> <li>• Gathers data that improves student retention and wellness.</li> </ul>
Offline Access	<p><b>Kolibri</b></p> <p>Provides offline access to a curated and openly licensed educational content library.</p>	<ul style="list-style-type: none"> <li>• Facilitate broad, low-cost adoption, Application is designed to run on as many devices and operating systems as possible, leveraging existing legacy hardware or low-cost off-the-shelf devices. This includes Windows, Linux and OSX - currently creating for android.</li> <li>• Developed special processes to package online learning materials to be taken offline. One of their innovations is a video compression technique that converts the pen strokes and objects in a blackboard-style video into scalable vector objects. A 250MB video can now be compressed into just a single megabyte while retaining most of the original quality. This reduces the time and cost needed to download a large set of videos and allows a large amount of content to be stored on a small, low-cost device.</li> <li>• Track educational growth for individuals and groups of learners accurately and easily, even in informal educational contexts. Kolibri comes with tools such as a coach dashboard, exam creation, exercises, assignment of content for differentiated instruction, and a recommendation tool that displays useful and relevant next steps based on a learner's history, progress, and goals.</li> <li>• Devices running Kolibri will be able to find and directly connect with each other over a local Wi-Fi network, allowing for easy content sharing and data updates.</li> </ul>

Table 2. Innovation Sourcebook, Continued

# Appendix B: Trends

## Accessibility in the Classroom

Accessibility in the Classroom consists of more than just the designing of courses and developing a teaching style to meet the needs of the students. However, it does and will continue to envelop access to technologies, the internet, as well as adjusting to various students' abilities and learning styles. There will be more onus on institutions and instructors for ensuring that students are able to participate in the classroom with minimal barriers.

## Implications

In the near future, students are left behind due to the increase of digital learning and their own financial barriers.

Instructors are expected to know multiple technologies and accessibility tools to ensure they are best equipped to teach their students.

## Extrapolations

Institutions and Instructors invest time and effort into creating accessible learning environments and creating grants, bursaries, and funding programs for students in need.

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## AI in the Classroom

AI integration in the classroom transforms the way in which students and teachers interact with one another. The introduction and further use of AI aids teachers in grading, tracking performance and test scores, data analysis, emotional observation, and aiding a teacher in learning about a students' learning habits. Overall assisting teachers in personalized lesson creation and adaptive learning.

## Implications

AI advancements into reading social and body language cues can lead to pre-planning and assessment from AI - leading to emotional avoidance or negating problem-solving.

ChatBots gain enough confidence and knowledge to become integrated into the counselling and advising offices - assist students with their future planning.

## Extrapolations

Through signals by 2030, AI systems will become a commonplace tool in most schools. They will be used as assisting tools to create better curriculums, track student learning, automate the grading, and to provide more personalized support for students.

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### Art Schools Lose Funding

Public funding for art institutions decreases because of the implementation of performance funding, the emphasis of STEM over STEAM in the workforce, and a continual decrease in student enrollment.

### Implications

When art schools lose funding, this can risk an over-emphasis in STEM. Pushing young people to learn STEM without a balance of humanities courses can leave them unprepared for the interdisciplinary requirements of tomorrow's labour market. Art institutions are unable to retain public funding that pushes them into privatization. This funding model can influence research, programming and projects conducted by the institution.

### Extrapolations

Creative schools need to get creative with their funding. Because Art institutions lose funding, they cannot adapt as well as other, larger institutions. They are in competition with schools but not set on the same playing field.

This loss in funding then bleeds into their student enrollment rate, which can decrease and lead to more loss.

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### Blended Learning

Institutions fully incorporate blended learning practices into their pedagogy. Working in collaboration with digital tools, online learning, and in-person teaching to allow flexibility and control for students and their development.

### Implications

While there is an aspect of brick-and-mortar where an instructor lectures to the classroom, the instructor knows how to engage their students with technology, moving with the future, preparing students on how to use technology with their learning.

### Extrapolations

Blended schools will soon take over the brick-and-mortar as well as sole digital learning. It has become more apparent through the Covid-19 pandemic that students are unhappy with sole online courses and sole in-person courses. The introduction to blended learning will occur with innovations such as VR, AR, MOOCs, and AI.

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### Credentials the New Wave

An economic collapse, a pandemic, and rising student debt led to the emergence of PSE credentials. Learning companies and educational institutions band together to break colleges' monopoly on degrees by creating a new form of credentialing. Students are no longer spending their time on four-year degrees but working on retaining online credentials for a quarter of the cost.

