TEACHERLESS:
THE FUTURES OF DESIGN EDUCATION

Andrew Hladkyj

TEACHERLESS: THE FUTURES OF DESIGN EDUCATION

Andrew Hladkyj 2019 MDes

TEACHERLESS: THE FUTURES OF DESIGN EDUCATION

Andrew Hladkyj

Submitted to OCAD University in partial fulfillment of the requirements for the degree of Master of Design in Strategic Foresight & Innovation.

Toronto, Ontario, Canada
April 2019

COPYRIGHT

DECLARATION

I hereby declare that I am the sole author of this MRP. This is a true copy of the MRP, including any required final revisions, as accepted by my examiners.

I authorize OCAD University to lend this MRP to other institutions or individuals for the purpose of scholarly research.

I understand that my MRP may be made electronically available to the public.

I further authorize OCAD University to reproduce this MRP by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

ABSTRACT

With the ever-growing disruption of education by technology and the trend toward self-directed and autonomous learning, how might we re-imagine legacy post-secondary design education in a “teacherless” society?

Through a human-centred examination of today’s educational environment, this Major Research Project (MRP) derives 20 aspirational motivations at the heart of an independent learning model. It reframes the disconnect between design academia and industry using an ’80s computer game and a Greek myth as fresh paradigms to uncover the value of strategic partnership, addictive learning, and platform-agnostic foundational training in preparing post-secondary design education for the future. This research offers four alternative worlds built around distinct sets of motivations and presents one in detail to illustrate a higher-value ecosystem of flexible locations, virtual spaces, and re-defined roles that empower tomorrow’s independent learner. Finally, a high-level road map outlines a stakeholder consultation and implementation plan (key activators, alliances, milestones, pitfalls, and metrics) to make this re-imagined world a reality.

ACKNOWLEDGEMENTS

To my dear daughter Leah and my mother Katherine, for their extraordinary patience
Helen, Cherie, and Peter, for their sage advice
Melvyn, for his guidance and knowledge
Gillian, for her wisdom
Chris, for his inspiration
My dear SFI cohort, for their camaraderie
The OCAD University SFI faculty, for their infectious and passionate devotion to lifelong learning

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

BACKGROUND

As a designer, educator, and coordinator for Sheridan College's Web Design Graduate Certificate Program, I have always been interested in how design is learned and how it will be learned in our rapidly changing environment.

With the ever-growing technological disruption of education (Gleason, 2017) and pedagogical trends toward self-directed and autonomous learning (Farkas, 2012), what will the currency and role of today's design educator be in the not-so-distant future? How might these trends impact the value and values of future design graduates, particularly at Sheridan College?

In 1971, Ivan Illich showed formidable foresight in calling for "radical alternatives to school-centred formal education." In his provocative tome Deschooling Society, he notes that "the inverse of school would be an institution which increased the chances that persons who at a given moment shared the same specific interest could meet—no matter what else they had in common."

Today, hobbyist and social platforms like Pinterest and MeetUp, certainly radically different in tone and structure from traditional schools, are bringing together like-minded individuals and are learning platforms in their own right. Within formal education, shared online platforms allow students to take part in online communities where they learn from and are evaluated by not only their peers but also external experts and knowledge networks. Thus, students today are armed with a diverse knowledge repository no longer limited to the instructor. Are we teachers, then, a dying breed? With independent educational platforms offering personalized, on-demand, and "just-in-time" learning (Gleason, 2017), will education (d)evolve into an institutionally determined algorithm?

To the educator's defence, Illich also writes about the delight and surprise in unexpected questions and how "priceless" and "true" a partnership between master and pupil can be. Furthermore, access to educators, whether online or in person, reinforces the sense of common purpose among students, which, in turn, improves retention and enrolment, the Achilles heel of many Massive Open Online Courses (MOOCs).

Along with my personal stake in shaping the future of design education at Sheridan College (I have been tasked with revamping the above-mentioned graduate certificate program), this unresolved tension between autonomy, community, and technology is the driving force behind my major research project (MRP) and its main question: ***How might Sheridan College reimagine post-secondary design education in a "teacherless" society?***

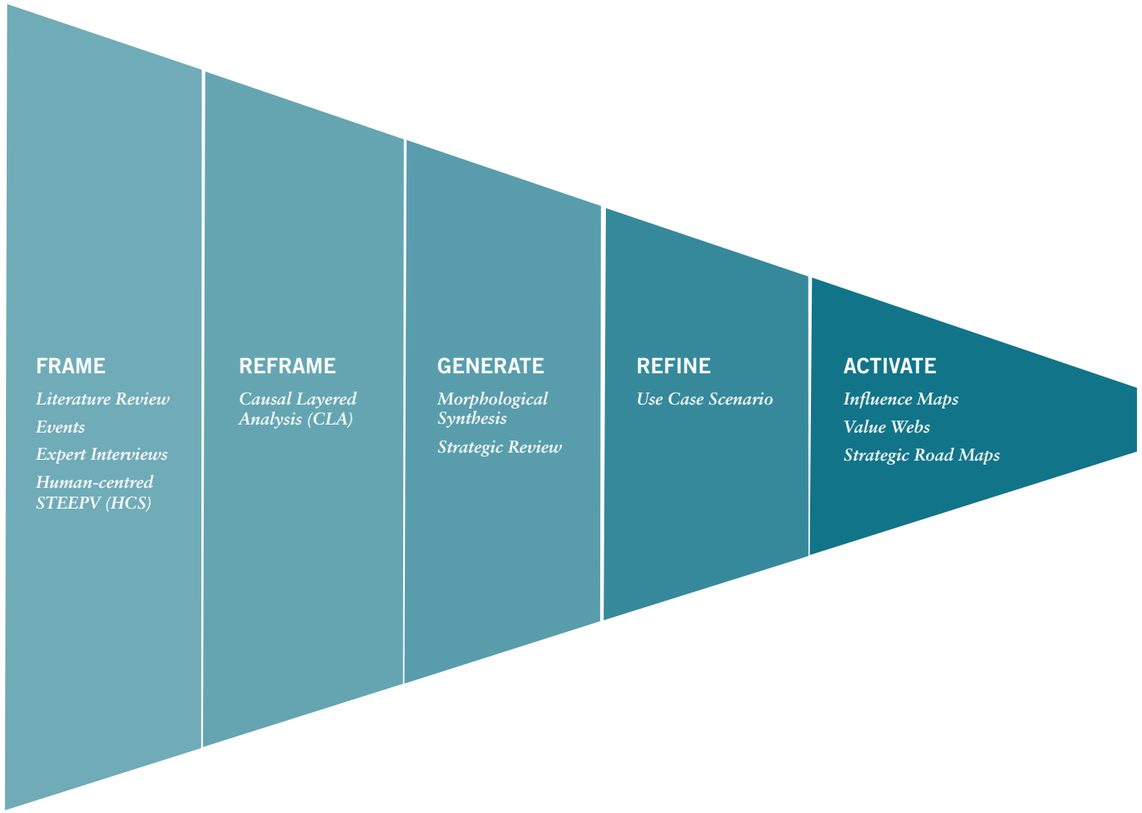


Figure 0.1: Overview of Research Methods

RESEARCH OVERVIEW

This MRP is anchored on the following objectives and methodologies:

FRAME

Establish a technological and pedagogical "lay of the land" in the realm of higher education

Build a knowledge base with breadth and depth of opinion on technology and pedagogy in tech-enabled higher education	***Literature Review***	Conducted comprehensive baseline study of seminal works, academic papers, and canonical texts (including those from online journals, blogs, and technology keynotes) from thought leaders in the fields of education, technology, or both
Glean insight on the current state of tech-enabled higher education and where it may be heading	***Events***	Attended educational seminars with diverse stakeholders—educators, students, administrators, employers, and government representatives—to obtain opinions on innovating tech-enabled education
Focus on understanding the current state of design education, the role of technology in design learning, and how design education might evolve	***Expert Interviews***	Moderated eight semi-structured expert interviews with college-level design educators, government, administrators, a digital pedagogy specialist, practicing designers, and design students (both current and former) to place educational innovation in a design setting

Identify considerations for building a human-centred curriculum for online-enabled post-secondary design programs

Derive high-level motivations, tensions, and levers to inform curriculum design principles	***Human-centred STEEPV (HCS)***	Applied STEEPV framework (Social, Technological, Economic, Environmental, Political, Values) from a human-centred perspective to structure foundational research utterances into key themes

REFRAME

Develop a new mental model for post-secondary design education

Abstract deep-rooted, systemic issues in design education to uncover unconventional paradigms for program innovation	***Causal Layered Analysis (CLA)***	Moderated two workshops with design educators and students (current and past) to reveal surface-level issues, sustaining conditions, cultural views, and an alternative image or narrative to inspire stakeholders to reassess their positions

RESEARCH OVERVIEW (CONT.)

GENERATE

Create human-centred design program concepts to support a new paradigm

Brainstorm alternative design learning territories based on aspirational motivations and gauge their potential to incite change	***Morphological Synthesis***	Moderated four ideation workshops with design students and educators to "ladder up" from a new narrative and explore potential environments with unique combinations of derived program principles
	Strategic Review	Analyzed and ranked ideas by strategic fit from a design program provider's point of view

REFINE

Unpack the winning program concept

Visualize, empathize, and sympathize with learners operating within the reimagined design learning environment	***Use Case Scenario***	Illustrated a "slice of life" through storyboards and crystallized benefits of the new system through contextual depictions of empowerment

ACTIVATE

Set up the proposed design learning future for success

Identify critical stakeholders to engage	***Influence Maps***	Associated stakeholders with perceived involvement in human-centric design program outcomes or levers
Envision new and modified sources of value to highlight opportunities and garner stakeholder attention	***Value Webs***	Projected key stakeholder interactions and new, enhanced, or eliminated value exchanges under the proposed arrangement
Build discipline and structure into the change management process	***Strategic Road Maps***	Anticipated and distilled the rationale, impact, timing, and requirements of proposed future to maximize stakeholder cooperation

Methodologies are covered in greater detail within their respective phases.
See Table of Contents and Appendices.

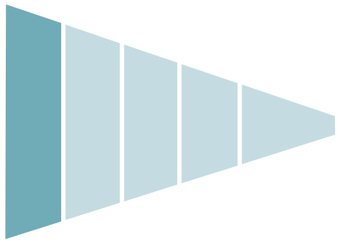
SCOPE & LIMITATIONS

This MRP is as much about a compelling future as it is about putting forth a sound and replicable approach to envisioning and inspiring change in a design education setting. As such, it was necessarily pragmatic in shepherding insights through progressively tangible phases and acknowledges that other valid solutions exist with iteration. All qualitative methods (e.g. expert and user interviews, workshops) were designed to elicit highly informed perspectives rather than the full spectrum of opinion.

To optimize interviews, participants were given the opportunity to represent multiple points of view depending on their experiences. For example, recent graduates who now practise design were treated as equally credible contributors of both industry and post-secondary design education insights.

All interviewees and workshop participants were screened for consent, availability, and (for workshops) in-person appearance at a designated central location. To accommodate restrictive mutual availabilities, Causal Layered Analysis (CLA) workshops were compressed into a two-hour intensive format and used an assigned but broadly accepted surface problem as a springboard for laddering down. Educators who took part in these workshops taught at the same institution as the researcher. Partly by design (i.e. the specific institution provided real-world context for change), this was also due to the limited pool of qualified external participants from which to recruit (e.g. professors who resided in the Greater Toronto Area and worked at other post-secondary, technology-led interaction design programs).

Lastly, this MRP expresses the author's personal analysis and synthesis of the current and potential states of post-secondary design education. It is not a validation, critique, or rejection of the subject educational institution, its policies, management, and/or personnel.



PHASE 1

FRAME

DESIGN EDUCATION

CONCEPTUAL BUILDING BLOCKS

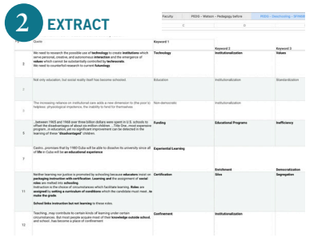
What is the current state of post-secondary design education, and which key principles might inform its reimagination for an unpredictable future?

Using a Human-Centred STEEPV (Social, Technological, Economic, Environmental, Political, and Values) framework, Phase 1 of this research derives the conceptual building blocks (i.e. major themes, motivations, levers, and tensions) that will serve as foundational principles for a compelling redesign of post-secondary design education in Phase 3 of this document.

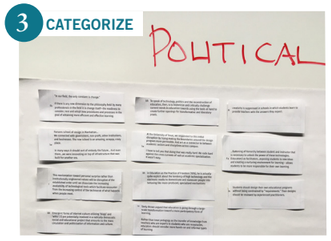
Given my goal of developing a Sheridan College technology curriculum anchored on humanistic values, I adapted the classic STEEPV framework to be more human-centred while keeping its thoroughness, re-focusing on experiences, relationships, and even perceptions between actants in the higher-ed space to yield deeper insights. As such, a political scan that would have given rise to observations about government bodies and regulations, for instance, now speaks to organizational hierarchies, power relationships, and technology as a political artifact seen through the lens of students, instructors, and administrators.

Figure 1.1 outlines the adapted Human-Centred STEEPV process followed.

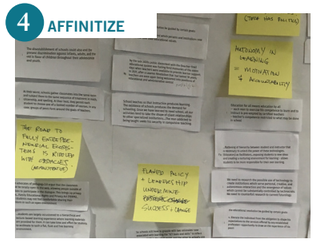
Seminal works and expert interviews



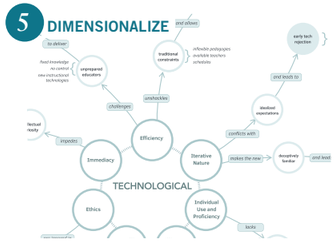
270+ quotations and ideas (utterances) cross-referenced by source



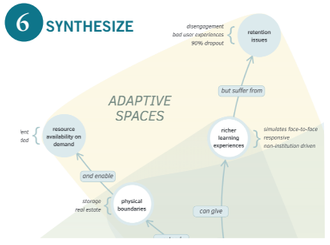
Utterances assigned to STEEPV "buckets" based on hypothesized inclusions



Sort and summarize utterances by key themes. Review and regroup as needed



Structure themes into actants and actionable components



Derive motivations, levers, and tensions to develop curriculum design principles

Figure 1.1: Human-centred STEEPV workflow

SOCIAL

People are more than demographics.

They are emotional beings who engage others and have their own desires, preferences, and personalities. This research uncovered five key social dimensions (Collaboration, Self-Selection, Public Opinion, Isolation, and Interactions) that drove the insights below.

Online learning carries a social stigma

Negative educational user experiences and low retention rates (Terras & Ramsay, 2015) plague online schools and cast doubt on the quality of their instruction and credentials.

Equally (if not more) damaging, perceived lack of community or sense of the social (Lv., personal communication, August 5, 2017) as well as a sit-and-listen culture marked by forced participation and disengagement (Ch., personal communication, August 5, 2017) portray electronic course delivery and students as operating in a world devoid of interaction and nuance (Kemp et al., 2014), ultimately unfit for the workplace. This characterization extends to online course creators, who are labeled "instructional technologists," "engineers," or "technicians" rather than respected "designers" or "architects" (Ely, 1999). Prophetically, Illich (1971) identified a "cultural bias of a society in which technological growth has been confused with technocratic control" (the latter associated with "bureaucracy and teaching" versus "independence and learning").

The overall effect is a privileging of courses that are taught face to face, with the implied assumption that they are better, when this may not necessarily be the case (Kemp et al., 2014).

Collaboration promotes transferable skills, employment

Skills do not develop in isolation. "Learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers" (Vygotsky, 1978, p. 90).

This cooperative ideal is a common thread among various learning theories. Constructivism proposes that students actively build on their existing worldview and gain new knowledge by interacting

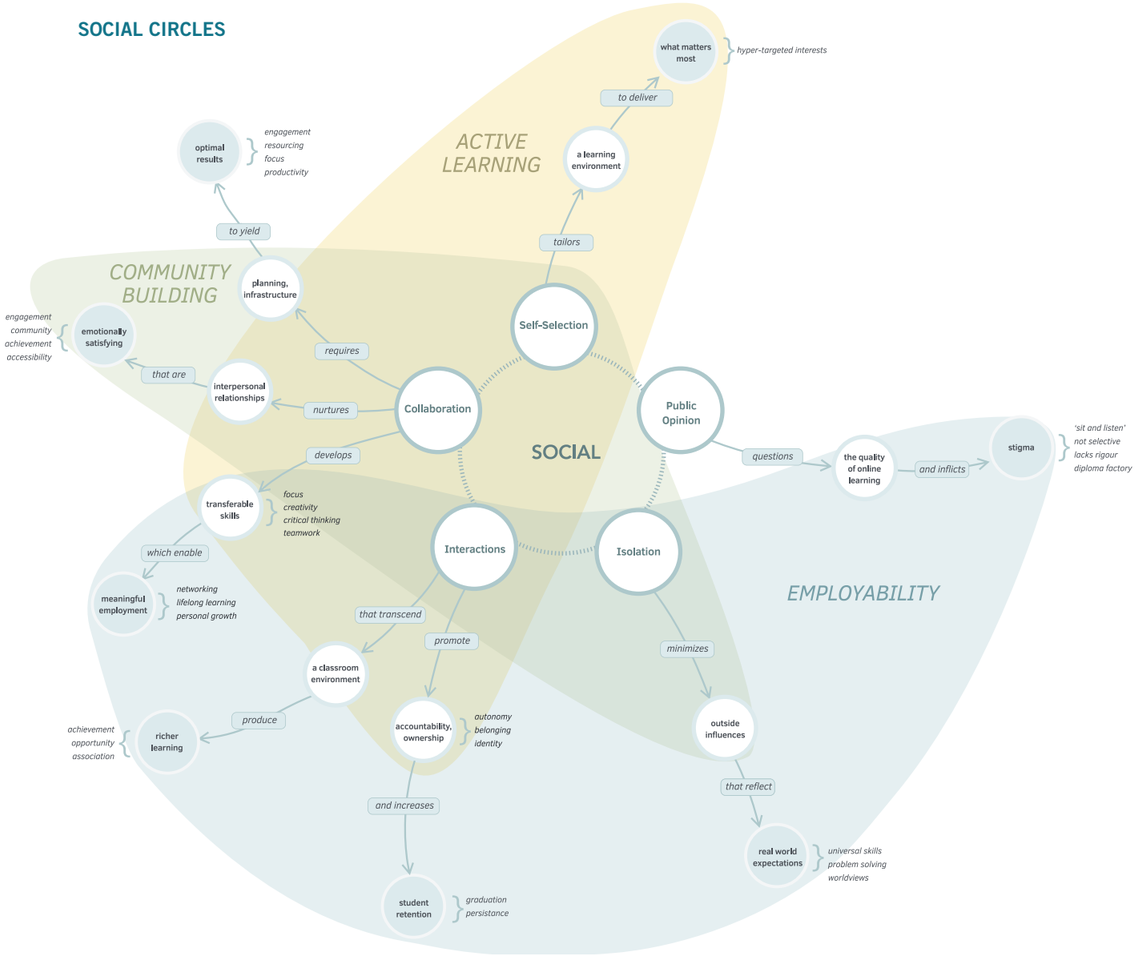


Figure 1.2: Social dimensions and motivations on which to base curriculum design

with peers and instructors. Connectivism espouses the greater importance of the quest for knowledge and rapid sense-making from networks compared with what one isolated individual currently knows (Farkas, 2012).

In practice, participatory technologies such as forums, blogs, and other content co-creation tools facilitate network-building and have been shown to hone creativity, reasoning, focus, critical thinking, and analysis (Terras & Ramsay, 2015), all sought-after skills in the workplace.

Lastly, the interpersonal skills that arise from peer-to-peer learning are crucial to job seekers as employers increasingly demand teamwork and cultural fit from new hires. In part, this may explain why jobs elude even graduates of STEM

programs where learning is not necessarily about creativity and play (Swearer, 2017).

Collaboration without planning, infrastructure yields sub-optimal results

Collaborative efforts can fail when the right conditions and expectations are not present. Some students could be distracted or disengaged (Ma., personal communication, August 4, 2017), while others may not buy into participatory tools (Ch., personal communication, August 5, 2017; Manca & Grion, 2017; Yusop, 2017) and feel that their autonomy is curtailed by being forced to collaborate or use a technology meant only for their personal lives (Farkas, 2012). Traditional logistical or resource issues (e.g. classroom availability, scheduling) can also make collaboration more difficult.

Educators must first set the stage for collaboration to flourish by building a strong sense of community where students feel comfortable engaging and sharing knowledge online (Farkas, 2012) and modifying their practices such as how they evaluate students for collaboration (LaMonica, 2006) or communicate collaboration as a learning outcome (Farkas, 2012).

Social interactions promote accountability, ownership of studies

Whether on- or offline, students are more likely to commit to their studies when they have opportunities to interact with others. Participatory technologies like blogs support autonomy by providing identifiable personal spaces from which students can contribute to a larger knowledge-building community (Farkas, 2012). By fostering a sense of belonging without sacrificing identity, online communities can boost learner persistence and achievement (Hughes, 2009) and promote sharing of one's ideas in a space where conversation is king (Farkas, 2012).

> ***What is common to all true master-pupil relationships is the awareness both share that their relationship is literally priceless and in very different ways a privilege for both.***
>
> **Ivan Illich**

Outside online spaces, direct relationships enable individualized feedback that helps keep students engaged in their studies (Terras & Ramsay, 2015). Face-to-face contact and impromptu after-class discussions with peers remind students that they have a personal obligation to others to complete group projects as promised (Kemp et al., 2014). How might these same benefits accrue to online learning settings where disengagement and dropout rates are high?

Students can demonstrate their learning in an open way that allows for collaborative assessment, rather than simply receiving feedback from the instructor.

Meredith Farkas

Social interactions outside traditional environments promote learning

The idea of learning outside the classroom is not a new one. A simple walk with students outside the classroom to practice their photography and receive immediate feedback can result in meaningful, teachable moments (Ma., personal communication, August 4, 2017).

Today, interactions are no longer tied to physical locations as Illich's vision of learning driven solely by matched interests and peers becomes a reality. Online communities and tools facilitate virtual connections to crowdsource solutions to shared problems (Swearer, 2017), and the ubiquity of participatory media in all aspects of a person's life has cemented the notion that "learning is no longer happening solely in the classroom, and the divisions between learning, work, and recreation are becoming increasingly blurred" (Farkas, 2012, p. 84).

Interpersonal relationships are emotionally satisfying

Much emphasis is placed on students' intellectual growth and perhaps not enough on their emotional well being. If we accept that "students leave schools, they don't leave communities" (Kemp et al., 2014), then accountability and commitment also rest on the fulfilment of emotional needs such as personal interactions and a sense of belonging.

A technical tool such as blogging can reduce students' feelings of isolation while building an identity in the classroom (Dickey, 2004). It also lends itself well to more personal and informal writing, which leads to greater socialization (Farkas, 2012).

TECHNOLOGICAL

Do technologies have politics?

This research uncovered seven key technological dimensions (Digital Media, Efficiency, Ethics, Function, Immediacy, Iterative Nature, and Individual Use and Proficiency) that drove the insights below.

Technology lacks emotional nuance

Technology has yet to match the richness offered by face-to-face settings (Fischer, 2014). Subtle nuances (e.g. sarcasm, humour, body language) may not always translate well digitally, resulting in a watered down experience where instructors cannot be themselves or students misinterpret intent (Kemp et al., 2014). Technological innovation (e.g. greater connectivity, access to resources) aside, "human factor"-driven differentiators that can compete with the ease of smaller in-person classes and the relationships that develop within remain high on the Massive Open Online Courses (MOOC) agenda (Fischer, 2014).

Technology is an extension of the person, not a replacement

From blogs to wikis, innovative learning technologies facilitate content creation and sharing more efficiently than ever (LaMonica, 2006). Technology has also expanded the reach of educators, allowing them to stay in contact with their students and work around logistical constraints (Kemp et al., 2014). On the cutting edge of this trend, artificial intelligence (AI) is being tested in more basic or screening roles such as an intelligent tutor (Fischer, 2014) or chatbot responding to questions that are frequently asked by students. This frees up the educator to participate in deeper and richer conversations that draw on their personal experiences and expertise (Swearer, 2017).

While the exact role of technology in education (e.g. standalone tutors, expressive tools of communication) has yet to be defined (Fischer, 2014), it seems that technology is, at best, the new TA for now.