### Implications

Degrees continue to lose their significance; this leads to a focus not on the degrees an individual has, but how they engage with the content and materials. Because of the condensed commitment of time and money, more people are able to flitter in and out of interests they maintain and gain knowledge.

### Extrapolations

Recognition of online degrees may have a huge and positive impact on the accessibility, prevalence, value and practicality of higher education.

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### Data Pollution

Although online learning may be seen as more accessible and less wasteful, the further digitalization of society does produce negative external effects on the environment - leading to a different kind of pollution, data pollution. The over manufacturing, use, and disposal of gadgets create increased demand for energy, produce toxic waste, and contribute to air pollution.

### Implications

Data pollution will only add to the array of problems that humans are causing to the environment. "Last year, the Guardian reported that billions of internet-connected devices could produce 3.5 percent of global emissions within a decade, and that may rise to 14 percent by 2040." Therefore, raising our emissions.

### Extrapolations

The increase of Data Pollution also leads to the increase of Fossil Fuels - this is because of the power used to generate data. Forcing us to maintain this unstable energy production.

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### Decolonization of Education

While colonized history and teaching methods have been the dominant viewpoint of educational content for the last few centuries, shifting demographics, means this dominant position in curriculums may be abandoned.

### Implications

Mass hiring of a variety of voices and backgrounds into higher education. Curriculums and program development need to be adjusted to include these histories and voices.

### Extrapolations

The integration of decolonizing education includes actual full histories and more voices into our education creates a space for people to be involved with. Students are well rounded and educated on multiple cultures rather than just colonial.

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### Democratize Education

Institutions are more invested in fighting for students' rights to access education; arguing that students should have access to technology, the Internet, support, and resources while attending higher education. Institutions focus on representing the most vulnerable students rather than the most able and wealthiest.

### Implications

People may resort to digital education and realize too late that that is not democratized education - it furthers the gap between wealthy and poor in institutions.

### Extrapolations

Accessing education is so much more than what the PSE institution is able to change - it takes a community effort to ensure that society is well educated and heard. Accessing education is the issue of cost, transportation, time, cultural norms, social expectations, and accessibility needs.

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### Digital Divide Rescinds

The Northern Policy Institute has outlined a timeline to provide Northern Ontario with access to the Internet (high-speed) by 2025. While the federal government is already planning the implementation of 5G networking by 2030. Creating accessible, affordable Internet access for all.

### Implications

Information will be able to travel to remote places of the country with ease, allowing for a more educated and informed society. However, this may also lead to a decrease in trades - wherein these communities are thriving in. This may lead to a shift in economic standing in various communities across the country.

### Extrapolations

Broad access to online learning may increase the number of students in rural, Indigenous and northern communities in Canada. Therefore, developing a more educated society and the opportunity for differences and more employment options.

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### Free Education for All

Higher education is no longer seen as a luxury, we have hit the point in time where PSE is viewed as the only available next step and, indeed, the only hope for those who want a middle-class life (timeline, 2016). High school graduates are more convinced than ever that their only viable option for a better life in college. High schools used to charge tuition at one point, and we now consider this to be a right, Canada implements policies and legislation to begin down the road of free and accessible higher education.

### Implications

PSE institutions become free for students to attend, now becoming a mandatory stepping-stone into the workforce. Because of this, we become a highly educated society, furthering our innovation and community development.

Universities and Colleges will work with donors and create add-on payment options (similar to private high schools) to ensure that they are still competitive.

### Extrapolations

Education will become free; it will just take time. There are processes and procedures in place to ensure this is a difficult task to achieve. Technology will assist this greatly in the further development of education and making it more accessible to students.

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### Future of Faculty

Instructors no longer teach material for a one-size-fits-all model but work in collaboration with their students and digital learning tools to create a more personalized curriculum.

### Implications

Faculty of a certain age (still a majority of faculty) lack both the experience and stamina to learn new and highly unfamiliar teaching methods and technologies. The fact is that developing high-quality online courses and programs requires skill, new ways of thinking about pedagogy, and money. Which in some institutions is an unrealistic ask at the moment and in the near future, thus leaving them to fall further behind.

### Extrapolations

A shift to online learning has decreased cross-collaboration between faculty members and students, therefore, adding stress on the individual to create and develop engaging curriculums. Although Faculty will need to adapt to a personalized learning plan, more hours will be put into this type of teaching. Putting a stress on institutions to compensate and train staff.