Technology is a means, not an end. Educational content, intent matter more

Simply having access to the Internet or training educators to use computers is less important than educators' effective pedagogic use of ICT (information and communications technology) to benefit learners (Watson, 2001; Ofsted, 2001).

Striking the right balance (and knowing the difference) between learning about technology and learning how to benefit from it

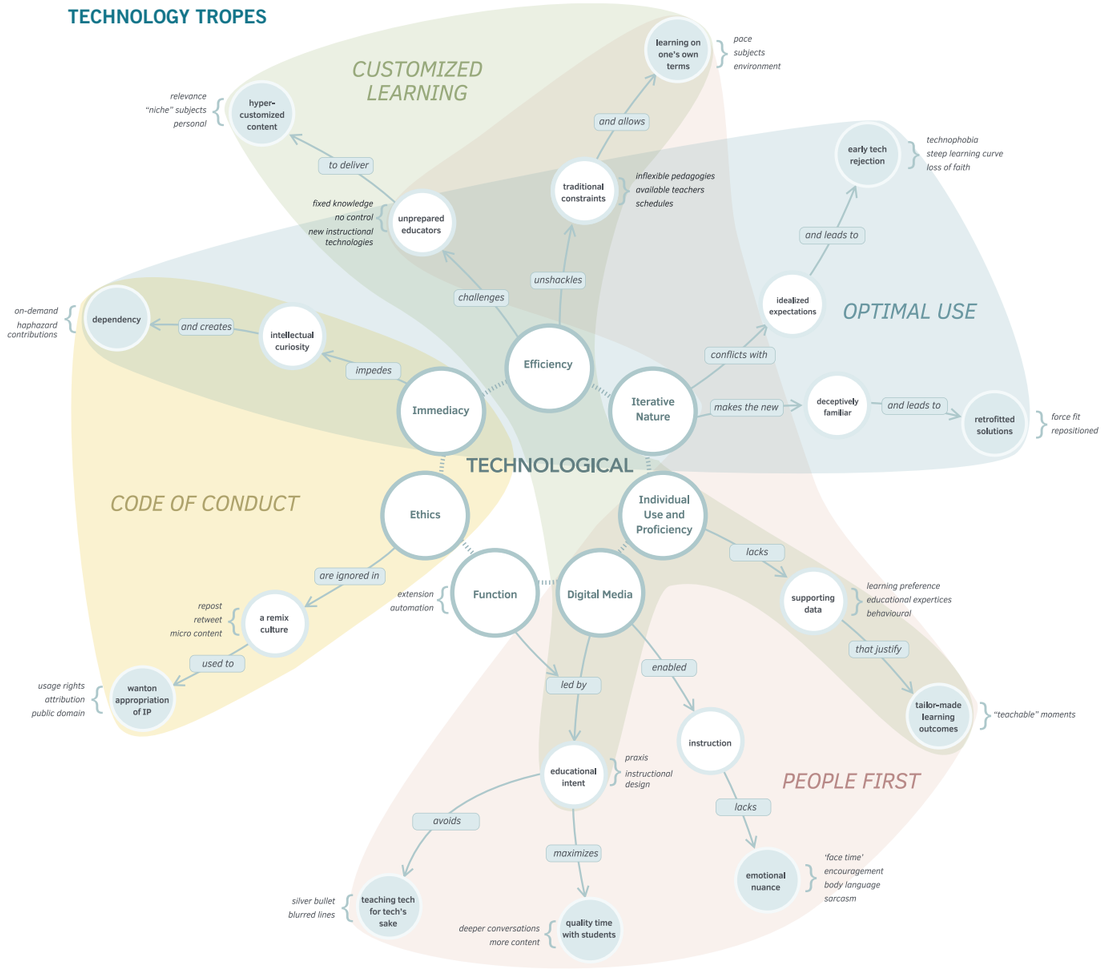


Figure 1.3: Technological dimensions and motivations on which to base curriculum design

(Fischer, 2014; Watson, 2001) has challenged educators since the turn of the millennium when U.S. and Canadian schools had widespread Internet access (NCES, 2002, p. 3; OECD, 2001, p. 256).

As growing evidence suggests, the use of instructional design process, not specific hardware and software, results in better learning outcomes (Ely, 1999). In education, technology is not the silver bullet (Kemp et al., 2014).

Tech's experimental, iterative nature causes people to underestimate its potential to effect meaningful change

New technologies have a long history of being treated like Trojan horses. Socrates dismissed the written word, fearing it would force students to follow an argument rather than participate in it. He did not foresee "new pathways for the intellect" as his student Plato did (Shirvani, 2015, para. 6). Similarly, early MOOCs were poorly received as many assumed that their initial, primitive feature sets and the platform itself would not evolve over time. As today's hyper-connected economy sees innovation cycles shorten and steepen (McGowan & Araya, 2016), new technological uses and contexts soon arise that demonstrate the true value of iterations, be they games used ex-curriculum to identify unusual talent in children otherwise labelled antisocial by school psychologists (Illich, 1971) or Facebook's pivotal role in the Arab Spring (Kemp et al., 2014). While it may be too early to expect online course delivery to be the answer to education for everyone, it may also be too soon to completely abandon them (Kemp et al., 2014).

Little is known about students' personal learning styles, how they actually use technology to learn

Having a fine-grained understanding of how and why students interact with technology to learn is a prerequisite to addressing the practical and psychological barriers in e-learning (Terras & Ramsay, 2015). Notwithstanding, educators grapple with obtaining this knowledge for a variety of reasons.

They may not be asking the right question when focusing on "What should someone learn?" instead of "What kinds of things and people might learners want to be in contact with in order to learn?" (Illich, 1971).

For example, learning curves for some technologies can be so steep that they take time away from actual learning (Ruth and Houghton, 2009). Yet educators may not always be aware of this dichotomy as they deliver content. The sheer size of MOOCs also challenges the feasibility of understanding individual students and creating a learning path in advance that factors in a diverse (and likely unknown) range of competencies and technological literacies (Farkas, 2014).

> ***Technology is certainly not a silver bullet. How the tools are utilized makes all the difference in the world.***
>
> **John Preston**

While the use of big data and simple surveys of students' learning preferences and experiences have been suggested as means of shaping instructional strategy (Kemp et al., 2014; Terras & Ramsay, 2015), students' emotional and cultural relationships with technology and each other may prove harder to uncover. When collaborative wiki sites were first used in schools, for instance, students felt uncomfortable with the idea of

editing each other's work, and only after a strong sense of community and friendships in the classroom developed did collaborative writing emerge as intended (Farkas, 2012).

Educators are unprepared for the autonomous, customized learning that technology affords

When technology futurist John Seeley Brown argued that educators must change their teaching practices to make each new piece of technology work (LaMonica, 2006), one wonders if they were tempted to change professions given the already-high demands of teaching with existing technology and online course instructors' complaints of having "little to no control over the scope and sequence of the syllabus, texts chosen, assessments created, and pacing of the material" (Kemp et al., 2014, p. 6). With predefined roles and areas of expertise, educators struggle to establish their relevance amidst MOOCs' obvious targets: self-motivated students who feel responsible for their own learning and have Netflix-esque micro-genres of interest (Fischer, 2014; Swearer, 2017; Ely, 1999).

Technology makes it easier to appropriate intellectual property unethically

With culture commentators like Kirby Ferguson (2012) proclaiming that "everything is a remix," it is easy to see how students might assume that online content is fair game for them to reuse and repurpose. What do usage rights mean to a generation where a viral Internet meme justifies wanton image appropriation?

Desensitized to piracy and accustomed to reposted micro-content (e.g. blogs, tweets), students lack the information literacy skills required for ethical knowledge co-creation (Ravenscroft, 2011). Meanwhile, educators who are expected to guide students through this foggy terrain may themselves be baffled by the complex web of licensing and intellectual property (Farkas, 2012).

What is new is old again

Relatability is a powerful tool in getting consumers to adopt new technologies. The original Macintosh leaned on skeuomorphism to provide users with a mental model of how to accomplish a familiar task within its new GUI.

The opposite is true in the case of MOOCs. Teaching and learning are made more difficult as tried-and-true bricks and mortar curriculum models are force fit into a new medium (Ely, 1999). Educators may lack training on how to transition a traditional classroom to an online one (Kemp et al., 2014) and assume that face-to-face practices (e.g. focus on faculty content delivery, assess only at course end) (Terras & Ramsay, 2015) will be acceptable in an online setting where participation, autonomy, and constant feedback are more

critical to keep students engaged from a distance and stem dropout (Baggaley, 2013; Farkas, 2012).

Technology fosters dependency, leads people to value immediacy over depth

When calculators first become affordable, schools scrambled to develop policies around their use for fear that students would depend on them to forgo analytical skills afforded by mathematics.

Fast forward to the Internet age, and dependency concerns run much deeper. Some argue that over-reliance on technology threatens the development of critical and evaluative skills needed for e-learning (Apple, 2003; Terras & Ramsay, 2015). Educators pressured by expectations of accessibility and infotainment may be enabling learners who rely on fast, bite-sized, 24-7 support from their instructors rather than "simmer" and figure out high-quality solutions on their own (Farkas, 2012; Ke, 2010, Kemp et al., 2014; Sternberg, & Zhang, 2014).

Tech enables students to learn on their own terms (How, what, when, where)

Advancements in technology dovetail nicely with new educational frameworks such as Universal Design for Learning (UDL). UDL recognizes that learners differ in how they perceive and comprehend information, the ways they navigate a learning environment, and how they can be engaged or motivated to learn (CAST, 2011).

Technology supports this framework by empowering diverse learners through accessibility tools, for those with sensory or learning disabilities; remote access to resources to learn at a desired pace; content that is available in a variety of media and retrievable from an environment that best suits the learner; support group work with participatory tools and for those who prefer to work independently, hardware and software that best engage the learner. Technology also extends the learning environment so it is less dependent on spatial, temporal, and human resource constraints, thereby expanding the number of skills one can acquire in a lifetime (Illich, 1971; Terras & Ramsay, 2015).

> ***I find myself having to tone back the sarcasm and humor [teaching online] because I realize they cannot see my facial expressions or hear the inflection in my voice so this leads me to feel as though I cannot be myself.***
>
> **Steven Page**

HUMAN-CENTRED STEEP V

ECONOMIC

People have individual, not just collective, worth.

They fuel the economy with their personal skills and experience. Who determines their currency, and how is it measured?

This research uncovered five key social dimensions (Incentives, Investment, Market Forces, Pockets of Wealth, and Worth) that drove the insights below.

Schools contribute to skills shortage by keeping students too long / out of the workplace

Higher education keeps young people out of the workforce and adult society in general with lengthy degree programs that artificially suppress labour supply (Ackoff & Greenberg, 2008; Illich, 1971). In the 1950s, a two-year Associates Degree in Nursing (ADN) was the de facto requirement to become a Registered Nurse in the US. However, in 1982, the National League in Nursing declared the four-year Bachelor of Science in Nursing (BSN) as the new minimum level for the field. The impact of that declaration was dramatic. Almost a decade later, the Department of Health and Human Services had to create a commission to address the unprecedented national nursing shortage (Illich, 1971; The Sentinel Watch, 2016), thereby putting a damper on the BSN requirement. In 2010, the Institute for Medicine sparked fears of another nursing shortage with a report calling for 80% of all nurses to hold a BSN degree by 2020.

Experiences and skills = credentials and currency

Educational value chains do not need to involve money. Swearer (2017) proposes an intriguing smart credentialing system that takes into account all of one's formal and informal life experiences. A machine agent-cum-guidance counselor would get to know a learner's goals, acknowledge what they have done, analyze government data and hiring trends, then return highly relevant employment opportunities or specialized skills training still needed to obtain them.

Another concept, put forth by Illich (1971), takes the form of a virtual skills exchange bank that equates experience with currency. People are given basic credits with which to acquire fundamental skills, after which those who contribute their time by teaching are rewarded with more credits and access to advanced teachers.

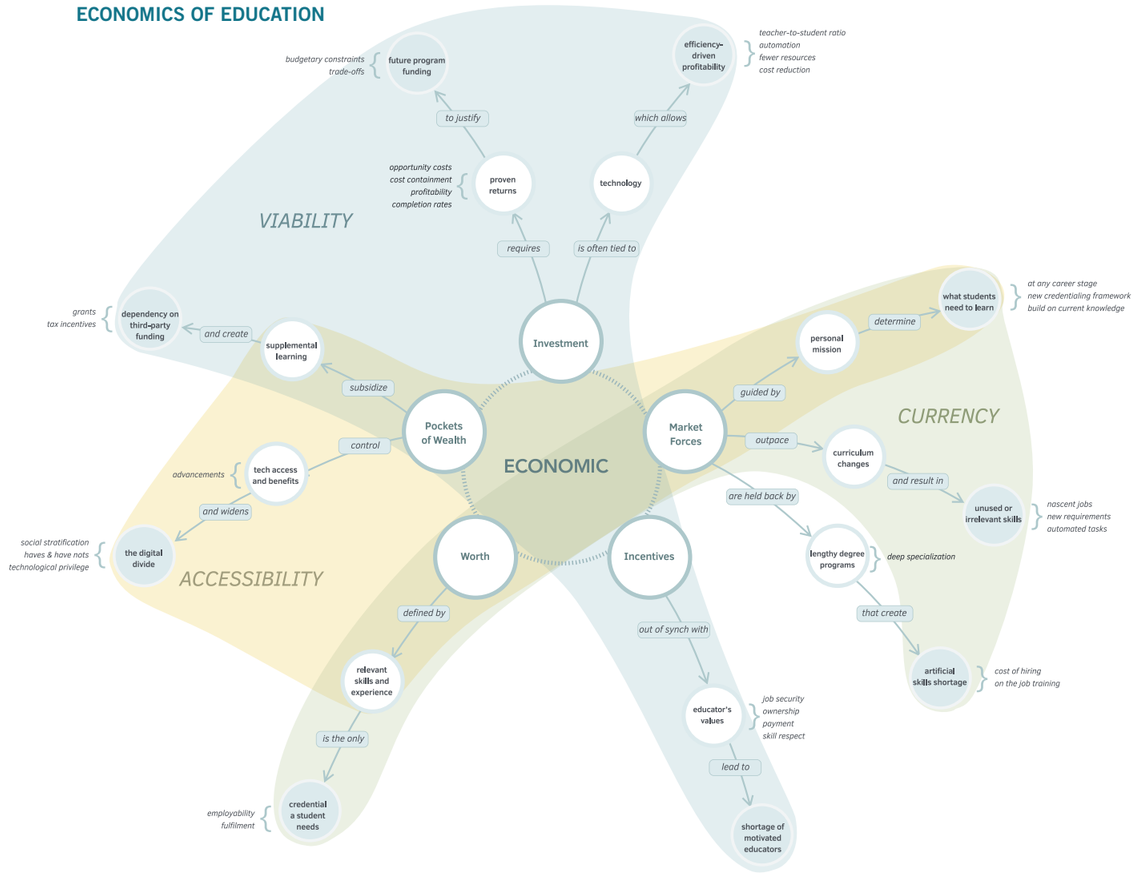


Figure 1.4: Economic dimensions and motivations on which to base curriculum design

Third parties have to subsidize enrichment programs to supplement traditional learning

Schools cannot keep up with industry. Various governmental and bureaucratic hurdles make it necessary for educators to tap third parties to support supplemental programs that round out and update what students learn inside the classroom. Seeing the value of real-life experience to the youth, Illich (1971) suggested larger skill credit to the underprivileged as well as tax incentives for willing industry partners who take on students in what are now modern-day internships.

In the U.S., parental spending on enrichment activities outside the school system has almost tripled since the 1970s, underlining the need that people see to augment STEM-based learning with in-demand creative and team-based skills even if they

have to pay for it themselves. Likewise, independent organizations like Project Lead the Way are also sharing the responsibility of building creative STEM-based programs into schools to help keep them free or at least affordable (Swearer, 2017).

Let market forces, personal missions guide skill acquisition, development

Higher education has long controlled the goal-setting aspect of learning. This has resulted in an unbalanced and narrow market for learners that presents industry with graduates who lack diversity and the relevant skill sets for agile workplaces. In contrast, efficient learning markets would allow anyone to start their lifelong journey at birth and acquire the most in-demand skills inexpensively, at any given time and place, and from any person willing to share their skill or knowledge (Illich, 1971).

From an economic perspective, many people believe that MOOCs will address the fundamental challenge to contain the costs of teaching more students using fewer resources.

Gerhard Fischer

Today, independents like Lynda.com and Code Academy are filling this void, while Credly and Degreed offer flexible credentialing frameworks that support a self-directed quest to learn something personally meaningful without the rigid, linear system inherent in legacy institutions (Swearer, 2017).

Financial security, incentives elude educators

Higher-education professors appear to be well-compensated but, in reality, are "overwhelmingly badly paid and frustrated by the tight control of the school system" (Illich, 1971, p. 102).

University administrators underestimate the amount of time educators devote to a course outside the classroom, particularly in rapidly changing fields like technology where content requires constant updating to stay relevant. Including office hours, marking, and professional development, the average professor works about 60 hours a week (Kroll, 2013).

How are educators financially rewarded for teaching MOOCs, where 95% of students do not attend that university (Fischer, 2014) and administrators assign fewer credits for teaching such courses? The financial picture gets murkier for adjunct professors, who generally have few benefits and little job security (Kroll, 2013; OPSEU, 2017). This precarity will likely worsen as technology enables deschooling (Illich, 1971) and teachers can no longer "ensure their jobs by requiring students to be taught subjects they, the teachers, know" (Ackoff & Greenberg, 2008, p. 71).

Digital technology can improve education delivery, employability, efficiency

The use of digital technology for curriculum delivery has tremendous potential to raise the standards of teaching and learning (Watson, 2001). Students benefit from greater flexibility in the number of courses and schedules available (Council of Ontario Universities, 2011; Fischer, 2014), making it easier for them to enrol. Despite MOOCs' notoriously low completion rates, sheer capacity allows them to graduate more students per instructor than traditional programs in a shorter period of time (Fischer, 2014), thereby broadening the selection of candidates from which employers can choose.

That said, technological throughput comes with opportunity costs, not the least of which are significant (and still largely unrealized) betterments of teaching ability and sustained student engagement as learning experiences get dehumanized with volume (Kemp et al., 2014).

This unprecedented change could necessitate perpetual teacher training and professional development, if not radical reform of educational systems (Ely, 1999).

Required workplace skills change faster than curricula, no longer guarantee relevant jobs

Created over a century ago, our educational system prepared people with deep specialization to work in hierarchical organizations and solve relatively simple problems. We live in a much different era of dynamic, collaborative workplaces that deal with wicked problems (Swearer, 2017) and, therefore, require new skills.

Teachers, like employees in any system, try to ensure their job security by requiring students to be taught subjects they, the teachers, know.

Ivan Illich

This leaves educators scrambling to update curricula and create new courses. The impact is already being felt as many students graduate already partially obsolete, leaving them indebted, anxious, and unable to practice in their field of study (Ackoff & Greenberg, 2008; Ely, 1999; McGowan & Araya, 2016).

Projections paint a dire picture for students if education maintains its current pace. 65% of children in grade school today will end up in jobs that have yet to be invented. By 2025, one-third of all jobs will be automated. By 2027, 75% of the S&P 500 index will comprise companies that have yet to be created (McGowan & Araya, 2016).

These are big businesses. They are not colleges that are run like businesses, and they are not businesses that are run like colleges. They are big education businesses.

Ch., personal communication

ROI / Overhead matter to education, too

Education is like any other business concerned with its P&L.

With domestic enrolment down, Ontario colleges are increasingly relying on international students to fill their revenue gap (Chiose, 2017), in some cases catering their courses to students from abroad strictly as a revenue stream (Ch., personal communication, August 5, 2017).

On the cost containment side, the allure of MOOCs is easy to see. Moving courses online would reduce administrative and operating expenses while greatly expanding the student (revenue) base (Contact North, 2013; Fischer, 2014; Illich, 1971; Baggaley, 2013). The Council of Ontario Universities (2011) disagrees, countering that online delivery costs are not necessarily lower. However, this may simply imply that the management of new technologies by traditional institutions is still a work in progress. Regardless, the savings from eliminating major capital expenditures like classroom construction are hard to ignore and will likely keep MOOCs on many schools' financial agenda.

Tech availability, benefits favour the rich

Do students from certain districts perform better because they have technology, or do these districts have other influences to begin with that also encourage learning (Kemp et al., 2014)? Do MOOCs work well only for students who are already fairly well educated (Fischer, 2014)? What one does with technology matters more than just having it, but affluence certainly makes availability a non-issue.

On the flip side, schools in lower socio-economic areas must deal with pre-packaged curricula without all the necessary resources to support them (Apple, 2003). Given these limitations, and with curricula developed without educator consultation, there can also be a loss of professional dispositions associated with good teaching, further demarcating the various strata that make up the digital divide (Kemp et al., 2014).

ENVIRONMENTAL

Much like our natural environment, the educational climate is rapidly changing.

Well-worn practices and beliefs can endanger the learning ecology if left unchecked. This research uncovered four key environmental dimensions (Online Platforms, Curricular Structure, Campuses, and Legacy Organizations) that drove the insights below.

Despite tech's potential to enrich learning, MOOCs are losing students

Technological advancements should enhance the learner experience beyond the traditional face-to-face model (Kemp et al., 2014). However, with dropout rates as high as 90% (Terras & Ramsay, 2015), MOOCs could not be farther from their potential.

Poor incentives to complete the course, issues understanding the content, and a general lack of support or feedback to address these issues have all been offered as possible explanations. While not inherent in or unique to MOOCs, these weaknesses are starting to define the medium and colour expectations. Others question why or how the traditional, and mostly passive, classroom model has come to stifle a highly interactive delivery method (Terras & Ramsay, 2015). More fundamentally, however, educators themselves do not understand learner experiences, goals, technical literacy, and preferences well enough to keep MOOC students engaged (Kemp et al., 2014; Terras & Ramsay, 2015).

Physical spaces are necessary for tech-facilitated ideas to come to fruition

A compelling tweet can instantly garner thousands of likes but not necessarily action.

While online platforms can reach large audiences efficiently and enable quick information exchange, nothing brings people together, allows new ideas to flourish, and galvanizes change more than a shared physical space (Kemp et al., 2014; Lopes, 2014). Taking a page from recent Egyptian history, "it was not until people were in solidarity, in the streets and voting booths, that the technology made a difference" (Kemp et al., 2014, p. 6).

Self-directed learning is much more common online

The 2.0 classroom is a "choose your own adventure" learning experience. Popular in the 1980s and 1990s, the innovative book

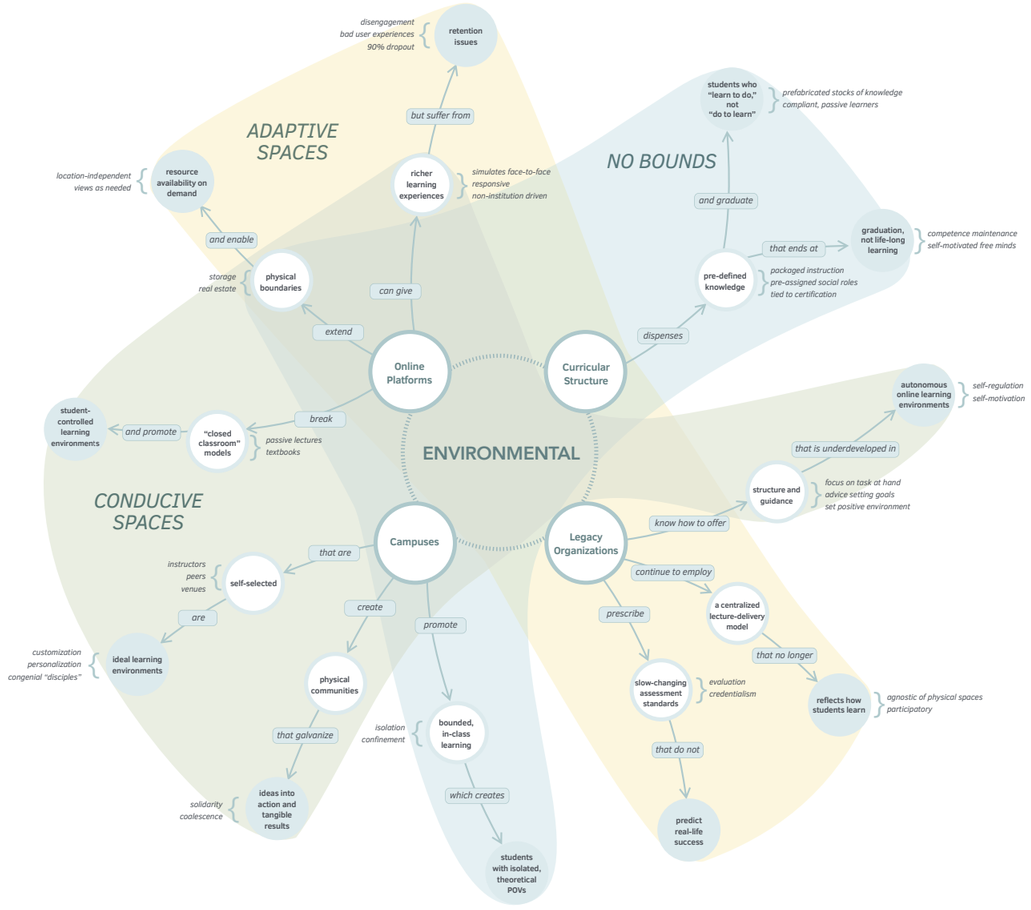


Figure 1.5: Environmental dimensions and motivations on which to base curriculum design

series allows readers to make choices that determine the plot's outcome. Similarly, students of tech-enabled courses can chart their own learning paths without familiar constraints like curricula, majors, and degrees (Illich, 1971; Farkas, 2012).

With instructor guidance on learning outcomes, self-motivated students select the technologies that best suit their needs, choose only subject matter that is meaningful to them, and give feedback that shapes course material (Farkas, 2012).

In contrast to the "closed classroom" model's focus on unilateral knowledge transfer (whether through textbooks or lecturers), 2.0's learner-centric approach recognizes that successful online course delivery hinges on whether students can learn what, when, how, and why they want (Fischer, 2014).

Assessment standards are centrally prescribed, slow to change

Traditionally, performance evaluations have been quantitative and cognitive, where test scores set the standard for all students. A learner-centric environment knows when to switch to more qualitative, behavioural assessment, which gauges what students can do and how well they can do it (Ackoff & Greenberg, 2008; Ely, 1999).

While adaptable criteria can be especially useful for online, skill-based courses with diverse learner profiles and uncharted motivations (Terras & Ramsay, 2015), schools are not quick to embrace them. Tellingly, new blockchain approaches to micro-credentialing extracurricular work are direct nods to industry's demand for continuous, informal learning (Farkas, 2012), yet these initiatives are relegated to university side experiments that entrepreneurs can only hope make it through the system (Swearer, 2017).

Schools program learning to stop after graduation

Schools are set up to package instruction, not learning, with certification based on a curriculum of conditions (Illich, 1971). This practice of downloading and time-stamping knowledge is at odds with today's world, which values lifelong inquisitiveness over absorbed ideology and self-motivated learning journeys over finite linear programming (Swearer, 2017; Shirvani, 2015).

To this end, there are calls for universities to extend the learning experience and come up with "competence maintenance programs" that keep students and alumni abreast of key developments in their industry (Ackoff & Greenberg, 2008, p. 148).

> ***Although technology can bring people together, it is not until people have come together in a physical community that ideas and positions coalesce and change happens.***
>
> **Joseph Flynn**

Online platforms expand community resources, "time on task" beyond the campus

Online platforms extend valuable resources, both tangible and intangible. They allow instructors to use communication mechanisms (e.g. Facebook Messenger, portals) to increase contact with students, circulate course materials, or send mass reminders outside designated class hours (Kemp et al., 2014). At their convenience, students can access and review as many times as needed lectures and readings they missed or wouldn't have had access to (Fischer, 2014).

Reach and resource management aside, it remains to be seen how these platforms impact the quality of that extra time between students, peers, and educators. Some say that the teacher-student bond strengthens as time

Galileo could only gape touring NASA's Johnson Space Center. Columbus would quake with terror in a nuclear sub. But a 15th century teacher from the University of Paris would feel right at home in a Berkeley classroom.

Larry Spence

is devoted to those who could not connect with their teacher in class (Kemp, 2014), but the question of dependency on quick hits and whether online interactions have the same "magical or meaningful" quality as in-person ones are up for discussion (Ma., personal communication, August 4, 2017).

Learner-centric environments still need structure, guidance

Even the staunchest critics of traditional schooling believe that educators should set boundaries and assert their authority no matter how motivated or autonomous the student.

Specifically, the role of "wise counsellor" is appropriate when students require expertise in navigating rough or new terrain (Illich, 1971); are faced with roadblocks or alternative methods (Illich, 1971); or respond better to praxis and feedback than theory (Ad., personal communication, August 3, 2017).

Apart from their subject matter expertise, educators have a responsibility to control the learning environment and set students up for success through active problem prevention and purposeful "laissez faire" when independent exploration is beneficial (Farkas, 2012); and establishment of common ground and understanding of local issues and ways of thinking before students dive in, especially when MOOCs cross into unfamiliar international territory (Fischer, 2014).

Schools are frozen in time

Former University of California president Clark Kerr observed that starting from the year 1520, only 75 Western institutions still exist today in recognizable form: churches, parliaments, and 70 universities (Shirvani, 2015), all legacy institutions steeped in ritual, hierarchy, and tradition.

Indeed, the stoic lecture hall has withstood the test of time, with tenured professors seemingly oblivious of the agile and innovative workplaces awaiting unsuspecting graduates. Is the classroom model broken? (Ma., personal communication, August 4, 2017; Lv., personal communication, August 5, 2017).

Schools are isolating places detached from the real world

The words "confinement", "magic womb" (Illich, 1971), and "bubble" (Lv., personal communication, August 5, 2017) have all been used to describe the school environment.

Schools shelter learners from reality and stunt their creativity and critical thinking by teaching them how to learn about (vs. be) themselves in their own world, all the while using a pre-packaged process (Illich, 1971; Fischer, 2014). Further, skills are taught without real-world context or application (Fischer, 2014), resulting in an "unbridgeable gulf" between how people learn and how they are expected to function in the workplace (Watson, 2001, Lv., personal communication, August 5, 2017). Lastly, schools tackle issues in artificial silos that correspond to academic majors, thereby robbing students of a multidisciplinary approach to problem solving (Ackoff & Greenberg, 2008).

A self-selected environment (peers, topics, modes) is an ideal environment

The higher education experience is predetermined and offers little choice. Students follow a prescribed program map of prerequisites and co-requisites and are assigned professors and classmates. With such a system so entrenched, it is hard to imagine an alternative model.

Illich (1971) proposes an arrangement where learners are empowered to choose a topic of interest independent of any pre-programming, find matches in motivated mentors and peers with like interests, share information, and co-construct new knowledge by exploring and debating each other's point of view (Farkas, 2012). The result is an engaging, congenial atmosphere that recognizes the importance of the individual, not the institution, in charting their path and achieving their social role in life.

Schools are set up to dispense knowledge in pre-defined blocks

Universities have long been compartmentalizing education around well-worn genres, focusing on the accumulation of specialized intellectual capital (Fischer, 2014) and teaching students to deploy these stocks of knowledge within their field of study rather than cross-pollinate with other disciplines to solve broader issues (Watson, 2001).

Meanwhile, the world has moved on from Industrial Revolution-inspired "learning to do" approaches to more "doing to learn" models of knowledge discovery, which acknowledge that today's complex problems will be better served not by 30 or 40 classic academic majors but by branching pathways of micro-genres of interest that may not even have names today (Ackoff & Greenberg, 2008; Swearer, 2017; Watson, 2001).

HUMAN-CENTRED STEEP V

POLITICAL

Disgruntled students, outsiders see a better way.

After centuries of unchallenged rule, higher education's leaders and administrators are facing resistance.

This research uncovered six key political dimensions (Administrators, Autonomous Learning, Educational Feudalism, Entrepreneurial Sub-ecosystems, Policy, and Technologies) that drove the insights below.

The road to fully entrepreneurial ecosystems is riddled with obstacles (administrative)

Entrepreneurial ecosystems are difficult to introduce, let alone incorporate cohesively, into legacy environments.

Attitudinally, academics can be skeptical of new technologies and reluctant to adopt changes to established procedures (Watson, 2001; Farkas, 2012). Structurally, there are complications as well. Faculties are housed separately on campus and set up to function in isolation rather than collaborate with other academic sectors and disciplines (Swearer, 2017). Students themselves have been trained to accept hierarchical teaching and administration and may not do well in a flat, fluid, and free learning environment (Farkas, 2012; Swearer, 2017). Finally, privacy concerns stand in the way of open sharing of information both internally and to outside parties.

Schools are discriminatory to students, teachers

Higher education is not open to all. Universities require a secondary level of education, which effectively shuts out younger teens who want to learn. While mature students would qualify, the culture is decidedly youth-oriented and can leave older adults feeling out of place.

Under the cloak of standards and fairness, students are mandated to receive pre-determined content in set ways regardless of their individual interests and learning preferences. Instruction is still mostly tied to the classroom and built around the goals and expertise of teachers who, in turn, are subject to specific guidelines of when and where they can teach. As such, instructors are restricted in their ability to share their skills and knowledge even if there is a market for them (Illich, 1971).

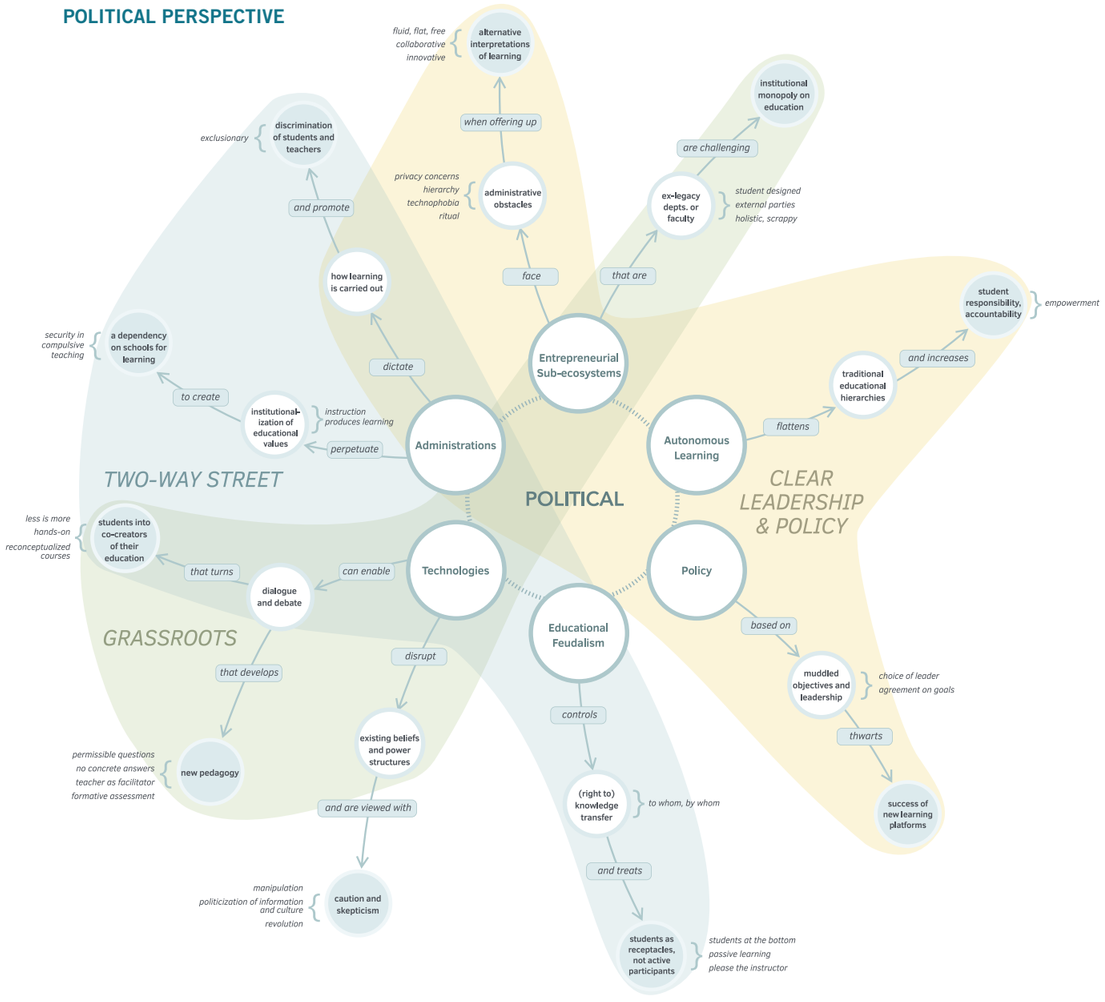


Figure 1.6: Political dimensions and motivations on which to base curriculum design

Flawed policy, leadership undermine success and change

Standards for good online education is a case of the "blind attempting to lead the sighted" (Baggaley, 2013, p. 137). Rather than seek the guidance of interaction designers, online educators, and of course, tech-savvy students, administrators, engineers, and "bricks and mortar heavyweights" stumble as they try to understand and develop a usable online learning platform (Baggaley, 2013, p. 137).

Schools also grapple with dichotomous rationales for teaching technology. While there is a clear focus on the mastery of ICT skills used in the workplace, there is no clearly stated mandate to use this mastery to

further the rest of the curriculum, thus creating a silo within a silo. This confusion of purpose reflects the difficulty of implementing flawed policies in schools (Watson, 2001).

Participate and co-create, don't simulate

When Illich (1971) met with a high school resistance movement demanding more education, he was struck by their clever slogan "Participation not Simulation," which was, unfortunately, misunderstood to be a demand for less. The spirit of that motto lives today in instructional technology built on an "architecture of participation" (Farkas, 2012, p. 83).

Undoubtedly, participatory technologies have disrupted educational dynamics. Learners are now simultaneously consumers and co-constructors of knowledge with their peers (Farkas, 2012; Fischer, 2014), resulting in greater comfort with uncertainty and less reliance on instructors. With more hands-on, informal types of learning, the days of passive knowledge transfer may be numbered (LaMonica, 2006).

The flattening of hierarchy between student and instructor is necessary to unlock the power of these technologies.

Meredith Farkas

Technology up-ends current beliefs, power structures (Tech has politics)

Outside the classroom, Internet technologies have been accused of large-scale circulation and politicization of information, even maneuvering people into "behaving like mass-produced, specialized mechanisms" (Khan, 2007, p. 436).

As technology is institutionalized in education, the fine line between "teaching and learning online" and "the use of technology to augment teaching and learning" (Kemp et al., 2014, p. 6) becomes political when interpreted as a win-lose choice between having a pedagogical complement or a competitor.

For students, this privileging of technology is already repositioning them as empowered knowledge co-producers (Farkas, 2012; Fischer, 2014). Whether students use technology (or technology uses them) to spark counterculture movements that question institutionally engineered values (Illich, 1971; Watson, 2001) or mobilize around larger issues (Khan, 2007) remains to be seen.

Autonomy in learning = motivation + accountability

Flattening the traditional classroom hierarchy shifts the educator's role to facilitator, presenting new ideas and concepts in a nurturing environment while students take over their own learning (Farkas, 2012) and explore the applications of new knowledge and technologies to their personal goals.

This approach is closer to the "Education for all means education by all" ideal set out by Illich (1971, p. 12), that is: drawing on peer experience and harnessing technology to create channels of personal and creative expression independent of any institution.

Entrepreneurial sub-ecosystems are emerging within legacy environments

Supported by faculty and experienced practitioners, students should be designing their own learning experience without the constraints of onerous curricular requirements (Ackoff & Greenberg, 2008). Taking this entrepreneurial approach to the next level, special university teams are partnering with government, not-for-profits, businesses, and other entities to set up innovation and maker spaces within campuses (Swearer, 2017).

"Amazing, scrappy, and crazy" (Swearer, 2017), these new spaces could not be farther in culture, activity, and composition from traditional schools. Illich (1971) famously associated the liberation of critical and creative resources with taking control back from institutions, so it is easy to see how these entrepreneurs could be seen as threats. Wisely, teams creatively work around and on top of infrastructure built for another era and stay low by not being officially connected to any one department or faculty (Swearer, 2017).

Our educational system is the only major institution in our country that officially recognizes autocracy.

Russell Ackoff

Democratic dialogue in classrooms promotes learning

An environment that encourages open discussion yields greater learning than one that is solely lecture-based.

When instructors initiate informal discussions with students before class, they can gauge student progress to date, gain insight on what students want to learn, and tailor their curriculum and pedagogy with this simple formative assessment (Farkas, 2012). A shift in emphasis from concrete answers and lectures to explor-

Rather than treat pedagogy as the transfer of knowledge from teachers who are experts to students who are receptacles, educators should consider more hands-on and informal types of learning.

John Seely Brown

atory questions and debates develops students' core skills and dispositions as they work with information in a safe environment (Farkas, 2012). Meanwhile, instructors can draw on their knowledge (or address their lack of it) by challenging students to ask controversial questions and actively participate in the dialogue and discourse themselves (Ackoff & Greenberg, 2008; Watson, 2001).

Education is feudalistic, one-way

Traditional pedagogy formed in an era when expert knowledge was scarce (Farkas, 2012). The result is the familiar teaching (not learning)-centered scenario of a "sage on the stage" transmitting information to a captive audience waiting to receive it (LaMonica, 2006). Ackoff & Greenberg (2008) describe schools as "the only major institution in our country that officially recognizes autocracy," where students are at the bottom and feel that they must conform to instructor expectations to get a good mark (Farkas, 2012). Teachers themselves have to please the system, as their legitimacy and livelihood largely depend on their association with an educational institution (Illich, 1971).

Schools promote the institutionalization of values

According to Illich (1971), the existence of schools produces a demand for schooling. As the notion that "instruction produces learning" takes hold, the self-taught are met with suspicion, the value of their education marginalized due to an absence of certification. The true victims, however, may be the students who, "addicted to being taught," now only value the result, having unlearned to "do their thing," "be themselves," and stay true to their lifelong mission (Swearer, 2017).

VALUES

Do schools know what makes each student tick?

Deeply-held truths are highly personal and serve as a compass that guides each individual in their unique journey of learning.

This research uncovered seven key values-related dimensions (Autonomy, Freedom, Good Pedagogy, Humanistic Values, Knowledge, True Learning, and Wisdom) that drove the insights below.

"Students" should be able to choose their "teacher" (source of learning)

Illich (1971) envisioned a deschooled society where learners are not pre-assigned any instructors. Instead, they choose their own learning partner based on skill matching and consultations with former students about their own experiences with a particular instructor. This transparent and objective peer rating system creates a level of educator accountability that would benefit higher education.

Education's output should be wisdom and life skills, not mastery of transient tools

Too often, instructors fall into the trap of teaching students the latest tools to stay current, only to find these supplanted by "the next big thing" come graduation.

Pedagogy should be grounded in transferable skills (e.g. collaboration, self-direction, creativity, information literacy) that foster lifelong learning and critical inquiry (Farkas, 2012). Since students acquire so much content already from a myriad of sources, from online to peers (Ma., personal communication, August 4, 2017), a solid foundation that allows them to build wisdom from the consequences of their actions and learn from their mistakes (Ackoff & Greenberg, 2008) may be a more lasting educational legacy.

Technology dehumanizes learning, education

Education has morphed from a humane exchange of ideas to a "technological leviathan that is slowly usurping the soul of the profession" (Kemp et al., 2014, p. 4).

As education becomes more dependent on technology, a greater concern for the return of humanistic values like identity, ethics, and understanding (Illich, 1971) will likely emerge as a countering force and support various aspects of instructional design (Ely, 1999). Of course, one can also

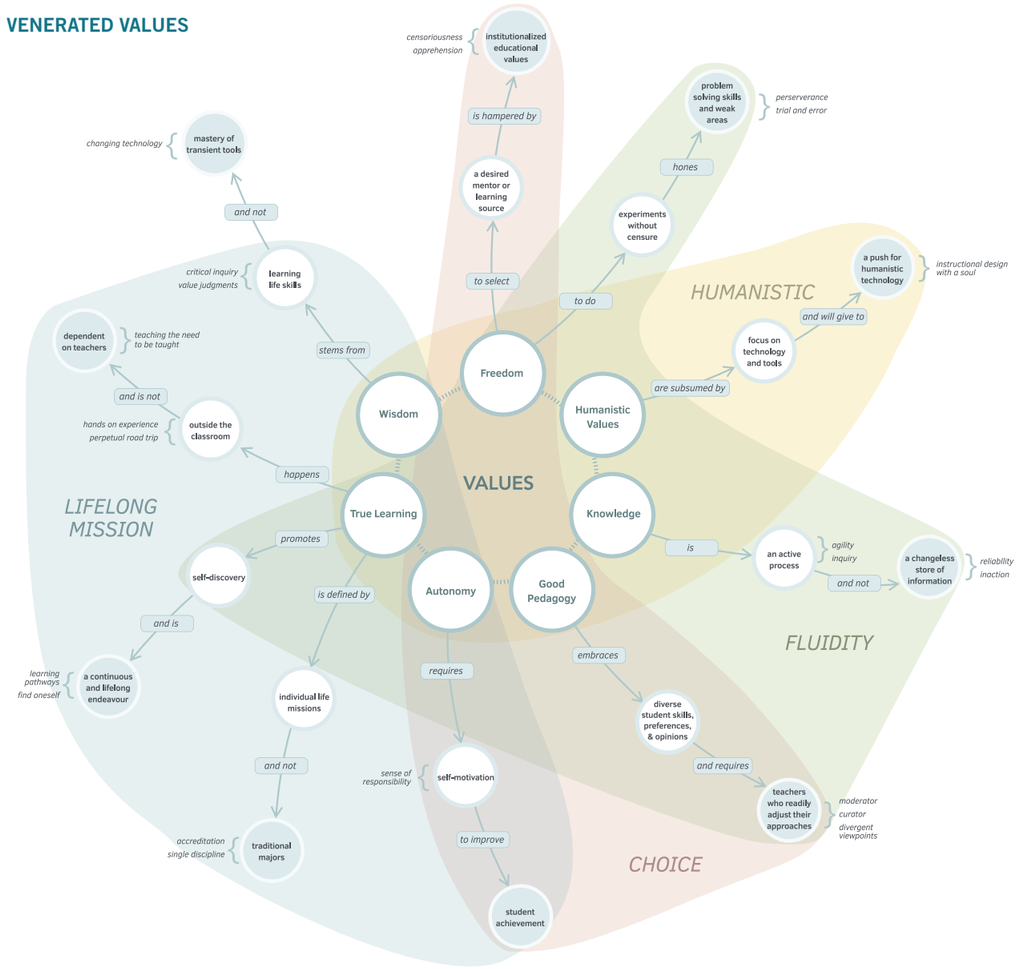


Figure 1.7: Values dimensions and motivations on which to base curriculum design

look to the university campus for solace, a reliable and durable constant through centuries of change (Shirvani, 2015).

A "super teacher" embraces and manages student diversity (skills, preferences, opinions)

Good pedagogy considers each student as an individual. While harder to administer in MOOCs due to their size, the learner autonomy that this platform affords (e.g. choice of resources, pace) makes an educator's thorough understanding of the skills and psychological capacities of students even more critical so they can support independent learning (Terras & Ramsay, 2015).

Successful online educators also need to be able to moderate a large online community and allow divergent viewpoints to expose learners to a range of ideas and beliefs (Farkas, 2012); curate and position student-generated content, which can be seen as excessive and less valuable than teacher-provided materials (Fischer, 2014); and be on the lookout for emerging countercultures that need to be understood (Illich, 1971).

Learning is a continuous, lifelong endeavour of (self) discovery

In today's knowledge economy, what one needs to be considered informed is constantly changing. Knowledge is no longer defined as something learned once, but rather a lifelong endeavor (Farkas, 2012). "We need to get students to move from majors to missions. Passionate personal missions that they pursue throughout their lives" (Swearer, 2017).

Higher education can help by creating an environment that focuses less on the delivery of knowledge and more on its discovery (Ackoff & Greenberg, 2008; Farkas, 2012).

True learning happens outside the classroom

Schools have taught people the need to be taught. This lesson discourages independent growth and closes the door on life's surprises and teachable moments that aren't institutionally sanctioned (Illich, 1971).

However, "the objective of education is learning, not teaching" (Ackoff & Greenberg, 2008, p. 5) and a "commitment to developing the whole person" (Shirvani, 2015, para. 2).

Connecting students with others and external environments can be the "perpetual field trip" (Ma., personal communication, August 4, 2017) that students can build on to learn for life.