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### Gamification Takeover

A classroom that contains some elements of gaming can be considered a “gamified” classroom. In 2040 we can see the integration of gamification in all classrooms. One that creates sustained engagement, considers the unique needs of the learners, and does more than solely points and levels to motivate and engage its students.

### Implications

Gamification learning allows for co-creation and journeyed approach lessons, allowing students to be a part of the lesson development process. Furthering the reality of personalized learning.

### Extrapolations

Following this integration, programs become more student-centred. Allowing students to work with instructors to develop their own learning method and gamification mode. Seeing success in the classroom engagement, Gamification may be applied outside of the class and to services and resources of institutions. Assisting students in engagement, problem-solving, and

personal development outside of the classroom.

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## International Students and Online Learning

With the increase of online learning there are less and less international students travelling overseas. This turn of events leads to institutions lobbying government officials to implement regulations that allow international students who are studying abroad to be able to apply for their work permits, permanent residency applications, etc.

## Implications

There are less students on-campus and in-residence housing because international students can study from home.

In-person campuses become homogenized. Different access to different technologies around the world will act as a barrier to students and institutions.

## Extrapolations

The loss of a large population of in-person international students may lead to financial troubles with tuition fees. Leading to a redevelopment and redesign of fee structuring.

## References

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## Isolation, what is a Community Anyway?

With the increase of online learning students get further away from social interactions and gatherings, organic collaboration, and community building. This isn't only an issue with students, but faculty as well. Faculty members lose organic collaboration and feedback from colleagues and students. Leading to deteriorating materials, research and products produced by the community.

## Implications

Because of reduced in-person interactions, mental health implications will continue to rise, leaving students in a wellness crisis.

Institutions and the province will need to reorganize funds into health and wellness centres to assist students through this.

Faculty members will need to be better equipped to interact with students through screens and work towards community building in online classrooms and forums.

## Extrapolations

The loss of the in-person community may manifest in worsening mental health for students. A 2017 report



based on the National College Health Assessment found that 67 per cent of students at the University of Toronto felt “very lonely.” For the foreseeable future, students are likely to lose in-person peer-to-peer interaction, university events and access to communal study spaces. Students may experience a growing sense of isolation (Policy Response, 2020).

## References

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## IT Infrastructure and Security

While institutions are using more online resources and services for their students and staff, there is a large concern for the security of online data and services. Their budgets will need to accommodate and incorporate these fees; future planning will need to incorporate more staff to assess and organize this

infrastructure.

## Implications

Funding needs to come from somewhere and needs to keep coming. With the associated costs of IT infrastructure and online security other services and resources will need to be cut to accommodate. There is no option to run legacy tech, institutions will need to be up-to-date on their tools or risk infection and hackers.

## Extrapolations

Moving toward an online teaching, and training model. Additionally, using online marking tools instead of TA's may be an option of the future as well. It is no longer solely a backend for IT Infrastructure and Security, but forward-facing as well - students are interacting with the school on all fronts.

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## New Paradigm of PSE

As a result of the recent forces and factors affecting education, four major paradigm shifts have occurred in higher education in recent years: The development of lifelong learning as a human right, The global democratization of knowledge, infringement of online learning, and the development of the global knowledge society.

## Implications

Faculty need to be prepared to best represent and tend to students. Training will need to occur more often to best support members of institutions. Constant adapting will need to be a skillset of students and faculty.

### Extrapolations

Paradigm shifts happen every couple of years, there is a large innovation and education shifts a bit.

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### Outdoor Schools

While online learning is still extremely popular, Wi-Fi and internet connection will be available around cities and rural environments (deemed a human right in the future) and considering a lack of space and infrastructure for many schools, they will opt to work outside. Focusing on environmental learning - working with the world around them.

### Implications

Institutions will need to manipulate their environments to allow for protection against the elements and/or provide proper education on how to protect yourself from various elements.

### Extrapolations

The incorporation of outdoor learning doesn't mean it's all or nothing - this can be done in a hybrid model along with online learning. However, the incorporation of outdoor learning may lead to increased betterment of mental health in students

and reduction in anxiety and depression.

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### Performance Funding

Ontario has begun to move into a Performance Funding model. This is outlined in the government's annual budget and projected to annually rise after 2025. Although this is not a trend itself, it will lead to a trend of Performance focused schooling and institutions. Therefore, creating more inequities across the university system and pitting schools against each other for funding.

### Implications

Institutions will cut off disciplines and faculties that aren't performing in the way that this government wants them to. Therefore, instead of having students and institutions decide what the school will focus on, the government now has that power.