> ***But what I couldn't learn was how to think, how to form an opinion, how to argue that opinion.***
>
> Ad., personal communication

Knowledge is not fixed. It is nimble, adaptive

The perception of knowledge must change from something reliable and changeless to something that is an inquiry and activity (Hovorka & Rees, 2009).

To that end, educational institutions can adopt design learning that, in the spirit of design thinking, pushes formal education to "entrepreneurial dispositions and skills necessary to adapt to rapid social and technological change" (McGowan & Araya, 2016, para. 8).

Furthermore, universities can focus their efforts on building deep learning mindsets with machine intelligence that will help people "continually navigate complexity over the course of their lives" (Swearer, 2017).

We need to get students to move from majors to missions. Passionate personal missions that they pursue throughout their lives with and without co-created learning pathways.

Randy Swearer

Learner autonomy + self-motivation = achievement

Teaching cannot produce learning without motivation (Ackoff & Greenberg, 2008). It is a driver that cannot be forced on students but comes from a genuine desire to learn, typically to ignite one's career or satisfy a thirst for knowledge (Ad., personal communication, August 3, 2017).

Adding learner autonomy to motivation can make for a powerful combination. Student achievement has been shown to improve with a greater sense of responsibility (Mcloughlin & Lee, 2008).

Define learning by missions, not majors

People are looking for educators who can translate today's complexity into meaningful skills like critical thinking and how to be better self-learners (Ma., personal communication, August 4, 2017). Educating the whole person will serve as a foundation to help prepare young people for a world of multiple careers or careers that do not yet exist (Shirvani, 2015).

To that end, more flexibility can be built into the educational system by waiving undergraduate degree requirements and reserving exit requirements only for students who need certification (Ackoff & Greenberg, 2008).

Freedom to fail is key to success. Just do it

If the consequences of failing were minimized, students would often challenge themselves to work on their weaknesses (Ackoff & Greenberg, 2008).

Trial and error, a natural problem-solving skill developed at birth and honed by Montessori schools, may unlock the secret to success in life (Ackoff & Greenberg, 2008; Swearer, 2017). It may not be a coincidence that so many Silicon Valley leaders attended Montessori and that the tech industry embraces the iterative and experimental "doing to learn" approach to design (Swearer, 2017). In the end, it is important to act. To quote Harvard educator Tony Wagner, "It is not what you know, but what you can do with what you know".

WHERE TO FROM HERE?

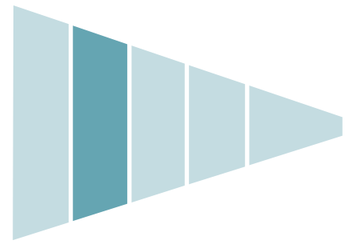
Derived Program Redesign Principles

How might technology and pedagogy function effectively as one to serve post-secondary design learners of the future? For program redesign to be compelling, it must incorporate synergistic combinations of the following human-centred motivations, levers, and tensions:

♥ MOTIVATIONS	↘ LEVERS	ⓘ TENSIONS
SOCIAL		
ACTIVE LEARNING The pursuit of highly personal learning outcomes through individual drive and co-creation of knowledge	Learning Environment Accountability, Ownership	Choice / Need to Succeed Blame / Responsibility
COMMUNITY BUILDING An inclusive, well-organized circle that creates emotionally satisfying relationships	Outside Influences Classroom Environment Interpersonal Relationships	Interaction / Isolation Skills / Workplace Culture Competition / Co-operation
EMPLOYABILITY A program that is highly respected and valued by employers, students, and the public	Transferable Skills Planning Infrastructure Quality of Online Learning	Employment / Fulfilment Engagement / Productivity Accessibility / Recognition
TECHNOLOGICAL		
CODE OF CONDUCT Clear policies on the acceptable use of technology in interactions with people and intellectual property	A Remix Culture Intellectual Curiosity	Attribution / Appropriation Dependency / Autonomy
CUSTOMIZED LEARNING Efficient tools that let students create and pursue learning pathways as unique as they are	Supporting Data Unprepared Educators Educational Intent	Variability / Scale Relevance / Engagement Availability / Effectiveness
OPTIMAL USE A culture of learning that embraces iteration and experimentation in the use of technology	Deceptively Familiar Idealized Expectations	Comfort / Innovation Extension / Limitation
PEOPLE FIRST A program that puts technology in the service of students and teachers, not the other way around	Instruction Traditional Constraints	Encouragement / Indifference Personalization / Constraints

MOTIVATIONS	LEVERS	TENSIONS
ECONOMIC		
ACCESSIBILITY Equal opportunity to have and to use technology to fuel one's personal learning mission	Tech Access and Benefits	Tech Costs / Admin. Budgets
	Supplemental Learning	Public Demand / Static Curricula
	Personal Mission	Market Demand / Learner Interest
VIABILITY A financially efficient business model that does not sacrifice student and faculty engagement	Proven Returns	Metrics / Funding
	Educator's Values	Compensation / Expectations
	Technology	Tech Costs / Profitability
CURRENCY Skills and experiences that are in tune with personal goals and ahead of industry demands	Curriculum Changes	Market Pace / Static Curricula
	Relevant Skills & Experience	Employability / Certification
	Lengthy Degree Programs	Market Demand / Tuition Income
ENVIRONMENTAL		
ADAPTIVE SPACES Fluid environments that mold physically, procedurally, and technologically to student feedback and the outside world	Slow-Changing Assessment Standards	Outdated Assessments / Industry Expectations
	A Centralized Lecture-Delivery Model	Student Engagement / Legacy Culture
	Physical Boundaries	Demand / Availability
	Richer Learning Experiences	Richer Experiences / Retention Issues
CONDUCIVE SPACES Student-defined learning environments supported by expert guidance and venues to implement ideas	Physical Communities	Ideas / Activism
	Self-Selected	Personalized Environment / Legacy Culture
	"Closed Classroom" Models	Student-Controlled / Legacy
	Structure and Guidance	Guidance / Autonomy
NO BOUNDS An eye-opening learning landscape that is not walled in by time, space, or orthodoxy	Bounded, In-Class Learning	Confinement / External Influences
	Pre-Defined Knowledge	Learn To Do / Do To Learn

MOTIVATIONS	LEVERS	TENSIONS
POLITICAL		
CLEAR LEADERSHIP & POLICY Holistic and widely understood direction built on institutional diversity and student success	Muddled Objectives and Leadership	Dubious Objectives / Quality of Learning
	Traditional Hierarchies	Autonomy / Accountability
	Administrative Obstacles	Change / Red Tape
GRASSROOTS A willingness to take a bottom-up approach to designing the future of the program	Existing Beliefs, Structures	Empowerment / Threat
	Dialogue and Debate	Openness / Teacher's Role
	Ex-Legacy Depts. or Faculty	Entrepreneurial Spirit / Monopolies
TWO-WAY STREET A democratic mindset that encourages dialogue and feedback for positive change	(Right to) Knowledge Transfer	Active Learning / Passive Learning
	Institutionalization of Educational Values	Dependency / Autonomy
	How Learning is Carried Out	Prescribed Learning / Discrimination
VALUES		
HUMANISTIC A celebration of each student as a unique, whole being who wants to achieve	Focus on Technology and Tools	Human-Centred / Tool-Centred
FLUIDITY A readiness to embrace the unknown and quickly change course in the name of progress	An Active Process	Inquiry / Inaction
	Experiment Without Censure	Trial and Error / Failure
	Diverse Student Skills, Preferences, and Opinion	Diverse Learner / Flexible Educator
LIFELONG MISSION A tireless quest of self-discovery that doesn't stop at graduation	Learning Life Skills	Learning / Mastery
	Outside the Classroom	Dependency / Discovery
	Self-Discovery	Discovery / Commitment
	Individual Life Missions	Single Discipline / Multiple Disciplines
CHOICE The confidence to put students in the driver's seat of their education	A Desired Mentor or Learning Source	Choice / Barriers
	Self-Motivation	Autonomy / Motivation



PHASE 2

REFRAME

DESIGN EDUCATION

PARADIGM SHIFT

For program redesign to be relevant and cohesive, the various motivations behind post-secondary design education need to coalesce around a compelling underlying truth. What, then, might this quintessential anchor be that we should focus on and innovate around? How do we reframe and solve for the core issue rather than chase down symptomatic evidence?

Through Causal Layered Analysis (CLA), Phase 2 of this research ladders down to interpret key stakeholder perceptions of a pervasive dilemma and suggests alternative paradigms for post-secondary design education.

GETTING TO THE BOTTOM OF THINGS

Causal Layered Analysis

Developed by futurist and academic Sohail Inayatullah (2005), Causal Layered Analysis (CLA) was employed to uncover a powerful, metaphorical basis for program change that not only unifies our motivations into a single redesign context but also crystallizes our understanding of design education, all the while enabling stakeholders to see problems, generate solutions, tell stories, and influence others with a fresh, shared mental model (by defining and structuring its conceptual system in terms of another).

Workshops

To this end, two separate in-person CLA workshops were held at OCAD University's graduate building. While the mechanics of each session were identical, two distinct stakeholder groups were recruited to bring forth a more holistic view of post-secondary design education:

- Recent graduates working in design, for firsthand accounts of their learning experiences and how these have prepared them (or not) for professional life
- Design educators, for an insider view of academia, including the challenges of teaching and being part of the educational system (e.g. administration, politics, the business of education)

For recruitment criteria, participant profiles, and moderator's guide, please see Appendix E.

Choosing a Starting Point

The critical choice of problem statement from which to ladder down was driven by recurring themes that surfaced during different stages of this research, from literature review, to Human-Centred STEEPV analysis, to expert interviews. More precisely, the notion that there is a growing, undesirable chasm between design education and industry was widely held by thought leaders and design professionals consulted in this project.

A digital pedagogy specialist (Mo., personal communication, June 27, 2018) recalls a situation where a highly educated graduate lacked the skills to stay employed with a software development firm, concluding that higher education "pushes out all these learners with skills we think the industry wants." As design workplaces deal more and more with wicked problems, students continue to be educated for deep specialties aimed at specific issues (Swearer, 2017). Students are graduating already partially obsolete (Ackoff & Greenberg, 2008). Ba. (personal communication, June 30, 2018), a working designer and educator, adds that graduates who

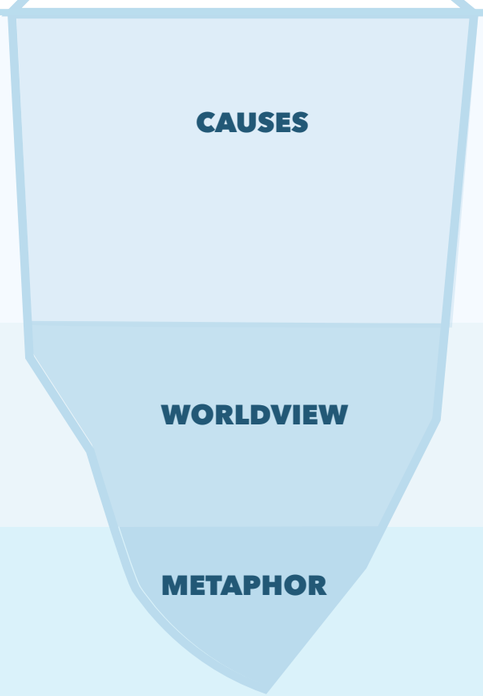
have the confidence to apply their knowledge on the job are just as hard to find.

From my personal experience leading Sheridan College's Web Design program, this disconnect between curriculum and industry also bears weighty financial consequences for the educational institution. With interfaces outgrowing the browser and the display (e.g. chatbots, smart speakers, augmented reality), "Web Design" has ceased to resonate with potential candidates, resulting in a five-year trend of declining applications and enrolment that is only now being addressed during a program suspension.

With these in mind, workshop participants started from the surface problem that *"Required workplace skills change faster than curricula, and design degrees no longer guarantee desired employment."* Figure 2.1 summarizes the rhetoric, systemic issues, worldviews, and depictions revealed in the sessions.

The resulting myth and metaphor are then presented in greater detail on the following pages (See "Of Bricks & Beasts"), where each mental model is broken down for moments of truth, pivotal mechanisms, emotional underpinnings, and unexpected commonalities that might translate well in a design education context.

Figure 2.1: CLA Workshop Summary



Observations
What is the common understanding of the problem?
(policy, opinions, media spin, events, trends)

Required workplace skills change faster than curricula, and design degrees no longer guarantee desired employment

Interconnections
What systems sustain the problem?
(contributing factors: technical, social, political, economic)

RECENT GRADUATES

- Workplaces want "unicorn designers" who are able to perform multiple roles
- Post-secondary education is not interdisciplinary, it is heavily siloed
- The democratization of design gives the impression that anyone can do it, so designers are less valued
- Design programs do not emphasize problem-solving skills

EDUCATORS

- No time for educators to understand tech's long-term impact and cover potential consequences with students
- Schools hire cheaper part-time faculty instead of dedicated staff to craft the curriculum
- Post-secondary education prestige heightens employers' expectations of design graduates
- Faculty have little say in time or compensation for professional development, it is hard to stay current

Debates and Discussions
What culture feeds the problem?
(dominant or marginalized opinions, values, viewpoints)

Schools push student conformity for fairness and ease of administration while employers want celebrity and uniqueness to stand out in the marketplace

Design programs prepare students to work as technical specialists in a variety of traditional workplaces but not at any particular company or one that has yet to exist

Depictions
What image or narrative properly depicts the problem?
(gut level or emotional responses, archetypes, visual images)

Design education is a multi-year jigsaw puzzle. In contrast, industry is an interactive, fast-paced game of Tetris: an ever-changing mosaic that requires agility

Industry is a fearsome, hyper-complex beast that is beyond academic control. Industry demands seem to grow in number and difficulty as soon as one challenge ends

Figure 2.2: Towards a New Mental Model

OF BRICKS & BEASTS

RECENT GRADUATES: Design education is a multi-year jigsaw puzzle: a single-solution endeavour where patience and ability to handle volume in a stable environment are key. In contrast, industry is an interactive, fast-paced game of Tetris: an ever-changing mosaic requiring agility, strategy, and looking ahead to win. For post-secondary design programs to evolve and become more relevant, which aspects of Tetris might we project onto academia to refresh its thinking?

DESIGN EDUCATORS: Industry is a fearsome, hyper-complex beast beyond academic control. Expected to apply a gamut of creative, technical, and strategic skills to unfamiliar disciplines and professional situations, ill-prepared graduates are overwhelmed by industry demands, which seem to grow in number and difficulty as soon as one challenge ends. Which supernatural elements might educational institutions humanize to help design graduates thrive in industry?

TETRIS

Tetris is a tile-matching video game by Russian software engineer Alexey Pajitnov. Launched on June 6, 1984, it appears on nearly every game console, computer, and mobile phone OS today, making it one of the best-selling games of all time.

Gameplay

Players rotate, move, and drop a series of falling geometric shapes (Tetriminos) into a rectangular Matrix. At increasing speeds, players attempt to clear as many horizontal lines as possible by completing rows of blocks without empty spaces. When the stack of Tetriminos reaches the Skyline, the game is over.

TETRIS EFFECT

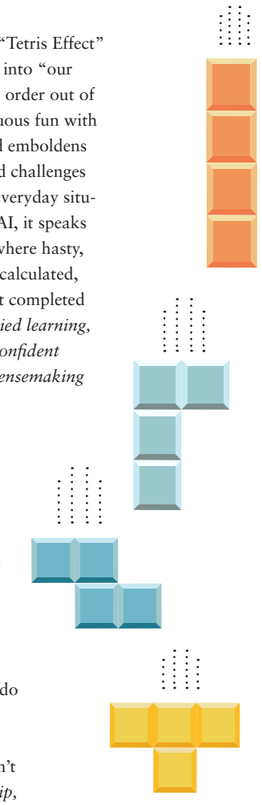
Coined by avid players, "Tetris Effect" is the way the game taps into "our universal desire to create order out of chaos," marries "continuous fun with mental stimulation," and emboldens gamers to face real-world challenges by seeing Tetriminos in everyday situations.[1] In evolutionary AI, it speaks to bounded rationality, where hasty, imprecise actions trump calculated, optimal ones that are not completed in time. Takeaway: *Applied learning, next-level engagement, confident problem-solving, rapid sensemaking*

REDUCTIONISM OF TETRIMINOS

Made of the same four blocks, seven shapes (Tetriminos) can be dealt in one of 5,040 ways.[3] Individual strategy, judgment, and skill equip players to manage the unknown, fill and clear rows given any shape, and determine how their personal Matrix ultimately looks. Takeaway: *Foundational training, problem analysis, internal locus of control, practice, risk management*

WINNING STRATEGIES

wikiHow offers the following to improve at Tetris: (1) Learn to do a T-spin (craft a T-shaped gap for a T-shaped piece to be rotated into); (2) Do Tetrises (clear four lines at once); (3) Know your playing style; (4) Avoid garbage; and (5) Push yourself (save–don't restart–a game that's going poorly).[3] Takeaway: *Entrepreneurship, invention, EQ, good learning habits, personal best*



CEREBRAL ADDICTION

Psychologist Vladimir Pokhilko named three drivers of Tetris' addictive appeal. "The main part is visual insight. You make your visual decision, it happens almost immediately. Insight means emotion: small, but many of them, every two, three seconds. The second is unfinished action. Tetris has many (that) force you to continue and make it very addictive. The third is automatization: In a couple of hours, the activity becomes a habit, a motivation to repeat."[2]
Takeaway: *Clear cause and effect, instant gratification, frequent feedback, inspirational goals just out of reach, repetition*

WINNING AND BRAIN EFFICIENCY

Instead of reaching a pre-defined end, success in Tetris entails "making the game last indefinitely." Psychologist Richard Haier found that while learning curves were steep, brain energy consumption normalized after four to eight weeks of daily play while performance grew seven-fold. Further, faster stimuli and harder decisions used less brain energy, especially in the best players, "the ones most efficient at dealing with Tetris' Daedalian geometry."[2] Takeaway: *Lifelong learning, continuous improvement, skill-based stress management, long-term payoff*

HYDRA OF LERNA

In Greek myth, Hydra is a serpentine monster whose lair was Lake Lerna, an entrance to the Underworld. "It had poisonous breath and blood so virulent that even its scent was deadly."[7] Depictions from 500 BC show multiple heads and tails, suggesting its ability to regenerate.

Second Labour of Heracles

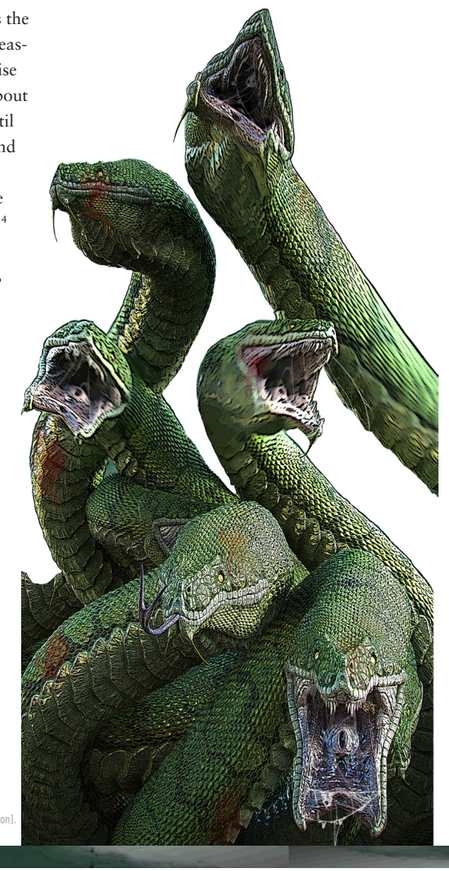
After killing his family in a fit of madness, Heracles was ordered to serve the king of Mycenae Eurystheus for 12 years and perform 12 impossible feats, the second of which was to slay the Lernaean Hydra.[7]

CHAOS THEORY

Fuzzy logic founder Lotfi Zadeh (1973) explains, "As the complexity of a system increases, our ability to make precise yet significant statements about its behaviour diminishes until a threshold is reached beyond which precision and significance (or relevance) become almost mutually exclusive."[4]
Takeaway: *Experimental mindset, iterative approach, culture of praxis*

HYDRA HEADS AND LONGEVITY

Symbolic of complexity's pervasiveness, Hydra's central head was immortal, leading Heracles to bury it "not forever eradicated, only controlled, contained, and constantly kept in check."[5] For Heracles, Hydra's regenerating heads were problematic but for Hydra, "this is resilience. A corollary to the Hydra paradox, the source of threat is also the source of fertility and productivity."[5] Takeaway: *Embrace complexity, build experience, develop grit*



Borkowski, P. (n.d.). Lernaean Hydra. [Illustration].

POWER RELATIONSHIPS

That Hera raised Hydra as Heracles' punishment and induced the madness that led to his crime shows a hubristic manager/managed dynamic that falters in non-linear environments. "Hydra does not need a brutal Heracles-manager, but her own dangerous powers do need limits."[5]
Takeaway: *Planned interdependence of industry and academia, neither governance nor resistance*

FIREBRAND AND BLOOD AS SMART TOOLS

Wielding a club and brute force, Heracles struggled until Iolatus' inspired use of fire quelled Hydra's multiplying heads. Dipping arrows in the slain monster's poisonous blood, Heracles acquired potent means of achieving future labours: Slaying the Stymphalian Birds and Obtaining the Cattle of Geryon.[6]
Takeaway: *Buildable, multi-purpose, platform-agnostic toolkit*

IOLAUS AND PARTNERSHIP STRATEGIES

Knowing he could not defeat Hydra alone, Heracles called on his mortal nephew Iolaus, who applied Athena's wisdom to cauterize each neck as Heracles beheaded, thus stopping new ones from sprouting. The duo's success may be attributed to "individuals capable of independent thought... while the heads of Hydra…conjoined at the body...must work in lockstep."[6] When Eurystheus knew of Iolaus' role, he deemed the Second Labour void.[6] Takeaway: *Youth partnership, reward collaboration, complementary talents*

Key Learnings

Addictive experiences promote lifelong learning. Frequent hits of emotional satisfaction and long-term rewards for advancing progressively larger passion projects motivate students to ritualize learning and seek "power ups" for personal pleasure, not professional survival.

Methods will minimize the madness. Core courses that emphasize "permanent" skills (e.g. human factors, innovation methods, analysis and synthesis, entrepreneurship) complement technical ones and better prepare students to thrive in unfamiliar and complex situations.

Ambiguity, speed, and risk are resources to be used, not threats to be contained. Faced with scarce assets (e.g. discourse with industry, dynamic feedback, eustress) that are critical inputs to value creation, design programs and students should vigorously compete for (not avoid) the new.

Partnering with design students will go further than mentoring them. Opportunities for students to act as respected partners to industry (versus passive receivers of advice) train them for individual contribution, trust, responsibility, compromise, and shared purpose.

1 O'Conner, J. (2019, January, 31). It's All Connected. The beauty of Tetris Effect after a year of grief and sorrow. *Medium.* Retrieved from https://medium.com/super-jump/its-all-connected-7584b84db266

2 Goldsmith, J. (1994, May 1). This is your brain on Tetris. *Wired.* Retrieved from https://www.wired.com/1994/05/tetris-2/

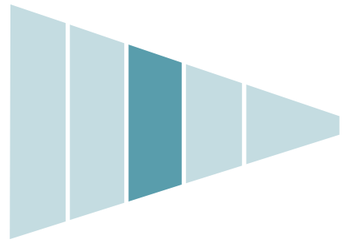
3 How to Get Better at Tetris. (n.d.) *wikiHow.* Retrieved from https://www.wikihow.com/Get-Better-at-Tetris

4 Zadeh, L. A. (1973). Outline of a new approach to the analysis of complex systems and decision processes. IEEE Transactions on Systems, Man, and Cybernetics, SMC-3(1), 28-44. doi:10.1109/TSMC.1973.5408575

5 Diamond, S. (2009, October 25). Why Myths Still Matter: Hercules and His Twelve Healing Labors. Psychology Today. Retrieved from https://www.psychologytoday.com/ca/blog/evil-deeds/200910/why-myths-still-matter-hercules-and-his-twelve-healing-labors

6 Slaying the Hydra. (2018, January 27). De Philosophia. Retrieved from https://dephilosophia.com/slaying-the-hydra/

7 *Apollodorus' Library and Hyginus' Fabulae: two handbooks of Greek mythology.* Hackett Publishing, 2007.



PHASE 3

GENERATE

DESIGN EDUCATION CONCEPTS

(UN)FAMILIAR TERRITORIES

What alternative futures might arise from our fresh perspective on industry and academia? How might learning environments look, feel, and function differently from today, and which human-centred motivations should they primarily serve?

Morphological Synthesis

Compelling aspirational futures should not only showcase the powerful human truths uncovered to date but also be at once new, well-rounded, and focused. To achieve this, Morphological Synthesis, a creative problem solving technique pioneered by astrophysicist Fritz Zwicky (Ritchey, 1998), was employed to construct unfamiliar "worlds" based on the motivations uncovered in Phase 1.

Ideation Workshops

Laddering up from the metaphorical depths of CLA, four one-on-one workshops were held with post-secondary design educators to generate and develop innovative program concepts. Using playing cards with a motivation on the face side (See Figure 3.1) and its corresponding colour-coded STEEPV factor on the back, participants were given all 20 cards face down and asked to randomly pick one card per colour (i.e. the lead motivation for a specific factor) to end up with six cards in total. The result is a unique world (one of 1,296 possibilities), with a set of balanced, targeted, and unbiased environmental considerations for each person to explore.

For recruitment criteria, participant profiles, and worksheets, please see Appendix F.

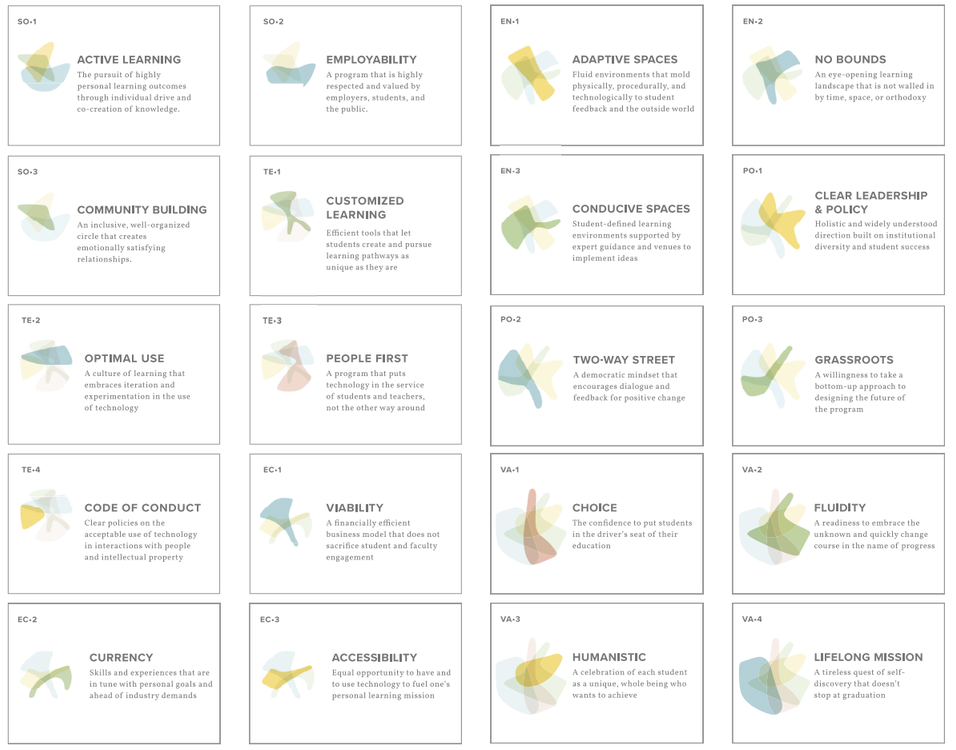


Figure 3.1: Human-Centred STEEPV Cards (Face Side)

Alternative Worlds

The workshops produced four distinct design program concepts, each with its identity driven by different motivations in combination. Figure 3.2 lists these concepts, a brief description, and the inputs that led to their creation.

Figure 3.2: Design Program Concepts

A BOT OF COFFEE

Participant CL

- soc Community Building
- tec Optimal Use
- eco Accessibility
- env Adaptive Spaces
- pol Two-Way Street
- val Fluidity

Open to learners from all countries and walks of life, "A Bot of Coffee" is an affordable, pay-as-you-go design program that takes place in virtual and real spaces outside of school.

Facilitated by human advisers and non-human assistants, the learning system adjusts lesson content and approach in real time as sensors interpret individual learner comprehension, mood, and feedback. "A Bot of Coffee" is incredibly social and connects design learners and leaders worldwide for dialogue, lifelong relationships, or a virtual pat on the back.

IT'S PERSONAL

Participant JT

- soc Employability
- tec People First
- eco Accessibility
- env Adaptive Spaces
- pol Clear Leadership & Policy
- val Humanistic

For design students who get lost in a "one-size-fits-all" system, "It's Personal" is a virtual, on-demand environment that customizes learning goals, schedules, modes of engagement, and projects based on individual preferences. It uses technology and analytics to automatically align portfolios, course offerings, and internal budgets with employment needs and trends. To encourage the pursuit of self-defined success, "It's Personal" rewards passion projects with tuition subsidies in exchange for design research.

ENLIGHTENMENT

Participant JA

- soc Community Building
- tec People First
- eco Currency
- env No Bounds
- pol Grassroots
- val Lifelong Mission

For design students who march to the beat of their own drum, "Enlightenment" is a one-on-one learning system grounded in self-discovery, fit, and knowledge acquisition, not marks. Gurus (industry experts and long-time students) are matched with learners according to their interest, learning style, and personality. Based on the ingenuity displayed by the student in workshops and practical challenges, gurus personalize programs and guide students in applying new lessons to real-life design dilemmas. Students never graduate from "Enlightenment". Instead, they learn for life and become increasingly better versions of themselves for personal and industry gain.

COLLABORATION COLLEGE

Participant RA

- soc Community Building
- tec Optimal Use
- eco Currency
- env Adaptive Spaces
- pol Two-Way Street
- val Fluidity

For students who enjoy diversity and working in groups, "Collaboration College" is an online program built around interdisciplinary teams, complementary skills, and partner institutions. Designers and non-designers are matched and brought together remotely or in person to prototype solutions to real-world problems hackathon-style. Facilitators promote a cooperative and positive environment, while strategic alliances with outside faculties, other higher-education institutions, and industry nurture adaptable designers who are "project-lead ready" as soon as they graduate.

Finding the Right Fit

Acknowledging that a range of equally creative solutions exist, this research now seeks to converge for depth and detail by advancing one of the four concepts presented in the preceding pages as a means of sparking a conversation for change in post-secondary design education and, closer to home, elevating the program I am redesigning and coordinating at Sheridan College. Which one of these ideas has the strongest potential to open the doors of discussion and, importantly, on what basis?

Strategic Alignment as Key Criterion

Oftentimes, even the best-intentioned proposals hit a wall when they are deemed "off strat." Indeed, conflicting priorities, lack of buy-in, concerns over resource misallocation, workplace redundancies, and unclear contextual purpose are organizational hurdles that can easily thwart fledgling initiatives. It is, therefore, imperative to not only recognize long-term plans but also deliberately set strategic fit as a major qualifier in our evaluation of alternative concepts.

In the case of Sheridan College, it has pinpointed five "Strategy Hives," major thrusts that it hopes will position the school for competitive success in the next five years. Per its communication "Sheridan 2024: Defining Our Future" (released well into this MRP), the college offers the following goals and development areas that can (and should) now be taken into account:

Figure 3.3: "Sheridan 2024" Strategic Objectives

Invent the "learningspace" and workspace of the future

How do we use technology to make education more accessible and relevant? What new ways of teaching and programming can support students in learning the hard and soft skills they need to be self-directed and adaptable? How can we lead in progressive work practices that enhance productivity, creativity, and service to students?

Foster agility for the future

The future workforce will require people to adapt to continual changes, navigate uncertainty, invent new roles, and keep learning throughout their lives. How do we develop skills to solve problems that haven't been defined yet?

Invent through collaboration with cities and industry

What kinds of integration between learning, cities, and workplaces can be created through truly transformative collaboration? How can we transform co-op, continuing education, and other forms of applied and lifelong learning to define a new hybrid space for learning, research, and community development?

Offer a truly inclusive, globally aware student experience

How do we create spaces where every voice matters? How do we connect people for more interdisciplinary, cross-program, cross-campus collaboration? How do we deepen student/faculty and peer mentoring so everyone feels supported?

Have processes, infrastructure, and space to fully enable Sheridan 2024

What IT and technological infrastructure would make the administrative side of campus life most seamless and free people up for the essential aspects of their work? How can the physical reality of Sheridan truly reflect and support creativity, learning, and wellness?

With these strategic objectives in mind, how do our four alternatives stack up? Figure 3.4 offers an empirical assessment of fit by looking at how directly each concept and its salient features feed the college's various strategic thrusts.

Figure 3.4: Gauging Strength of Concept Alignment to "Sheridan 2024" Strategy

"Sheridan 2024" Strategic Objectives	A Bot of Coffee	It's Personal	Enlightenment	Collaboration College
Foster agility for the future	◐	○	◐	◐
Invent the "learningspace" and workspace of the future	●	◐	●	○
Invent through collaboration with cities and industry	●	○	◐	●
Offer a truly inclusive, globally aware student experience	●	○	●	●
Have processes, infrastructure, and space to fully enable Sheridan 2024	●	●	◐	◐

● Strongly / directly supports strategy
◐ Somewhat / indirectly supports
○ Poorly supports

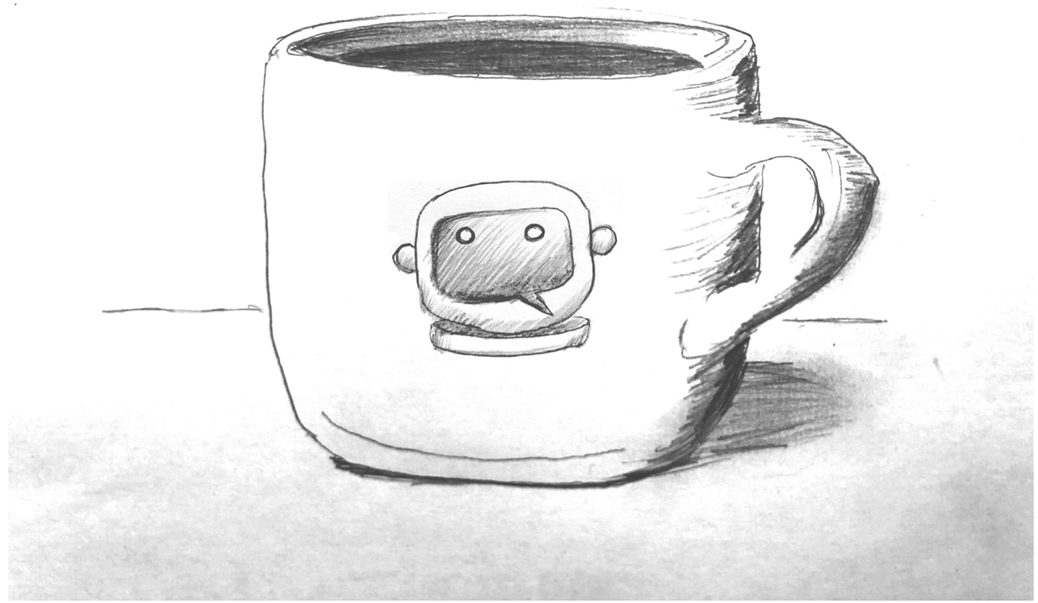
Choosing a Concept to Develop

Based on the above criteria, one alternative world rose above the others and dovetailed more tightly into Sheridan College's strategic priorities. Coincidentally, it also stood out in the workshops for its cohesiveness, imaginative use of technology, and clarity of intent. The following section unpacks our winning concept: **A Bot of Coffee**.

PHASE 4

REFINE

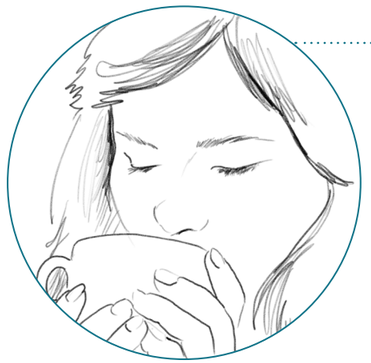
THE CONCEPT



A BOT OF COFFEE

Taking a bigger sip

How might A Bot of Coffee operate in the future? This section builds on the CLA and ideation workshop results by illustrating a "slice of life," lending physical form to the motivations, key concepts, and insights at the heart of this idea. More explicitly, it seeks to (1) contextualize A Bot of Coffee as a human-centred solution, (2) visualize its moving parts, (3) bring to the fore required investments or partnerships, (4) serve as a gut check for validity, and (5) compose a narrative for communicating the new.



Nara has a zen moment before her module begins.

Use Case Scenario

Nara walks into her neighbourhood café ready to start learning. She likes the laid back, lazy feel of a Sunday afternoon and feels it is the perfect time to start her new module. With her tech in one hand and favourite beverage in the other, she is fully armed as she takes her usual spot at the communal study table.

She is excited to start her new module. At the price of a cup of coffee a day, why not? Rather than the mammoth tuition commitments of old, the price of learning is much friendlier with a pay-as-you-go model. Nara recalls the orientation pitch that got her into the Digital Product Design program:

A global and affordable virtual learning environment

From the comfort of a local coffee house, the Digital Product Design program offers always-on Learning In Virtual Environments (or LIVE) with a global perspective. For the price of a cup of coffee a day, students from around the world cover foundational topics such as human factors, empathic design, design strategy, sustainable design, user experience design, and evidence-based design; collaborate with like-minded peers; and partner with industry to work on real-world projects. Your learning isn't time-boxed. You learn when and for how long you want. Plus, LIVE senses and adjusts to your comprehension and feedback, allowing you to learn at your pace.

Nara really values learning on her terms and how the program is accessible to all. Paying a little more for her modules helps ensure the LIVE virtual glasses are distributed to underserved areas.

The LIVE learning trend is certainly not her mother's academic experience. In fact, Nara just read another article on the enrolment freefall in traditional academia. The fixed pace, one-size-fits-all education certainly doesn't appeal to her generation.

As she takes a sip of her dark-roast coffee, she puts on her LIVE glasses and enters a personalized virtual learning environment. Since it is the first day of the new module, Nara is a little nervous. The LIVE virtual environment senses that and changes her default techno "wallpaper" environment to an ambient one. That's better, she thinks.

Nara is comfortable and completely immersed in LIVE

Her new session focuses on Sustainable Design. This is a perfect subject for Nara. Ever since she was young, she tinkered with things, trying to make them last just a little longer. Why throw them in the waste? Given the fragile state of the planet, she wants to make things better and for a greater good. Finally, she will be in her element and dig into discussions with others who feel the same way!

She turns to see a few classmates joining her at the café's communal table. She greets Jakob and Li, fellow classmates and now friends from a previous session. A few others just join virtually, and she looks forward to making new acquaintances. That's the benefit of coming out to the Learning Perks coffee shop: you get to virtually collaborate with people from afar as well as peers you know locally.

Nara chats with her peers about their last module

Waiting for her module to start, she recalls the last one she took, Evidence-Based Design. It was more challenging than anything she

Advisor Akilah offers industry insider knowledge to Nara virtually

had taken before, and it was the first time she missed any achievement badges. LIVE sensed the puzzled looks Nara had with readings from her Analytics modules, so PROF-BOT came to the rescue, slowed down the pace, engaged her in banter on the subject matter, and successfully unblocked her cognitive bottleneck. It also didn't hurt that she booked (on PROF-BOT's suggestion) a few sessions with her in-real-life Advisor Akilah, who guided her with creative ways of approaching her Analytics assignment. Those "power-ups" surely helped her get to the next achievement level.

Back to Nara's virtual LIVE class, Advisor Akilah introduces herself and lets the class know that she is available for collaborative sessions. PROF-BOT takes over, presenting recent research to guide the discussion on frugal innovation. A few students from remote/underserved areas of India chime in, offering a compelling take on their conditions due to limited water resources. This provides Nara with a new perspective. Her tinkering had always been about extending the life of her tech gadgets, not making daily life more manageable for other people.

Meaningful discussion inspires Nara to start designing

Inspired by the discussion, Nara finds herself sketching out a mixed-reality screen interface that detects optimal watering for crops. That's the thing with this program, Nara muses— it really infects you with curiosity. She tries a few more rounds of sketches to see what her peers think. Peer feedback happens so naturally in this program. She

values their opinion since they are the smartest people she knows.

Without realizing it, she is on her way to completing her first assignment for the Iterative Design module. She notices this later as she browses the tasks on tomorrow's agenda. She looks forward to starting that module. That iterative nature of design is what engages her—a venue that rewards experimentation is perfect for her tinkering disposition.

After having lunch in the west end with Jakob and Li from the morning class, Nara decides to go for the introduction to Product Design Workshop module in a Learning Perks coffee shop just a block away.

It appears that the project with Supercapacity Systems is the right fit. Judging from the kick-off meeting, the company really values her thoughts and suggestions on their newest product upgrade and expects her to take the lead! Given their own interest in sustainability and her desire to sharpen her skills, it is sure to be a fulfilling collaborative experience.

Looking ahead to next week, she can't wait to try Design Industry Virtual Environment (DIVE) simulator, a trial run for a few weeks before her real-life industry placement. Nara hears that advisors work with industry to design the simulations, and they aren't shy about throwing in some chaos and unanticipated curveballs. Recent graduates note that the experience is arduous at first, but everyone raves about the gains: resilience and a definite boost to emotional intelli-

Nara listens to peer feedback and reworks her design

Nara contributes to solving a real-world problem in DIVE

Nara processes everything she learned today

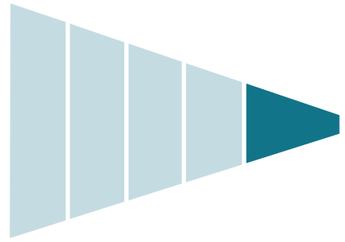
gence. They say the secret lies in trusting and using the methods PROF-BOT covers in class.

And it's not just students who benefit. Advisor Akilah immersed herself in an industry partnership earlier this year, and Nara noticed how invigorated her Advisor was when speaking about her collaboration. Current industry experience really shows at their advising sessions.

On her commute home, Nara is determined to realize the app idea she had earlier in the day. A passion project she has every intention of making a real project! She's happy how everything came together and will ask Jakob and Li if they'd be interested in collaborating with her

Nara asks PROF-BOT (who never sleeps) one last question for the day

As the evening arrives, Nara, a self-described night owl, has an urge to chime in from her mobile device for one last short burst of learning. She is able to connect from the comfort of her couch. One of the perks of an always-on system is that sessions run all day with advisors from different parts of the world. She gets an answer to her query and can now rest, ready to tackle what tomorrow has in store.



PHASE 5

ACTIVATE

THE FUTURE

FROM UNICORN TO REALITY

Now that the conceptual building blocks for reimagining design education have assumed a prototypical form, what (and whom) would it take to move A Bot of Coffee closer to fruition?

Identifying Stakeholders

As a first step, it is critical to identify the parties who can materially impact and be impacted by A Bot of Coffee's rollout. From a design thinking standpoint, they represent the bases whose needs and wants have to be considered. From the more pragmatic lens of change management, they are likely to be the most entrenched and "squeakiest" parties through (or around) which program change must occur. Who are emblematic of design education today?

Schools /Admin	Governing bodies and administrators at higher-education institutions offering design programs
Instructional Techs	Technologists who select and maintain the learning management systems (LMS), computer software, and equipment for design labs and studio classrooms
Students	Learners and their peers at college or university design programs (undergraduate and graduate)
Educators	Professors of college or university design programs (undergraduate and graduate)
Tech Industry	Developers of education learning management systems (LMS) as well as hardware and software used in the design field
Private Sector / Employers	Companies, design studios, agencies, and in-house design departments
Unions	Association of school employees formed to protect and further the rights and interests of its members
Government	Ministry responsible for educational funding, policies, grants
Family, Friends	Learner's immediate personal circle
Social Media	User-generated content on various online platforms, virtual communities, and networks

Visualizing Influence

Given the major players in current design academia, where does influence lie vis-à-vis A Bot of Coffee's fundamental attributes? Who has the authority to legitimize or restrict change, and where else could their influence be utilized to push this alternative future forward?

Influence Maps

To answer these questions and (more boldly) put a "face" to major issues and opportunities, the motivations, levers, and tensions from HCS were mapped back in full context to the stakeholder(s) most strongly associated with them by thought leaders and interviewees from Phase 1 as well as my professional experiences as a designer, program administrator, and design educator at Sheridan College. At first blush, the myriad connections between the various stakeholders and drivers of design education weave an expectedly tangled web of interests and accountabilities (See Figure 5.1).

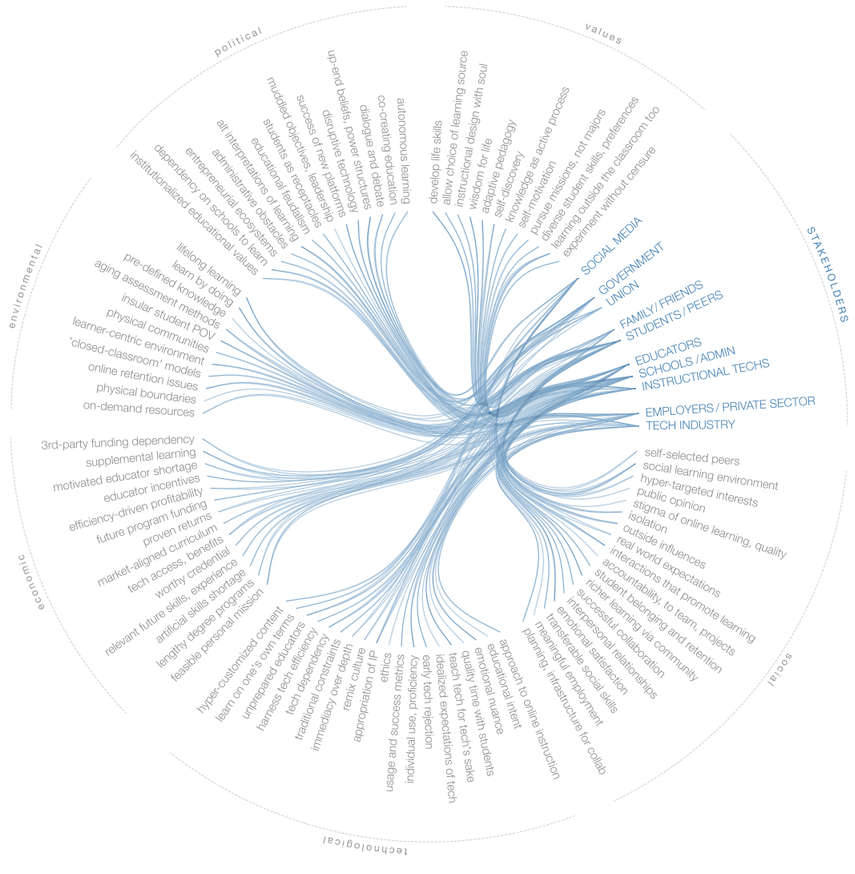


Figure 5.1: Key Stakeholders and Their Influence on Design Education

Isolating each stakeholder, however, paints a much more interesting picture. Supporting the notion that academia is an "ivory tower", Figure 5.2 shows that power and influence mainly reside in three players: Schools / Admin, Educators, and Students / Peers — visually the only stakeholders to touch (either positively or negatively) some aspect of each major factor, thereby suggesting that current design education is by and large shaped by this omnipresent triumvirate of influence.

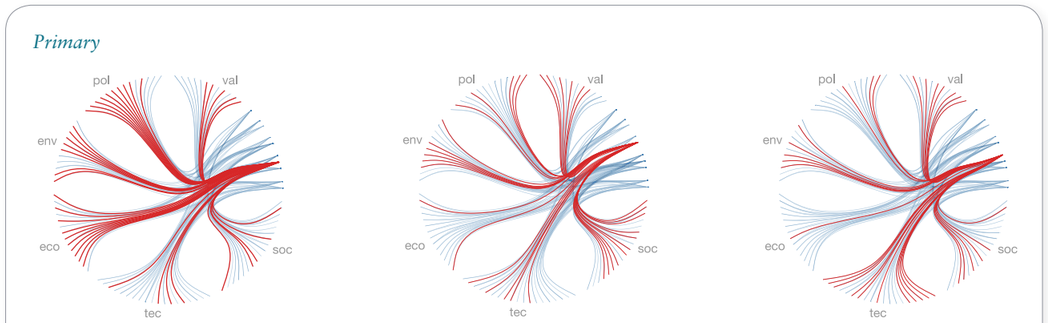


Figure 5.2: Individual Stakeholder Influence on Design Education

Partnering for Success and Value Creation

For A Bot of Coffee to close the gap between design industry and academia, it must break the self-referential triangle of school, teacher, and student to incorporate stakeholders who lie outside the sphere of studying, offer tremendous value, and may have thus far been underused (or worse, misused). Rather than coordinating diverse stakeholders to manage complexity, striking new partnerships to incite change and create new value will be instrumental in getting A Bot of Coffee off the ground.