Moving to performance-based outcomes will create accessibility barriers for programs, cut funding for remote schools due to their locations and already small populations, and Indigenous schooling.

### Extrapolations

The ambiguity in criteria used to evaluate post-secondary performance, the determining factors of funding offered may be based on graduation and employment rates rather than quality of education and needs-based.

### References

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### Privatization of Education

A decline in public funding will force Institutions to rely on private funding from donors. Places of learning will be subject to corporate values and practices (efficiency, secrecy of institutional budgets and operations, the erosion of collegialism), threatening university autonomy.

### Implications

Higher Education Research Development (HERD) is manipulated and distorted. Post-secondary institutions are no longer provided with public funding and have resorted to 'selling out'. Institutions may be providing research for organizations that fund them rather than what

interests them.

### Extrapolations

Education will be swayed by the highest bidder. Research and programs are no longer done by pure interest, but by funding requests.

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### Rising Inequality

Although access to higher education has become more democratized, accessible, over these past few decades, there remains an unequal barrier that's locking in a certain level of social stratification. Although there has been a push to accept students from different backgrounds into various higher status schools, if they cannot afford to be there, inequality rises.

### Implications

There is rising inequality in hiring practices, where future decades may continue to see an increase in societal income inequality, especially when the majority of the population who cannot afford to attend the top 15-20 institutions then fall into worsened societal inequality.

## Extrapolations

Education will become more and more inaccessible for students of lower social and class status - creating a larger gap in intellectual knowledge, earnings, and inequality.

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## STEAM is the new STEM

It is becoming more prevalent that without A in STEAM, students are leaving higher education without the soft skills and communication tools to flow through society, work in teams and even find a job in some instances. New Education Criteria's will emphasize the Arts to ensure the development of well-rounded students.

## Implications

Although STEM skills are incredibly important in the digital age, students are losing important traits such as creativity, innovation, soft skills, and even empathy. Without the balance that STEAM can offer students, the education system leaves them unprepared for the interdisciplinary requirements of the future labour market.

## Extrapolations

Following this realization, our education system begins de-emphasizing its focus on STEM and

re-emphasizing STEAM to include empathy, creativity, and critical thinking. Therefore, producing well-rounded students rather than solely specified.

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## VR Classrooms

Virtual Reality (VR) is one technology that can assist in relieving the limitation of digital learning. It can be expected that with the rate at which digital learning is taking over, top PSE institutions will integrate some form of VR into their curriculum, and by the late 2020s, it may be seen as a serious training and simulation tool.

## Implications

This means that educational institutions will need to invest in more digital development and IT. There will be fewer students on-campus, there may be less of a need to have large in-person institutions, shifting all learning, resources, meetings, advising to VR.

## Extrapolations

Following this, our education system begins

to incorporate VR into everyday learning. PSE Institutions and Digital Education Institutions will compete over who can provide students with the most engaging, lifelike, entertaining, and educational VR experiences (Quantumrun, 2020).

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### Wellbeing and Mental Health in PSE

Studies are showing heightened issues of depleting mental health, and this is a trend that seems to be growing. Wellbeing and mental health initiatives at colleges and universities, are and will continue to include emerging technology and application solutions. Ranging from online therapy and counselling to VR engagement.

### Implications

Faculty and administrators will need to navigate more frequent encounters with students seeking well-being and mental health help since students who do not have effective intervention services or treatment available to them will likely be less successful in academic and social activities.

### Extrapolations

Health and Dental plans through universities will work to include wellbeing.

Faculty and Administration will need to incorporate

wellbeing training and illustrate where resources are.

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### WeWork's University (Shared Space and Tools Between PSE's)

More often than not colleges and universities need to be creative with the resources and funding they are provided with. Post-secondary institutions funding and resources will continue to deplete while moving towards online learning. This leads to cost-saving measures of reducing physical spaces. These institutions will be collaborating with other institutions, community centres, and other businesses in their vicinity. Resulting in the shared collaborative spaces, resources, and tools.

### Implications

Considering the shared resources and space model, there is the chance that there are more people than resources at any given time. There will need to be project and class management, ensuring that assignments are spaced out to ensure the ease of shared resources. This reduces campus culture but elevates community collaboration by partnering with associated groups in the area.

### Extrapolations

Institutions have found a cost saving solution to manage their budgets.

By working collaboratively with similar institutions and organizations they are able to create a greater

community for learning and further development.