Given the significance of A Bot of Coffee's departure from the status quo, new investments, infrastructure, and working relationships will necessarily arise. With whom

Figure 5.3: Current Value Web

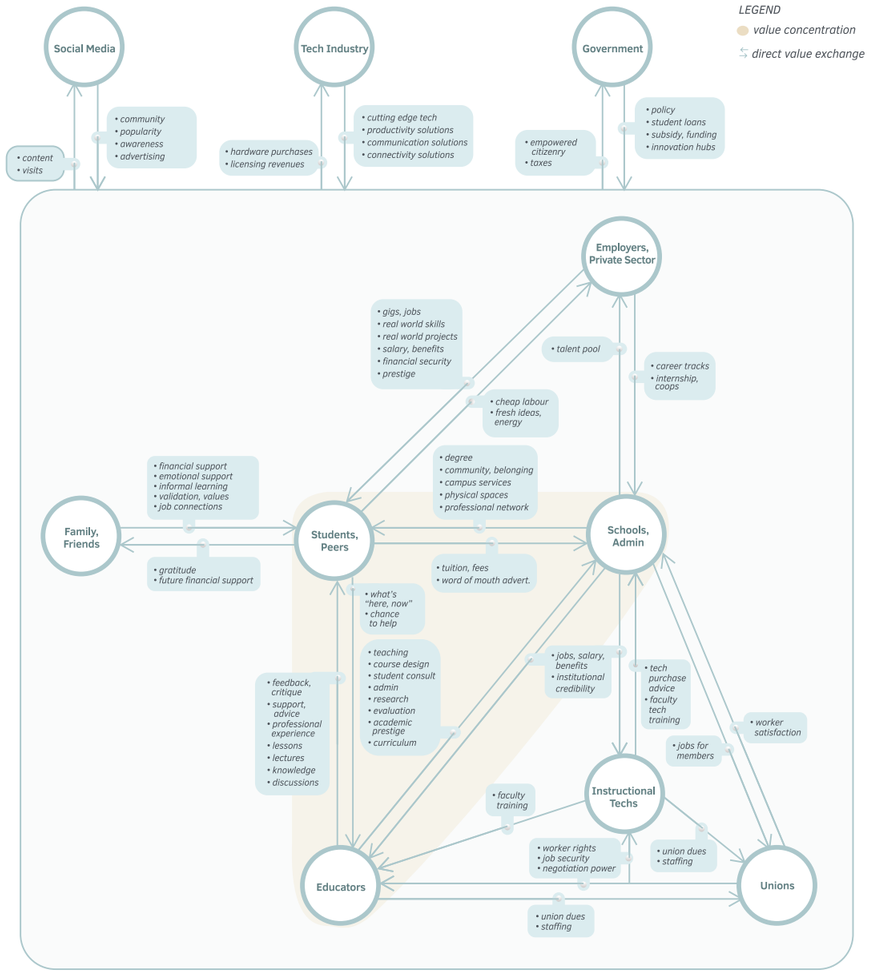
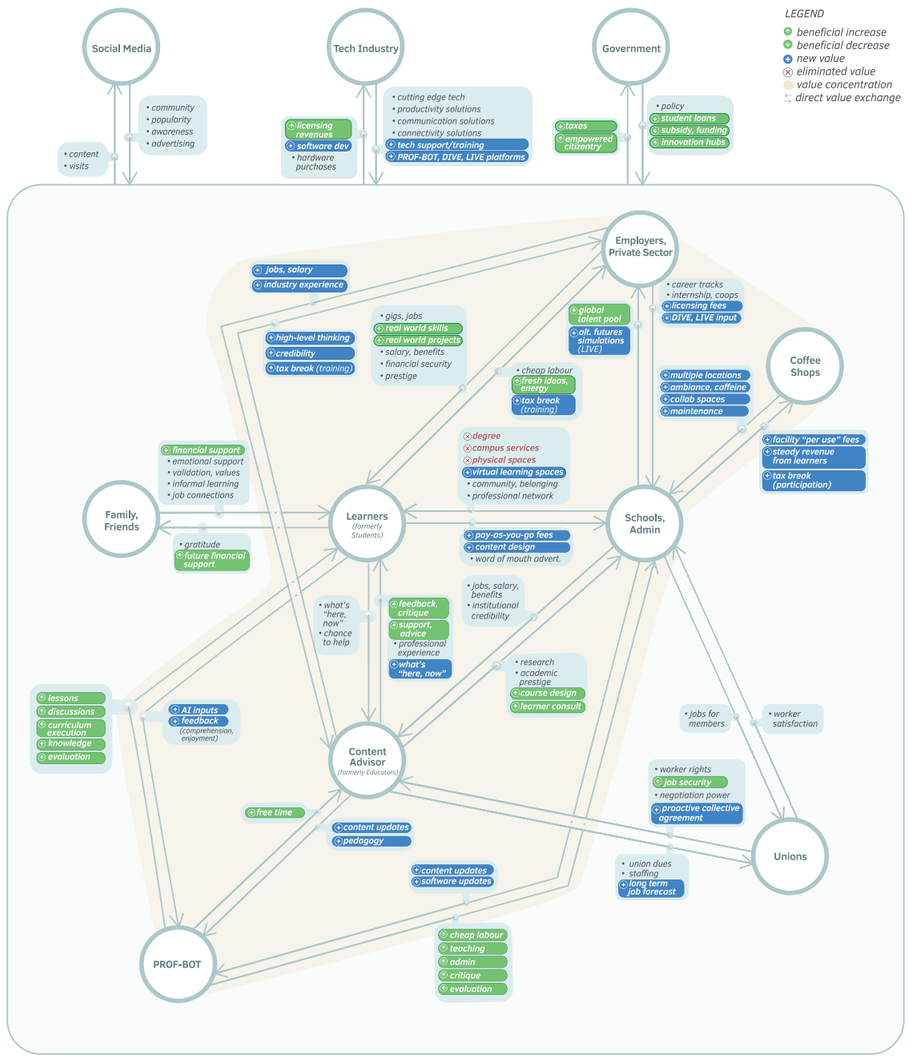


Figure 5.4: Proposed Value Web



and for which components should schools partner? What types of value exchanges might these new partnerships entail?
Figure 5.3 illustrates the familiar value web of post-secondary design education today, where tuition, knowledge, and academic infrastructure change hands in a closed loop. From this vantage point, one can see how enabling the current setup can be in perpetuating the misguided belief that students are low-value receptacles (i.e. receive but don't contribute), design educators teach because they can't do, and schools institutionalize learning for financial gain.

In contrast, Figure 5.4 puts forth a more robust, differently-connected value web driven by A Bot of Coffee. In this alternative future, (1) non-human players enter the mix to introduce value; (2) active private sector integration synchronizes academia with industry; (3) learners are equipped to generate value earlier in the process; (4) new revenue streams promote self-sufficiency; and (5) re-assignment or elimination of values result in qualitative wins and financial efficiencies.
How might we realize this re-imagined value proposition?

From Educator to Content Advisor

Shifting Educators away from course delivery and administration towards industry-based learning design and individual counsel

Campus to Go

Unloading schools' physical real estate to fund virtual spaces that are fully immersive, learner-selected, and decentralized

Experience U

Realistic virtual environment that simulates industry challenges for learner and private sector readiness

The Rise of Prof-Bot

Delegating content delivery, discussion topics, and time-consuming tasks to non-human learning assistants

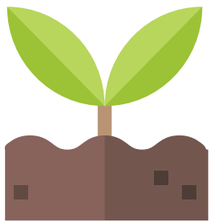
Figure 5.5: Turning Points (A Bot of Coffee)

Deconstructing the Nara-tive

Nara's learning future hinges on four turning points - mission critical "buckets of change" that are directly linked to particular aspects of our new value story and require leadership, planning, and change management to move forward. Figure 5.5 outlines these turning points.
The next section proposes a high-level road map (from the school's point of view) for activating each of these four turning points and moving A Bot of Coffee closer to reality. Built around the elements listed in Figure 5.6, it offers a considered initial structure to how we might think about and communicate the new for maximum acceptance and implementation.

Key Activators	"Must haves" that define the turning point
Main Objectives	Principal goals, gains to which all activities must ladder back
Partners	Parties to engage, who own resources we need / do not have
Securing Buy-in	Communicating what's in it for partners, stakeholders
Potential Pitfalls	Watch-outs that may derail the turning point and should be anticipated
Measurement	Key performance indicators to build in, monitor, gauge success
Milestones	Important steps to take and celebrate when achieved
School Readiness	Areas to work on or leverage (money, mindset, politics, technology)
Value Context	Principal relationships that produce value

Figure 5.6: Key Elements of High-Level Road Map



From Educator to CONTENT ADVISOR

Shifting Educators away from course delivery and administration towards industry-based learning design and individual counsel

WHAT'S NEEDED	TO GAIN WHAT	PARTNER WITH	TO CHANGE WHAT	INTO WHAT	SO WHAT
Educators with current industry experience	**Leading-edge program in tune with industry trends, challenges** **Better-prepared, relevant graduates**	**Private Sector** (industry insight) **Educators** (professional experience / gaps)	**Few full-time faculty work outside the college,** so dated knowhow, stale content transferred to students	**Learners have, apply the latest industry insight** from their project consultations	**Work with industry to train educators** who lack the latest skills for a part-time move back to the workplace
Educators who excel at conceptualizing, making, advising (not just teaching)	**Authentic programs by designers for designers** **Quality check-in time with learners**	**Unions** (new job descriptions) **Educators** (new responsibilities)	**Uninspired educators have little say on role evolution** **Reactive unions** protect current jobs	**Educators time, expertise put to more stimulating, higher-value use** **Proactive unions** protect future roles	**Consult unions, educators** on new job descriptions, requirements, benefits **Revise educator selection, retention criteria**

MAKING IT HAPPEN

MILESTONE 1	MILESTONE 2	MILESTONE 3	MILESTONE 4	MILESTONE 5	MILESTONE 6
Consult union, new collective agreement	Inventory faculty skills, skill gaps	Seek industry partners willing to upskill faculty	Pilot faculty industry placement	Placed faculty source industry projects	Advisors design, adapt modules, learner counsel around industry expertise

POTENTIAL PITFALLS

Industry Support / Availability
Private sector sees faculty as book-smart burden, cannot have new staff, do not have right roles
Fail-safe: *Variety of potential roles, skills swap*

Union Resistance
Union takes tough stance on new role, initiates a lengthy labour disruption
Fail-safe: *Early, frequent consultation with union*

Unwilling Educators
Educators refuse to intern, disrupt routine, work more, be evaluated for skills / experience gaps
Fail-safe: *Paid training, no salary reduction*

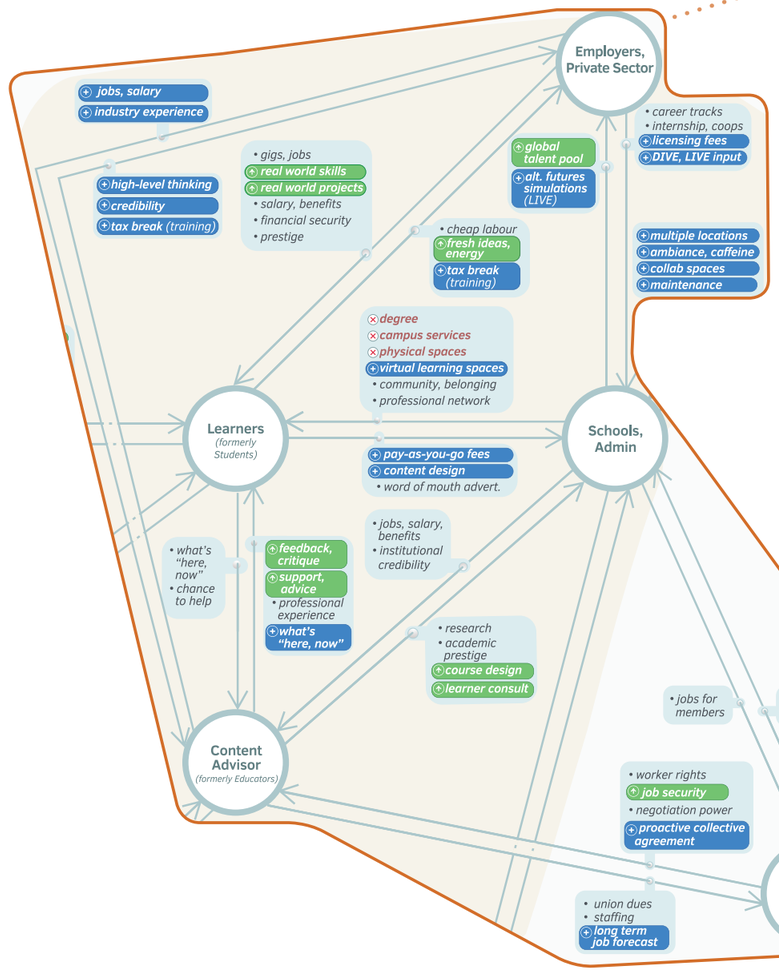
COMMUNICATING FOR BUY-IN

Educators
Paid industry exposure, future-proof skills, new research opportunities, job security, more interesting use of time, creative challenge

Private Sector
Experienced pool of respected high-level thinkers, insider access to top learner talent, corporate social responsibility

Unions
Upskilling ensures educator longevity, getting ahead of tech disruption to protect members, higher quality work life

VALUE CONTEXT



Employed part-time in industry as expert counsel, Content Advisors offer higher quality, up-to-date inputs to projects and course design, in turn letting learners and schools compete more effectively. They depend less on schools for income and entitle industry to tax breaks.

SCHOOL READINESS METER

Mindset		**Politics**	
Money		**Technology**	

KEY PERFORMANCE INDICATORS

- **Advice Quality**
- **Advice Quantity**
- **Learner Retention**
- **Placement Evaluation**
- **Mastery of Industry Challenge**

Vicarious

EXPERIENCE U

Realistic virtual environment that simulates industry challenges for learner and private sector readiness

WHAT'S NEEDED	TO GAIN WHAT	PARTNER WITH	TO CHANGE WHAT	INTO WHAT	SO WHAT
Simulated alternative futures for private sector planning, training	**Integration of global private sector, academia in real world projects** **B2B income stream from licensing**	**Government** (oversight, funding, resources) **Private Sector** (industry projects)	**Students don't get enough meaty, wicked "real-world" projects,** academia not seen as solution to industry problems	**Private sector seeks learners to co-develop** alternative futures, industry-specific simulations based on LIVE's deep learning platform	**Manage legalities** of licensing, intellectual property rights, agreements **Protect academic freedom** when working with private sector
Design industry virtual environment (DIVE) simulator	**Differentiating design industry simulation offering, global "plug and play" learners**	**Private Sector** (industry exposure) **Tech Industry** (digital development)	**Students are unprepared for design workplace realities**	**Learners experience a virtual trial of a full project** in fast-paced design industry, choose their best-fit internship environment	**Document a variety of challenging design studio environments,** workflows to simulate **Train educators** who maintain, contribute to simulation platform

MAKING IT HAPPEN

MILESTONE 1	MILESTONE 2	MILESTONE 3	MILESTONE 4	MILESTONE 5	MILESTONE 6	MILESTONE 7
Consult digital content, government, private sector partners	Develop engines for Design Industry Virtual Environment (DIVE), Learning in Virtual Environments (LIVE)	Create virtual design studio, industry-specific environments	Prototype, test, revise simulations	Students work iteratively with partners on pilot project	Update DIVE, LIVE based on pilot	Launch regional, global trials

POTENTIAL PITFALLS

Output Integrity
Industry interprets licensing agreements as ownership of work and unilaterally dictates scope, parameters, ethics

Fail-safe: *Partnership rules of engagement*

Bad Simulations
Design workplace, private sector issues are misrepresented, not thought through, cast doubt on value of simulations

Fail-safe: *Vetting process, quality data input, futures training*

No Industry Participation
Design industry, private sector doubt ROI, lack time, refuse to share competitive advantages / concerns / ugly side of business and withhold their support

Fail-safe: *Non-disclosure agreement (NDA), success stories, tax break*

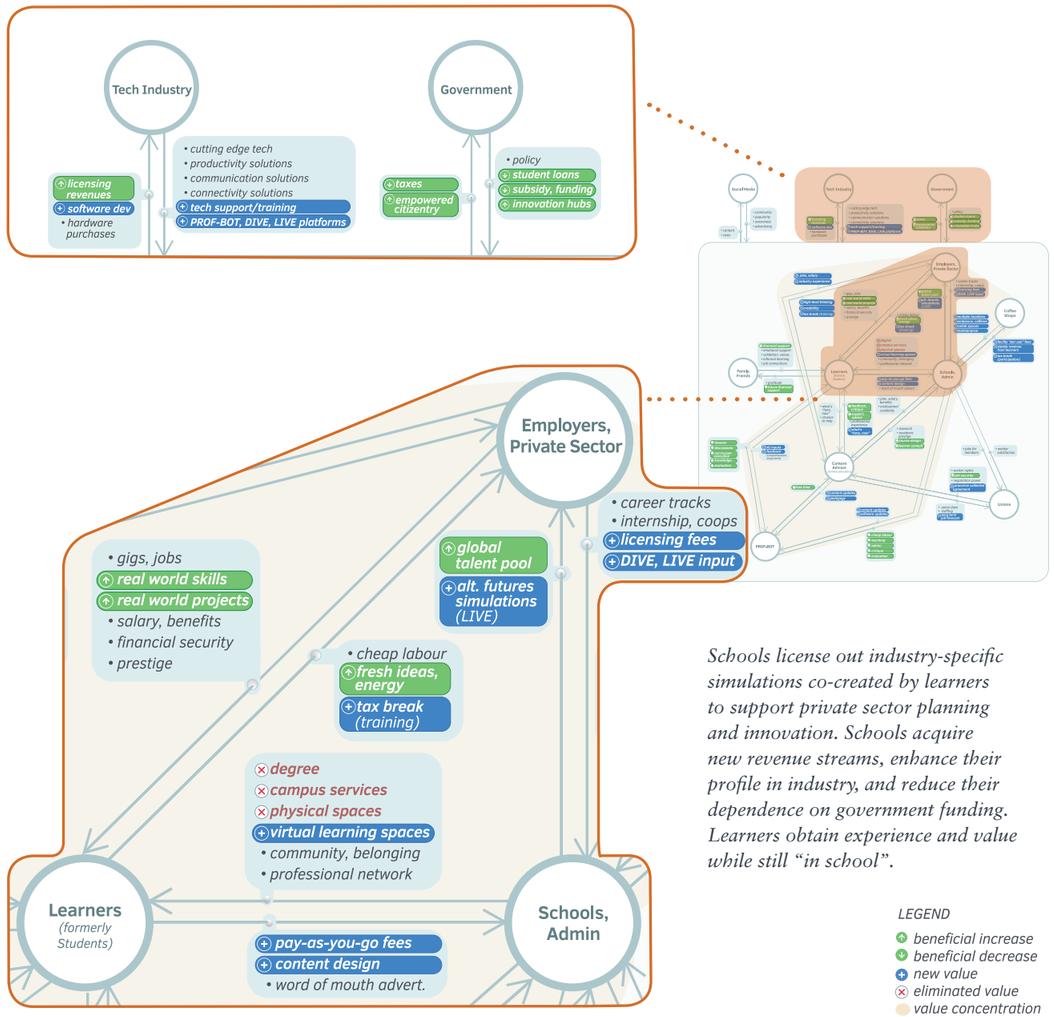
COMMUNICATING FOR BUY-IN

Government
Stimulate economic growth, innovative job growth initiative will satisfy voters, tax breaks for industry participation will quell "brain drain"

Private Sector
Hire from global talent pool of experientially-trained candidates, prestige as community partner, investor in education, minimal risk, better decision-making, futures-based training, latest tech, corporate social responsibility

Tech Industry
Multi-year service agreement, prestige of developing unique platform, corporate social responsibility

VALUE CONTEXT



Schools license out industry-specific simulations co-created by learners to support private sector planning and innovation. Schools acquire new revenue streams, enhance their profile in industry, and reduce their dependence on government funding. Learners obtain experience and value while still "in school".

LEGEND
- *beneficial increase*
- *beneficial decrease*
- *new value*
- *eliminated value*
- *value concentration*
- *direct value exchange*

SCHOOL READINESS METER

Mindset		Politics	
Money		Technology	

KEY PERFORMANCE INDICATORS

- **Tightness of Simulations**
- **Licensing Revenue**
- **Employer Satisfaction**
- **Workplace Skills Acquisition**
- **Employment Rate**
- **Planning, Training Effectiveness**

Convenient

CAMPUS TO GO

Unloading schools' physical real estate to fund virtual spaces that are fully immersive, learner-selected, and decentralized

WHAT'S NEEDED	TO GAIN WHAT	PARTNER WITH	TO CHANGE WHAT	INTO WHAT	SO WHAT
Non-school-owned physical collaboration hubs in convenient locations worldwide	**Freed-up capital** to invest in the development of hyper-responsive virtual spaces **Satisfying in-person human contact in informal settings**	**Private Sector** (Banks, Coffee Shops, Commercial Realty)	**Schools have acres of campus space that impede learning** due to distance, centralized location, disrepair	**Physical learning spaces inside cool, relaxed, well-maintained coffee shops everywhere**	**Seek suitable buyer of campus real estate** **Anticipate potentially complex rezoning laws** **Pitch coffee shop chain to host learners**
A variety of school-owned multi-person VR learning environments (LIVE)	**Collaborative, immersive, experiential learning regardless of location**	**Tech Industry** (Digital Content Developers, Virtual Environment, Wearable Hardware Developers)	**Sterile classroom environment is uncreative, isolated.** VR is limited to student recruitment, not design learning	**Digital content developers create experiential learning environments not tied to any one physical location**	**Determine optimal portfolio of virtual environments to propose and fund**

MAKING IT HAPPEN

MILESTONE 1	MILESTONE 2	MILESTONE 3	MILESTONE 4	MILESTONE 5	MILESTONE 6	MILESTONE 7
Seek potential buyers/uses of campus locations	Negotiate dedicated collaboration spaces in retail locations	Develop virtual learning environments with digital content developers	Pilot project at select coffee shop locations	Phase out legacy programs tied to campus buildings	Sell, lease campus buildings	Regional/national, global launch

POTENTIAL PITFALLS

Customer complaints
Regular cafe customers are irritated by commotion, walk away

Fail-safe: *Learner code of conduct*

Unattractive real estate
Location, type of buildings are difficult to sell

Fail-safe: *Urban planning proposal*

Peer availability
Scheduling flexibility results in unpredictable attendance, no one to collaborate with

Fail-safe: *Collaboration scheduling request app*

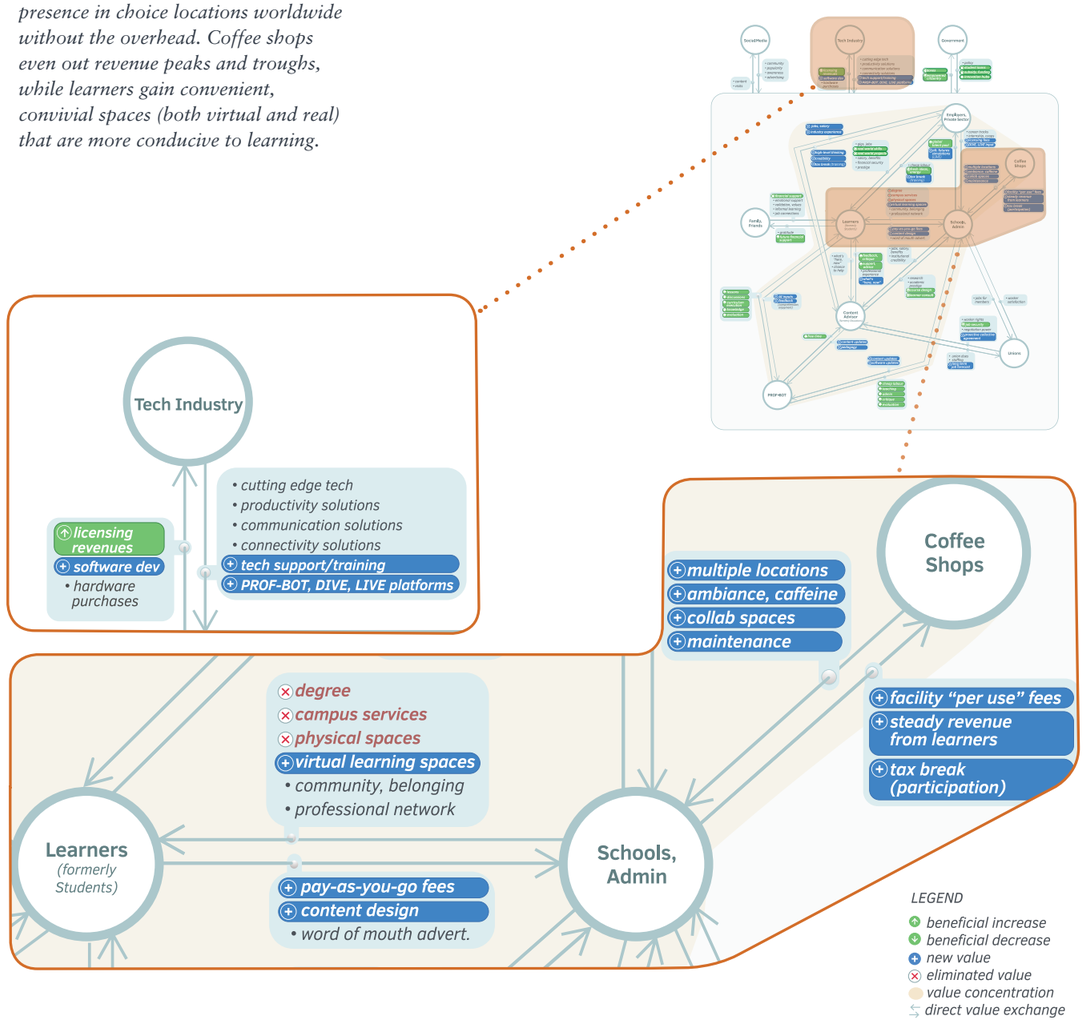
COMMUNICATING FOR BUY-IN

Private Sector (Coffee Shops)
Steady stream of paying customers, tax breaks for supporting education initiative, corporate social responsibility, mature and self-motivated learners

Tech Industry
Multi-year service agreement, prestige of developing unique platform, corporate social responsibility

VALUE CONTEXT

Schools augment their physical presence in choice locations worldwide without the overhead. Coffee shops even out revenue peaks and troughs, while learners gain convenient, convivial spaces (both virtual and real) that are more conducive to learning.

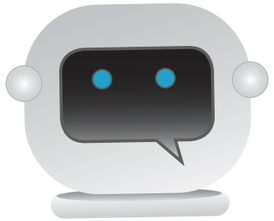


SCHOOL READINESS METER

Mindset		**Politics**	
Money		**Technology**	

KEY PERFORMANCE INDICATORS

- **Comprehension**
- **Attendance**
- **Retention**
- **Quality of Virtual Environments**
- **Learner Enjoyment**



The Rise of PROF-BOT

Delegating content delivery, discussion topics, and time-consuming tasks to non-human learning assistants

WHAT'S NEEDED	TO GAIN WHAT	PARTNER WITH	TO CHANGE WHAT	INTO WHAT	SO WHAT
Artificial Intelligence that effectively assesses, adjusts to individual student comprehension	**Real-time feedback** that satisfices student quandaries **without costly instructor hours**	**Tech Industry** (AI hardware, software) **Educators** (art and science of pedagogy)	**Not all students learn at the same pace**, so some are left behind while others are bored	**Students are engaged in their own time without consequences**	**Tighten standards of student privacy** **Change interim performance evaluation criteria** from standardized to individual
Virtual educator that curates content, facilitates discussions with emotional nuance	**Human-like substitute** that is more effective at **holding student interest** than traditional multimedia aids	**Tech Industry** (AI hardware, software) **Educators** (art and science of pedagogy)	**Current instructional media is static**, dry, lacks personality Chatbots are easily gamed, do not get cultural references	**Students feel that they are interacting with a fellow human at all times**	**Organize consultation**, free trials with PROF-BOT to minimize backlash from traditionalists and build confidence in the technology

MAKING IT HAPPEN

MILESTONE 1	MILESTONE 2	MILESTONE 3	MILESTONE 4	MILESTONE 5	MILESTONE 6	MILESTONE 7
Consult instructional techs, educators, admin, global partners on learning, criteria	Develop AI engine, sensors for learner comprehension	Create PROF-BOT personality matrix, content, evaluation rubric	Build initial prototypes, user testing	Iterate PROF-BOT per user feedback	Launch regional pilot, trial	Launch international pilot, trial

POTENTIAL PITFALLS

Public Readiness

People have idealized expectations of virtual educator or question learning from "something" with no track record

Fail-safe: *Awareness campaign, optimal mix of fast and slow tech*

Rushing to Market

Hasty launches to meet predetermined deadlines lead to awkward, error-prone PROF-BOT

Fail-safe: *Quality assurance testing*

Diversity / Localization

For a global rollout, not enough content from international experts to enrich the platform with design perspectives ex-North America

Fail-safe: *International recruitment of content experts, participants*

COMMUNICATING FOR BUY-IN

Educators

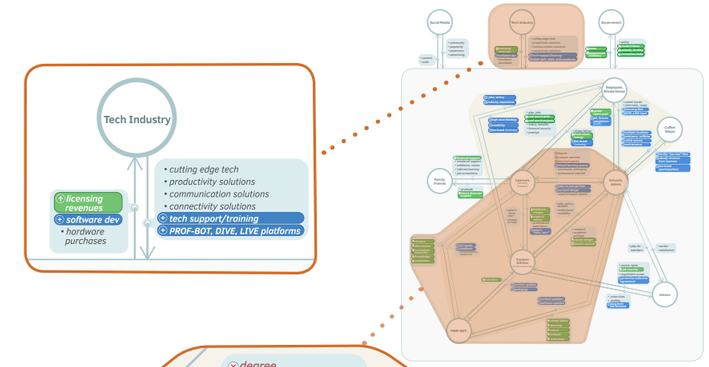
No preparing and delivering tedious lectures, universal access to marking assistant, lower volume of learner inquiries, more flexible work schedules, more time for interesting higher-value work, future-proofing their role

Tech Industry

Multi-year service agreement, prestige of developing unique platform, corporate social responsibility

VALUE CONTEXT

Virtual learning assistant (PROF-BOT) allows Educators to have more fulfilling careers as Content Advisors while learners maximize the personalized attention they need. Schools gain labour efficiency and rely less on unions for business continuity.



SCHOOL READINESS METER

Mindset		**Politics**	
Money		**Technology**	

KEY PERFORMANCE INDICATORS

- **Comprehension**
- **Attendance**
- **Retention**
- **Learner Engagement with Material**
- **Admin Turnaround Time**

REFLECTIONS

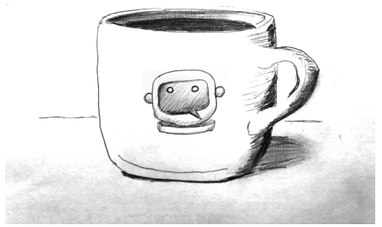
While PROF-BOT may not wander the virtual halls of Sheridan College anytime soon, it is incumbent upon design schools and educators to accept (if not welcome) this eventuality.

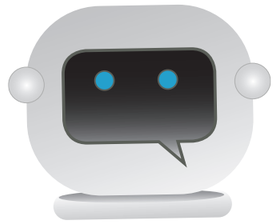
The promise of technology is well-documented: lecture automation, convenient access, content customization, entertainment, and scalability, to name a few. How, then, can today's educator thrive in this uncomfortable future world? The ironic answer is to dive even more deeply into our comfort zone. While the AI educator delivers hyper-customized lessons and technical skills training, the Content Advisor Formerly Known As Educator doubles down on their intrinsic value proposition and offers wisdom, guidance, empathy, and sober second thought to the design learner of tomorrow. Indeed, if we accept the dictionary definition of the word "luxury" as "something that gives you pleasure or an advantage which you do not usually have," might human contact be the new luxury in our technologically driven culture?

One of the unspoken goals of this MRP has always been to provoke thought, open discussions, and, better still, ignite stakeholder action well before the likes of PROF-BOT are amongst us. Schools can rethink physical campuses by partnering with the private sector for more conducive environments. Online learning approaches can be pushed beyond glorified web portals by collaborating with the tech industry on AI-assisted learning. Educators, in concert with their labour associations, can proactively evolve from lecturer to advisor in preparation for a "teacherless" society. As A Bot of Coffee shows, maximizing value creation in the web of post-secondary design learning allows us to face the future without fear.

As a program coordinator at Sheridan College, what can I commit to today? I intend to prototype the enhanced advisory role inspired by A Bot of Coffee. This starts with maximizing in-person studio time by shifting supplemental learning to online delivery methods. To enrich the learning culture, I will look to the human-centred motivations identified herein to foster a responsive environment that recognizes individual learning styles and encourages experimentation. To instill an addiction to learning, I will infuse a meaningful, scaffolded approach to curriculum design where methods and achievements are clear and content in one course purposefully informs another. Finally, I will recalibrate the "Web Design" program to showcase employable Sheridan talent who can design compelling, human-centred digital products for any platform.

It is important to recognize that A Bot of Coffee is but one depiction of the future at a fixed point in time. As such, my work cannot end here. I will continue to seek and workshop other viable futures so that tomorrow's design learning environment not only stays relevant but also one day predicts the needs of industry and learners alike. It takes a community to shape the future(s) of design learning. I invite others to advance this research approach of thoughtfully framing and evaluating the state of design education, creatively ideating and refining future "worlds" of learning, and most importantly, resourcefully finding ways of activating them. For those who need further convincing, I leave you with this: While large-scale technological disruption may still be unprecedented in an academic context, it is most certainly foreseeable.





REFERENCES

Aye, G. (2017, June 2). Design Education's Big Gap: Understanding the Role of Power. *Medium*. Retrieved from https://medium.com/greater-good-studio/design-educations-big-gap-understanding-the-role-of-power-1ee1756b7f08

Ackoff, R. L., & Greenberg, D. (2008). *Turning Learning Right Side Up: Putting Education Back on Track* (paperback). Pearson Prentice Hall.

Apollodorus' Library and Hyginus' Fabulae: two handbooks of Greek mythology. Hackett Publishing, 2007.

Apple, M. W. (2003). Is the new technology part of the solution or part of the problem? In A. Darder, M. Baltodano, & R. D. Torres (Eds.) T*he critical pedagogy reader* (pp. 440- 458). New York, NY: Routledge Falmer.

Baggaley, J. (2013). *Harmonizing global education; from Genghis Khan to Facebook*. Portland: Ringgold Inc.

Boutsalis, K. (2017, July 28). How Ontario post-secondary schools are putting robots to work in classrooms and clinics. *NOW Toronto*. Retrieved from https://nowtoronto.com/lifestyle/class-action/pepper-the-robot-mcmaster-ryerson-research/

Brindley, J., Blaschke, L. M., & Walti, C. (2009). Creating effective collaborative learning groups in an online environment. *The International Review of Research in Open and Distributed Learning, 10*(3) doi:10.19173/irrodl.v10i3.675

Bussey, Marcus (2009). Causal layered pedagogy: rethinking curriculum through a futures lens. *Transnational Curriculum Inquiry* 6 (1) Retrieved from http://nitinat.library.ubc.ca/ojs/index.php/tci

CAST (2011). *Universal Design for Learning Guidelines version 2.0*. Retrieved from http://udlcenter.org/aboutudl/whatisudl

Chelaru, S., Orellana-Rodriguez, C., & Altingovde, I. S. (2014). How useful is social feedback for learning to rank YouTube videos? *World Wide Web, 17*(5), 997-1025. doi:10.1007/s11280-013-0258-9

Chiose, S. Globe and Mail (2017, January 26). Declining enrolment has Ontario colleges facing an uphill battle: PwC report. *The Globe and Mail*. Retrieved from https://beta.theglobeandmail.com/news/national/declining-enrolment-has-ontario-colleges-facing-an-uphill-battle-pwc-report/article33770081/

Contact North. (2013). *Reducing Costs through Online Learning: Five Proven Strategies from the US, Canada, the UK and Australia*. Retrieved from https://teachonline.ca/sites/default/files/tools-trends/downloads/reducing_costs_through_online_learning.pdf

Conway, M. (2009). *Environmental Scanning: What it is, how to do it*. Thinking Futures. Retrieved from https://socialenterprise.us/wp-content/uploads/2016/03/ES-Guide-April-09.pdf

Council of Ontario Universities. (2011). *Implementation of the Ontario Online Institute: Recommendations of the Online Learning Working Group*. Retrieved from http://cou.on.ca/wp-content/uploads/2015/05/COU-Ontario-Online-Institute.pdf

Diamond, S. (2009, October 25). Why Myths Still Matter: Hercules and His Twelve Healing Labors. *Psychology Today*. Retrieved from https://www.psychologytoday.com/ca/blog/evil-deeds/200910/why-myths-still-matter-hercules-and-his-twelve-healing-labors

Dickey, M.D. (2004), "The impact of web-logs (blogs) on student perceptions of isolation and alienation in a web-based distance-learning environment", *Open Learning*, Vol. 19 No. 3, pp. 279-91.

ecampus ontario (n.d.) *Program Development Funding*. Retrieved from https://www.ecampusontario.ca/COntent/program-development-funding

Edupedia. (2018). *What is Morphollogical Synthesis?* Retrieved from https://www.theedadvocate.org/edupedia/content/what-is-morphological-synthesis/

Ely, D. (1999). Toward a philosophy of instructional technology: Thirty years on. *British Journal of Educational Technology*, 30(4), 305–310.

Farkas, M. (2012). Participatory technologies, pedagogy 2.0 and information literacy. *Library Hi Tech*, 30(1), 82-94.

Ferguson, K. (2012, June). *Embrace the remix*. [Video file]. Retrieved from https://www.ted.com/talks/kirby_ferguson_embrace_the_remix

Fischer, G. (2014). Beyond hype and underestimation: identifying research challenges for the future of MOOCs. *Distance Education*, 35, 2, 1–10.

Gleason, N. (2017). Higher education must prepare for the rise of the machines. *Times Higher Education*, (2299) Retrieved from https://www.timeshighereducation.com/features/higher-education-must-prepare-for-the-rise-of-the-machines

Goldsmith, J. (1994, May 1). This is your brain on Tetris. *Wired*. Retrieved from https://www.wired.com/1994/05/tetris-2/

Graham Badley & Trevor Habeshaw (1991) The Changing Role of the Teacher in Higher Education. *British Journal of In-Service Education,* 17:3, 212-218, DOI: 10.1080/0305763910170307

Gros, B., & López, M. (2016). Students as co-creators of technology-rich learning activities in higher education. *International Journal of Educational Technology in Higher Education*, 13(1), 28.

Hovorka, D.S. & Rees, M.J. (2009). Active collaboration learning environments: the class of Web 2.0. Presented at: *The 20th Australasian Conference on Information Systems (ACIS)*, December 2-4, Melbourne, Australia. Retrieved from http://epublications.bond.edu.au/ cgi/viewcontent.cgi?article1/41124&context1/4infotech_pubs (accessed August 21, 2011).

How to Get Better at Tetris. (n.d.) *wikiHow*. Retrieved from https://www.wikihow.com/Get-Better-at-Tetris

Hughes, G. (2009). Social software: new opportunities for challenging social inequalities in learning? *Learning, Media and Technology*, Vol. 34 No. 4, pp. 291-305.

Illich, I. (1971). *Deschooling society*. [1st ed.] New York: Harper & Row.

Inayatullah, S. (2005). Causal Layered Analysis — Deepening the future. *Questioning the Future: Methods and Tools for Organizational and Societal Transformation*, (1), 1–22.

Inayatullah, S. (2014). Causal layered analysis defined. *The Futurist*, 48(1), 26.

Kahn, R., & Kellner, D. (2007). Paulo Freire and Ivan Illich: technology, politics and the reconstruction of education. *Policy futures in education*, 5(4), 431-448.

Ke, F. (2010). Examining online teaching, cognitive, and social presence for adult students. *Computers & Education*, 55(2), 808-820.

Keevers, D. M. (2016). Exploring the Perceptions of Students as Co-Creators in Learning and Its Effect on Student Engagement. *ProQuest LLC*.

Kemp, A. T., Preston, J., Page, C. S., Harper, R., Dillard, B., Flynn, J., & Yamaguchi, M. (2014). Technology and teaching: A conversation among faculty regarding the pros and cons of technology. *The Qualitative Report*, 19(3), 1.

Kroll, D. (2013, January 5). Top 10 Reasons Being A University Professor Is A Stressful Job. *Forbes*. Retrieved from https://www.forbes.com/sites/davidkroll/2013/01/05/top-10-reasons-being-a-university-professor-is-a-stressful-job/

Krug, S. (2013). *Don't make me think, revisited: A common sense approach to web usability, third edition* (3rd ed.) New Riders.

LaMonica, M. (2006). Futurist: to fix education, think Web 2.0. *CNET*. Retrieved from http://news.cnet.com/ Futurist-To-fix-education,-think-Web-2.0/2100-1032_3-6140175.html

Lopes, A. R. (2014). The impact of social media on social movements: The new opportunity and mobilizing structure. *Journal of Political Science Research*.

Manca, S., & Grion, V. (2017). Engaging students in school participatory practice through facebook: The story of a failure. *British Journal of Educational Technology*, 48(5), 1153-1163. doi:10.1111/bjet.12527

Masouleh, N. S., & Jooneghani, R. B. (2012). Autonomous learning: A teacher-less learning. *Procedia - Social and Behavioral Sciences, 55*, 835-842. doi:10.1016/j.sbspro.2012.09.570

McGowan, H., Araya, D. (2016, September 14). Education and accelerated change: The imperative for design learning. *Brown Centre Chalkboard*. Retrieved from https://www.brookings.edu/blog/brown-center-chalkboard/2016/09/14/education-and-accelerated-change-the-imperative-for-design-learning/

McKinsey Global Institute. (2017). A *Future that Works: Automation Employment and Productivity*. Retrieved from https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works

McLoughlin, C., & Lee, M. J. (2008). The three p's of pedagogy for the networked society: Personalization, participation, and productivity. *International Journal of Teaching and Learning in Higher Education*, 20(1), 10-27.

Moore, S. (2016, April 6). *Shelley Moore: Transforming Inclusive Education*. [Video file]. Retrieved from https://www.youtube.com/watch?v=RYtUlU8MjlY

Narayanan, A. (2018, February 5). Every Designer should Try a Hackathon. *Medium*. Retrieved from https://uxplanet.org/every-designer-should-try-a-hackathon-de25de4d3b07

National Center For Education Statistics. (NCES). (2002). *Internet access in U.S. public schools and classrooms: 1994-2001*. Retrieved from http://nces.ed.gov/pubs2002/2002018.pdf

Novak, Matt. (2013, March 29). The Jetsons Get Schooled: Robot Teachers in the 21st Century Classroom. *smithsonian.com*. Retrieved from https://www.smithsonianmag.com/history/the-jetsons-get-schooled-robot-teachers-in-the-21st-century-classroom-11797516/

O'Conner, J. (2019, January 31). It's All Connected. The beauty of Tetris Effect after a year of grief and sorrow. *Medium*. Retrieved from https://medium.com/super-jump/its-all-connected-7584b84db266

Organisation for Economic Co-operation and Development, (OECD). (2001). Education at a glance 2001. *OECD Indicators*. Retrieved from http://www.oecd.org/edu/skills-beyond-school/educationataglance2001-home.htm

OFSTED. (2001). ICT in schools: the impact of government initiatives. An Interim Report April 2001. *Office for Standards in Education, London*.

OPSEU. (2017). *Two visions for a system in crisis: CAAT-A Negotiations Bulletin, Issue 6*. Retrieved from https://opseu.org/news/two-visions-system-crisis-caat-negotiations-bulletin-issue-6

Palmer, M. M., Shaker, G., & Hoffmann-Longtin, K. (2014). Despite faculty skepticism: Lessons from a graduate-level seminar in a hybrid course environment. *College Teaching, 62*(3), 100-106. doi:10.1080/87567555.2014.912608

Pelley, L. (2018, February, 25). Startup Business Incubators, Accelerators at GTA Universities Now Ranked Among World's Best. *CBC News*. Retrieved from https://www.cbc.ca/news/canada/toronto/incubator-rankings-1.4550499

Ramos, J. (2017, March 26). Futures Visioning. *Action Foresight*. Retrieved from http://actionforesight.net/narrative-foresight/

Ravenscroft, A. (2011). Dialogue and connectivism: a new approach to understanding and promoting dialogue-rich networked learning. *The International Review of Research in Open and Distance Learning*. Vol. 12 No. 3, pp. 139-60.

Reed, L. (2018). Disruption Ahead: The Pros and Cons of AI in Web Design. *Medium*. Retrieved from https://medium.muz.li/disruption-ahead-the-pros-and-cons-of-ai-in-web-design-927a3b0302d1

Ritchey, T. (1998). General morphological analysis. *16th euro conference on operational analysis*.

Rubin, P. (2018, October 23). The Tetris Effect and Our Boundaryless Digital Future. *Wired*. Retrieved from: https://www.wired.com/story/tetris-effect-tetsuya-mizguchi-virtual-reality/

Ruth, A., & Houghton, L. (2009). The wiki way of learning. *Australasian Journal of Educational Technology*. Vol. 25 No. 2, pp. 135-52.

Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychology*, 55(1), 68-78. http://dx.doi.org/10.1037/0003-066X.55.1.68

Shaughnessy, A. (2018). Will designers be replaced by robots? *Creative Bloq*. Retrieved from https://www.creativebloq.com/features/will-designers-be-replaced-by-robots

Sheridan 2024 Strategy Hives (Focus Groups). (n.d.). Retrieved from https://www.sheridancollege.ca/-/media/...2024/sheridan-2024-strategy-hives.ashx

Shirvani, H. (2015, December 31). Liberal learning: A suitable education for the free individual. *The Hechinger Report*. Retrieved from http://hechingerreport.org/liberal-learning-a-suitable-education-for-the-free-individual/

Slaying the Hydra. (2018, January 27). *De Philosophia*. Retrieved from https://dephilosophia.com/slaying-the-hydra/

Spence, L. (2001). The case against teaching. *Change*, 33(6), pp. 10-19.

Sternberg, R. J., & Zhang, L. F. (2014). *Perspectives on thinking, learning, and cognitive styles*. Routledge.

Swearer, R. (2017, May 30). *Reshaping Education for the Future of Work*. Speech presented at MaRS Discovery District, Toronto, ON.

Terras, M., & Ramsay, J. (2015). Massive open online courses (MOOCs): Insights and challenges from a psychological perspective. *British Journal of Educational Technology*, 46(3), 472-487.

The digital degree; the future of universities. (2014, Jun 28). *The Economist*, 411, 20-22. Retrieved from https://search-proquest-com.library.sheridanc.on.ca/docview/1541490086?accountid=3455

Timeline of nursing education. (2016). *The Sentinel Watch*. Retrieved from http://www.americansentinel.edu/blog/2016/09/06/a-timeline-of-nursing-education/

Tinsley McGill, P. (2012). Understanding the capstone experience through the voices of students. *The Journal of General Education, 61*(4), 488-504. http://dx.doi.org/10.5325/jgeneeduc.61.4.0488

Ungerleider, C. (2016, August 17). What's old is new when it comes to curriculum; key concepts endure, writes Charles Ungerleider. *The Vancouver Sun*. Retrieved from https://search-proquest-com.library.sheridanc.on.ca/docview/1812106642?accountid=3455

Ungerleider, Charles & C. Burns, Tracey. (2002). Information and Communication Technologies in Elementary and Secondary Education: A State of the Art Review. *International Journal Educational Policy, Research and Practice*. 3.

Watson, D.M. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies*. 6: 251.