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## Work after PSE and New Normal

People are likely to continue working from home or remotely. After seeing the benefits (costs and personal wellbeing) that hybrid work entails many organizations opt to continue to have their employees work remotely for a large portion of the work weeks. Building off of this, the workforce will determine what programs students enrol in. It's expected that more people will flee to the technology, engineering, and science fields, leaving art institutions with fewer students.

## Implications

Because of this shift in work demands, Art Schools will become smaller, more specialized for the individuals who are attending.

People are expected to know how to work from home as well as have the materials to do so, independent workers.

Funding may be reduced due to less students.

## Extrapolations

Creatives get lost. The workforce and society rely on a more robotic approach rather than a human-centred

and empathetic edge.

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## XR Technology

Powerful new platforms containing XR technology are beginning to emerge, and few institutions are experimenting with these in the curriculum, training tools, problem-solving activities, social engagement, creative work, and more. Further implementation will create new possibilities to modify learning environments and continue XR integration.

## Implications

This means that educational institutions will need to invest in more digital development and IT. Faculty will need to be well versed in multiple technologies. Students will need to invest in the complement technologies.

## Extrapolations

Education Institutions will compete over who can provide students with the most engaging, lifelike, and educational XR technologies.

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### 70 is the New 30

The average lifespan is expected to rise to 140 years by 2040. If this is the case, retirement at 65 is no longer feasible, and people will need to work for years after that. During that period, life-long learning and professional development will need to fill the gaps. People will need to educate themselves on new technologies, professions, and industries that arise over the years, forcing people into life-long learning.

### Implications

This means that educational institutions will need to invest in more professional development, skill workshops, and mature student programs. There will be more students these institutions will need to expand their space (classrooms, digital field, departments and programming).

Senior learning becomes destigmatized and intermingling between all ages throughout study becomes more fluid.

### Extrapolations

Funding, services, and resources reassignment from 17-24-year-old demographic to 50-70-year-old demographic. Because of this transformation, a two-tier learning system comes into effect.

The extension of life-long learning causes a greater financial burden. Although students are learning well into their 80s, their debt is following closely behind.

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# Appendix C: STEEP

The STEEP method assisted in providing a holistic overview of signals and trends developed for the purposes. These trends were categorized thematically through STEEP.

Category	Continued Growth	Collapse	Discipline	Transformation
Society	<ul style="list-style-type: none"> <li>Equity and Access</li> <li>Wellbeing and Health</li> </ul>	<ul style="list-style-type: none"> <li>Isolation</li> <li>Decrease Value of PSE</li> </ul>	<ul style="list-style-type: none"> <li>Wellbeing and Health</li> <li>5G Grows</li> </ul>	<ul style="list-style-type: none"> <li>70 is the New 30</li> <li>Equity and Access</li> </ul>
Technology	<ul style="list-style-type: none"> <li>IT Infrastructure and Security</li> <li>Adaptive Learning</li> </ul>	<ul style="list-style-type: none"> <li>Data Pollution</li> <li>Ai and Machine Learning Technology</li> </ul>	<ul style="list-style-type: none"> <li>Ai and Machine Learning Technology</li> </ul>	<ul style="list-style-type: none"> <li>VR Classrooms</li> <li>XR Technology</li> <li>Gamification Classrooms</li> </ul>
Environment (in the classroom)	<ul style="list-style-type: none"> <li>Blended Learning</li> <li>Decolonize Education</li> </ul>	<ul style="list-style-type: none"> <li>We Work University</li> </ul>	<ul style="list-style-type: none"> <li>Future of Faculty</li> <li>Decolonize Education</li> <li>Outdoor Schools</li> </ul>	<ul style="list-style-type: none"> <li>Credentials New Wave</li> <li>New Paradigm of Teaching</li> </ul>
Economics	<ul style="list-style-type: none"> <li>International Students</li> <li>Online Learning</li> </ul>	<ul style="list-style-type: none"> <li>Privatization</li> </ul>	<ul style="list-style-type: none"> <li>Future of Work - Who's enrolling</li> </ul>	<ul style="list-style-type: none"> <li>Education for All</li> </ul>
Politics	<ul style="list-style-type: none"> <li>Digital Divide Rescinds</li> <li>Democratize Access</li> </ul>	<ul style="list-style-type: none"> <li>Performance Funding</li> <li>Art Schools Lose funding</li> </ul>	<ul style="list-style-type: none"> <li>STEAM vs STEM</li> <li>Privatization</li> </ul>	<ul style="list-style-type: none"> <li>Digital Divide Rescinds</li> <li>Democratize Access</li> </ul>

Table 3. STEEP