Vygotsky, L.S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Webstock '14: Paula Scher - All design is social. (2014). *Webstock*. [Video file]. Retrieved from https://vimeo.com/92052442

Wood, A. (2017). Will AI replace creative professionals? *Venture Beat*. Retrieved from https://venturebeat.com/2017/06/01/will-ai-replace-creative-professionals/

Yusop, F. D., & Basar, S. M. M. A. (2017). Resistance towards wiki: implications for designing successful wiki-supported collaborative learning experiences. *Universal Access in the Information Society*, 16(2), 349-360.

Zadeh, L. A. (1973). Outline of a new approach to the analysis of complex systems and decision processes. *IEEE Transactions on Systems, Man, and Cybernetics, SMC-3*(1), 28-44. doi:10.1109/TSMC.1973.5408575

CREDITS

Borkowski, P (Illustrator). (n.d.). Lernaean Hydra. [Illustration]. Retrieved from https://www.deviantart.com/dafewf/art/Lernaean-Hydra-728199466 (used on page 47 with permission of the artist)

Icons made by Freepik from www.flaticon.com (used on pages 46-47 and 72-78 with Flaticon Basic License)

APPENDICES

Ac	Ackoff, R. (2008). Turning Learning Right Side Up: Putting Education Back on Track.
Ad	Expert Interview 1. Personal communication, August 3, 2017.
Bg	Baggaley, J. (2014). Online Learning: a New Testament. *Distance Education*, 35, 1, 133-140.
Ch	Expert Interview 3. Personal communication, August 5, 2017.
Ely	Ely, D. (1999). Toward a philosophy of instructional technology: Thirty years on. *British Journal of Educational Technology*, 30(4), 305–310.
Fa	Farkas, M. (2012). Participatory technologies, pedagogy 2.0 and information literacy. *Library Hi Tech*, 30(1), 82-94.
Fi	Fischer, G. (2014). Beyond hype and underestimation: identifying research challenges for the future of MOOCs. *Distance Education*, 35, 2, 1–10.
i	Illich, I. (1971). Deschooling society. [1st ed.] New York: Harper & Row.
k	Kemp, A. T., Preston, J., Page, C. S., Harper, R., Dillard, B., Flynn, J., & Yamaguchi, M. (2014). Technology and teaching: A conversation among faculty regarding the pros and cons of technology. *The Qualitative Report*, 19(3), 1-23.
kh	Khan, R., Kellner, D. (2007). Paulo Freire and Ivan Illich: technology, politics and the reconstruction of education. *Policy Futures in Education*, 5(4), 431-448.
La	LaMonica, M. (2006). "Futurist: to fix education, think Web 2.0", *CNET*
Lv	Expert Interview 4. Personal communication, August 5, 2017
Ma	Expert Interview 3. Personal communication, August 4, 2017
Mc	McGowan, H., Araya, D. (2016). - Education and accelerated change: The imperative for design learning. *Brown Centre Chalkboard.*
Sh	Shirvani, H. (2015). Liberal learning: A suitable education for the free individual. *The Hechinger Report*.
Sw	Swearer, R. *Reshaping Education for the Future of Work at MaRS Discovery District* (keynote lecture, May 30, 2017).
Tr	Terras, M., Ramsay, J. (2015). Massive open online courses (MOOCs): Insights and challenges from a psychological perspective. *British Journal of Educational Technology,* 46(3), 472-487.
w	Watson, D.M. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies*. 6: 251.

Legend for Sorting Utterances Appendix B to G

APPENDIX A: SORTING UTTERANCES–SOCIAL

Collaboration promotes transferable skills and employment

Fa Lev Vygotsky argues that:

Learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. (Vygotsky, 1978)

Fa ...father of constructivism, Jean Piaget, saw student motivation and their worldview as key to the learning process because they will bring that view into any learning environment...Constructivist pedagogy views students as active participants in learning who construct knowledge based on their existing understanding as well as interactions with peers and their instructor.

Fa Developed by George Siemens (2005a, b), connectivism reflects the assumption that no one isolated individual can know enough to make good decisions in their life and work, so being able to rapidly find and evaluate the abundant knowledge that is out there is more important than what one currently knows.
Siemens argues that technologies and network-building are critical to learning in the twenty-first century

Se (Autodesk Fusion 360) is cool enough to visualize where you are in the tool, actually visualize your skill level that you know and what you should know to do what you want to. And, it is really awesome is that there is peer piece to this, you can follow them, you can interact with them, ask them questions.And..you can connect them to job opportunities.

Tr participatory literacy (Pegrum, 2009) focuses specifically on the collaborative and production- based skills that are required across a range of forums (blogs, content creation) draws upon key abilities such as creativity, reasoning, focus, critical thinking and analysis

Se I think STEM is very important. But if you look at what happens to STEM grads out of college, there is actually not all of them are getting jobs.

Se You need to teach kids creativity and play, right? This kind of social skills, those soft skills that are so important. Having them work with others on teams. And in clubs. Encouraging peer-to-peer learning.

Collaboration without planning/infrastructure yields sub-optimal results

Fa It may be necessary to build a strong sense of community and social presence within the classroom before students actually feel comfortable engaging in collaborative writing. Ruth and Houghton (2009) found that students had to learn to work collaboratively and that this had to be built into the learning outcomes of the course.

Fa Some case studies showed that the deployment of participatory technologies did not result in increased collaboration amongst students, likely the result of not adopting pedagogies that encouraged participation, supported collaborative learning and facilitated the creation of knowledge communities (Hughes, 2009)

La Using these practices in the classroom, however, poses some challenges... the instructors had to modify several practices, such as grading students to encourage collaboration.

Ch But collaboration in person has been the core. Since we lost our own dedicated classroom that people can always be in to collaborate, it gets harder. Students have turned to other tools to help with that. It hasn't been 100% successful unless everyone buys in.

Fa (instructors) must remain cognizant of the fact that most ... students may not want to engage with participatory technologies (for academic work) because they see them as tools designed for their personal lives. Many may see forced participation as decreasing rather than increasing autonomy (Barnes and Tynan, 2007)

Ma One group suffered because of logistic issues because he was in Guelph, wasn't available on a critical weekend of the project. So as a result, they had ideas, illusions of grandeur that never became realized.

Sometimes, student collaborations fail because one student is distracted, or just disengaged in the project, or logistical challenges. We are in an area where students come from all over. Challenged by geography or don't know to manage or find proper resources.

Online learning carries a social stigma

k R Harper: Unfortunately, what I see happening with technology and online learning is that people blanket it with statements that insinuate the lack of quality associated with online course delivery. However, in doing so, we are privileging courses which are taught face to face, saying, without saying it directly, that they are better, when in fact, this is not the case.

Ely Professionals ...cringe at the more common interpretation of instructional technologists as "engineers" or "technicians". They would prefer to be "designers" or "architects". Yet the perceptions continue and are probably fixed in the minds of those who have always interpreted the term as hardware and software.

Rg It is in current blogs, for example that connectivist principles dating back 70 years have been promoted as a new and appropriate pedagogical rationale for MOOCs

I Technology is available to develop either independence and learning or *bureaucracy and teaching*.

k A Kemp: To teach, you need human interaction. While PowerPoints might replace overheads, and YouTube might replace a video, the interaction between student and teacher is essential. There is nothing in the electronic world that replaces the facial recognition, the tone of voice, the furled brow ...There are streaming videos that can replicate a classroom. However, each of these scenarios distances the educator from the educated. Nuance is lost.

Ch I think it is because nobody ever gives anyone enough time or money to properly develop an online course. To actually be engaging and I think there is a lack of realization of what it really takes. A lot of them are too sit and listen, or watch a video and enforced chatting. Which does not suit everybody. You need to make a certain amount of comments in forums to get grades--that doesn't mean people have learnt anything.

I The blind spot of educational research reflects the cultural bias of a society in which technological growth has been confused with technocratic control.

Se And those online courses, they don't have that sense of community or sense of the social, even though there are forums, that you need to contribute to. Which is great, but a part of me that disassociates from all that. That is me just creating an output but what I want is to sit down over a drink and to talk about it.

The source of learning is increasingly social (peers) + self selected

I A desirable educational system would let each person specify the activity fr which he sought a peer...The inverse of school would be an institution which increased the chances that persons who at a given moment shared the same specific interest could meet--no matter what else they had in common.

I The operation of a peer-matching network would be simple. The user would identify himself by name and address and describe the activity for which he sought a peer. A computer would send him back the names and addresses of all those who had inserted the same description.

I The most radical alternative to school would be a network or service which gave each man the same opportunity to share his current concern with others motivated by the same concern.

Fa Students can demonstrate their learning in an open way that allows for collaborative assessment, rather than simply receiving feedback from the instructor...students could share their work with the class using a blog or a wiki... In addition to...the instructor...students can also receive valuable feedback from their peers.

Fa Students can challenge or support each other's ideas through blog comments and can negotiate meaning collaboratively in a wiki.

Rather than seeing teaching as being focused on the instructor, students can learn from their peers and even from external experts and knowledge networks.

Social interactions promote accountability and ownership of studies

Tr In traditional face-to-face delivery, the provision of individualised f eedback is one of the most important ways of keeping students engaged in their studies: direct relationship between tutor and tutee that students seek and thereby contributes to retention and performance.

Fa The sense of identity and belonging in an online community has been shown to increase learner persistence and achievement (Hughes, 2009). Unlike a traditional online forum, where there is no individual ownership, blogs allow students to create their own space for sharing ideas and building identity in the classroom.
Participatory technologies allow users to open their work up to everyone in the class, or even the world, for comment in a space where conversation is king...

k J Flynn: Gone are the impromptu after class discussions. Gone are the moments when students must look at each other and hold one another accountable for completing group projects.

Fa Participatory technologies support student autonomy by giving them their own personal space for knowledge-building within a larger community, which allows them to drive their own learning (Minocha, 2009).

Social interactions outside traditional environments promote learning

Ma Once a term I take the students on a photo walk somewhere in the GTA. Really meant for fun, but I always try to capture that opportunity where a student got a camera but don't know how to use it. Give them that opportunity to test out their composition skills and about the camera by physically being there. Pull that student aside, help them with their shot and that can be so meaningful to them.

Id In one example, architecture students work on group design projects in a public setting. A professor's critique of a project is instructive to others. Collaboration is valued and encouraged along with individual achievement.

I ...seek partner for discussion...arrange meeting place for dialogue
Match by idea/issue, characteristics, incidental assistance

Fa Learning is no longer happening solely in the classroom and the divisions between learning, work and recreation are becoming increasingly blurred. Individuals use participatory media to connect with friends, stay informed professionally, and engage with others in learning communities.

Se Crowdsourcing innovation-post a problem and then it is crowdsourced people can offer solutions.
You look at universal skills as a huge platform, and you ask yourself, could you connect it to the broader education ecosystem. Why not? You create innovation ecosystem that works within the tool, but extends outside the tool.

Interpersonal relationships are emotionally satisfying

k Although a person can learn a great deal through technology and online education, until that person is in physical interactions with others and engaged in the practices of community does the value of that education make sense.

Fa *blogs allow students to create their own space for sharing ideas and building identity in the classroom.*

This medium also encourages more informal and personal writing, leading to greater socialization
than is usually found in fora. Dickey (2004) found that blogging reduced students' feelings of isolation in the classroom through identity-building and socialization.

I What is common to all true master-pupil relationships is the awareness both share that their relationship is literally priceless and in very different ways a privilege for both.

I Education...relies on the surprise of the unexpected question which opens new doors for the inquirer and his partner.

k J Preston: ...has there been a study done to correlate the increase in student retention with the adoption of online tools to help faculty be more accessible to students? I've heard it said that students leave schools, they don't leave communities; so if technology can improve accessibility to teachers and better form communities among students..., perhaps there should be a trend of increasing enrolments.

APPENDIX A: SORTING UTTERANCES–TECHNOLOGICAL

Technology lacks Emotional nuance (Human Touch)

k Steven Pagé: I like to use sarcasm and humor when I teach. ...When responding to students online I find myself having to tone back the sarcasm and humor because I realize they cannot see my facial expressions or hear the inflection in my voice so this leads me to feel as though I cannot be myself.

k Flynn: Moreover, since the teacher does not actually have "face time" with students, it becomes infinitely more difficult to develop relationships with students.

Fi Could the technology used in distance education ever become good enough to mimic the ease and richness of interaction we see in face-to-face settings?

To identify the factors that (independently of technological progress) will differentiate MOOCs from smaller, face-to-face courses represents an important item on the MOOC research agenda.

Technology is an extension of the person, not a replacement

k I see technology as a personal tool, not a means to educate. Technology is an extension of the person, not a replacement. While I love texting students to tell them classes are changed, or updating a blog to enhance a discussion, the technology is a textbook. It is a tool. And with all the bells and whistles, it is just a tool.

Se There was a Georgia Tech AI teaching assistant in the class to answer questions ....., and a lot of the graduate students figured out that it was an AI. But most didn't.
It freed up the human to answer questions that were deeper and richer and required a direct human engagement. I do believe that the way, as you look at standard accreditation systems, the way they are based on rigid outcomes. I think over time that will change, much more drivers by actual outcomes of students that are measured in part by AI.

La The evolution of the Internet can facilitate this approach, he said. Web 2.0 tools, such as wikis and blogs, make information sharing and content creation easier.

k Without technology, those five weeks they spent in lab schools would have resulted in no contact between teacher and student. Instead, technology has allowed me to be connected to both my students and my colleagues in a way like never before.

Fi - enduring design trade-offs in the learning sciences: whether computers should be designed as independent stand-alone intelligent tutors or as intelligent assistants, or expressive tools of communication, or as some mixture of these

Technology is a means, not an end. Educational content and intent matter more

Ely There is growing evidence that the use of instructional design procedures and processes leads to improved learning without regard to the hardware and software that is used.

Design is a more powerful influence on learning than the system that delivers the instruction.

k "In fall 2001, 99 percent of public schools in the United States had access to the Internet. When National Center For Education Statistics first started estimating Internet access in schools in 1994, 35 percent of public schools had access" (NCES, 2002, p. 3). However, it is not simply just having the Internet that is important but rather what the Internet allows teachers and students to do in the classroom.

Se Most recognise a distinct difference between teaching people with computers, and teaching people about computers. But this difference has become increasingly blurred, until the role of the computer as a learning resource has become subsumed by a notion of Information Technology skills and competencies. It is as if pupils are taught about functionality of the component parts of a car, ... but never actually take a vehicle onto the road...How has this come about?

Se The training for those teachers who have received it (i.e. the new training programmes) has contributed to an increase in their use of computers, but only rarely do the pedagogic expertise to help them make the most effective use of ICT in their lessons (Ofsted, 2001).

k Preston: Are students in some districts learning more because they have technology, or are such districts populated with students who have other influences to encourage learning... Technology is certainly not a silver bullet...How the tools are utilized...makes all the difference in the world.

Fi Learning about and learning to be represent antinomies (Bruner, 1996): presenting learners and educators with tensions and contradictions

Technology is an extension of the person, not a replacement

Ma I think the hybrid courses (in-class studio and online sessions) are fascinating to me. It is something comfortable for students and less comfortable for instructors, where a majority are old and afraid of technology. I really think it is more of a question if instructors can rather than if students can. To me, it is how students learn anyway.

The friction is reduced as well. If they can go online in their pyjamas and connect with you there and roughly get the same amount of information from you. Maybe it isn't as meaningful or personable but if it is in the hybrid where you meet every few weeks, it is the best of both worlds.

Ma Across a hyper-connected global economy, cycles of innovation are accelerating and becoming shorter and steeper. As this creative destruction expands across industries, cultural frameworks and contextual references are shifting and morphing.

Sh Socrates, who wrote no books, gave reasons why he did not like the written word...warned that writing would change concepts of privacy and the meaning of public discourse. In particular, it would force students to follow an argument rather than participate in it.
He did not see what his student Plato did-that writing would create new modes of thought altogether and provide wonderful new pathways for the intellect.

Fi Innovations do not work on the first attempt. Iterations driven by formative evaluations are key to learning from shortcomings and mistakes. With the hype and the underestimation of MOOCs as the two end points of the spectrum of an analysis, it is too early to believe on the one hand that they will be the answer to education for everyone and for all interests for free, or on the other hand that the time has come to abandon them

k R Harper: While I get what the critics of technology are saying- technology and online learning are not equal to face-to-face interaction, technology should be used as a tool only, etc., I have to re-visit the world my students are a part of. This is the generation that saw Egypt liberated, with banners hanging in the midst of the chaos that said, "Thank you Facebook." This is the world they are living in. Our students are part of a technology-rich world; in my mind, education has to move with the times, adapting to the world (of) our students

I For some children such games are a special form of liberating education, since they heighten their awareness of the fact that formal systems are built on changeable axioms and that conceptual operations have a gamelike nature,...

Used outside the curriculum such games provide an opportunity for identifying and developing unusual talent, while the school psychologist will often identify those who have such talent as in danger of becoming antisocial, sick, or unbalanced.

Fi reason for the underestimation may be based on the current early development cycle of MOOCs and the assumption that their primitive capabilities will remain static and will evolve insufficiently over time.

Technology is a means, not an end. Educational content and intent matter more

Fa Information literacy will have to address knowledge creation through dialogue and negotiation of meaning (Ravenscroft, 2011). Using information ethically and legally also becomes more complex in environment full of microcontent (blog posts, tweets, etc.), which are licensed in myriad ways, sometimes allowing for reuse and remixing.

Little is known about students' personal learning styles + how they actually use technology to learn

B Dillard: I learned how to select appropriate technology and instructional strategies that enabled me to develop an online learning environment that was appropriate, responsive, and beneficial for my students. One instructional strategy that I incorporated was to email students, at the beginning of the school year, a questionnaire that asked them about their learning preference.

After reading the students' feedback and knowing about their prior educational experiences, I began to understand why some felt the traditional public school failed them: they had not experienced a "teachable" moment. I wanted this to happen for them.

Tr The massive nature of MOOCs makes such an approach challenging as learning paths could not be determined in advance for such a large and consequently diverse learner population. An alternate possibility is that provision is tailored to the average learner, but here too scale and the variability also make this problematic.

However, a promising solution may lie in the use of big data concerning learner behaviours, such as what type of information accessed, how, when, for how long and for what purposes

Tr It is essential to have a fine-grained understanding of how learners interact with technology in any technology-mediated learning environment...More specifically, it is crucial to have an insight into how learners use technology to learn

i (We should) not start with the question, "What should someone learn?" but with the question, "What kinds of things and people might learners want to be in contact with in order to learn?"

Se With critical thinking, there are a number of elements to that. Deductive, Inductive and Abductive Reasoning, how do you bring that together, forms hypotheses, I think all of that can be done with AI. And it can be done really well.
A coherent integration of AI into an educational experience for students that is about adaptive personalized learning, legacy forms of learning...extra curricular learning, peer to peer learning

Fa Some technologies may have a learning curve so steep that they take time away from learning (Ruth and Houghton, 2009). There needs to be a recognition that students are coming into the classroom with very different competencies, technological literacies and expectations.

Fa Students did not use the class wiki collaboratively at first, but instead created their contributions in their word processor and pasted them into the wiki. They were also uncomfortable with the idea of editing the work of others and it took time for students to become friendly enough with their classmates to truly work collaboratively. It may be necessary to build a strong sense of community and social presence within the classroom before students actually feel comfortable engaging in collaborative writing.

Educators are unprepared for the autonomous & customized learning that technology affords

Ad All year, we had agencies come in, speakers talk about future of technology. You have to adapt to change. Whether you like it or not, change is always leading to technological advancements. New platforms coming up, tech changing. People were talking about VR and AR a lot. Becoming the new form of teaching in the classroom, would give students a way to interact with technology in a completely different way.

Fl Do MOOCs work well only for students who are self-motivated and already fairly well educated?

Do they have the potential to enable participants to be autonomous learners capable of managing their own learning pathways?

Ely Distance education, as practiced by the British, Dutch and German Open Universities, is likely to become a major influence in the reconceptualization of adult teaching and learning.

Consequently, new philosophies that support the notion that each learner must become responsible for his/her own learning will alter the role of instructional technology in the course of reaching that goal.

Fa Technology futurist John Seeley Brown argued that "with every new piece of technology, to make this technology work, you have to change your teaching practices" (LaMonica, 2006).

Frequently, this requires altering the roles and responsibilities of teachers and students in the classroom.

k J Flynn: people who teach online courses, they complain that they, as the instructor, have little to no control over the scope and sequence of the syllabus, texts chosen, assessments created, and pacing of the material.

Se this whole idea of learning to do / doing to learn, and the whole idea of how to achieve this. So I'll try it on you too; this idea of Blockbuster and Netflix
Blockbuster...sold DVD in boxes at physical store with about 12 well worn genres (action, comedy, etc). Netflix...invested massively in machine learning to create this algorithm uncovered about 77,000 micro genres that they can serve up to people, depending on their interest and use patterns are.

Tech enables students to learn on their own terms (How, what, when, where)

Tr Technology enables learners to exercise greater control over not only the temporal and spatial contexts, but also the pace at which they learn. This increased choice and control must be grounded within flexible pedagogies with students, staff and the institution... importance of considering the profile of the learner, and how learners cope and how they can be supported in dealing with the increased autonomy and flexibility in e-learning

i (If I) teach myself to play guitar... this arrangement may have advantages--if the available tapes are better than the available teachers, or if the only time I have for learning the guitar is late at night, or if the tunes I wish to play are unknown in my country, or if I am shy and prefer to fumble along in privacy.

i Tapes, retrieval systems, programmed instruction, and reproduction of shapes and sounds tend to reduce the need for recourse to human teachers of many skills; they increase the efficiency of teachers and the number of skills one can pick up in a lifetime

Technology fosters dependency & leads people to value immediacy over depth

kh the digilized 'one world' (Cosgrove, 2001, p. 263) of harmonious planetary communication brought about by the exchange of information is in many ways a myth that cloaks the seductive inequalities of what is better characterized as an 'infotainment society'

k Thus, the integration of technology is a critical and required part of any teacher education program. Critics, however, suggest the over-reliance on technology has caused people to become deskilled in almost every other area (Apple, 2003).

k 5 Page: I often feel as though I have to respond immediately to a student's e-mail when I get it on my Blackberry. I choose not to text with students because I think that I would become completely consumed by the Berry. However I wonder if our constant use of smartphones' and technology may cause our students to be more dependent on the professor?

Tr Digital Natives, (with their) ...ability to use a range of technology in a variety of everyday settings, does not necessarily entail that individuals will possess, or be able to apply, the critical thinking and evaluative skills essential for e-learning ...a finer-grained analysis of the digital literacy skills that support MOOC-based learning is required

Fa Some studies have described blogging initiatives in the classroom that led to "haphazard contributions" (Kerawalla et al., 2009). If the stage is not set properly to encourage – rather than force – students to participate in the learning community, the dialogue so critical to pedagogy 2.0 will never arise.

I J Preston: I find that I do this regularly with my students; I'm "gaming" education, which, since I'm a professor in the field of computing and gaming, this seems to make some sense.

k But what opportunities might be lost if I allowed students to "simmer" and not get a quick, short (perhaps incomplete) response from me. Am I feeding them the equivalent of fast food and supporting a world where instant gratification (oftentimes without substance) is expected?

i The increasing reliance on institutional care adds a new dimension to the (pre-C) helpless: physiological impotence, the inability to fend for themselves

Le I take time to process to what I learn. There is an anxiety with tech, where an immediate response is required. I can't give that, because I need to absorb what it is. And there is no physical artifact. I remember teachers giving handouts and I could jot notes, but now with slides... you knew something was important if the professor wrote it on the board, you can take the time to listen and they would have to understand and read from notes, and have a conversation. With technology, there is a tendency to become too dependent on it.

What is new is old again

Fa Teaching is still largely f ocused on the transmission of knowledge from instructor to student. Even online learning management systems replicate these models with a focus on faculty content delivery rather than student participation.

Ely there have been major paradigm shifts caused by the broad acceptance of new media and communication channels (Dills and Romiszowski,1997). ... there has been some retreat to the past when new media are adopted and used in old ways;

Rg Current online learning practices are also being criticized for flouting orthodox beliefs, and for giving the impression that MOOCs are a new idea, despite the fact that institutions have been using solid design principles to deliver massive open courses for over a decade

Rg by the late 2020s public discontent with the (teacher-free) educational system was fueling fond memories of the olden days when teachers were available to provide learner support. In 2035, after a Learner Revolution that had lasted 18 years, teachers are once again being welcomed into positions of educational and administrative control

k lack of sources of support has been identified as an influential factor in dropout.

This problem may be exacerbated with the tendency for many MOOCs to mirror traditional face-to-face modes of delivery and present assessments at the end of the course. It is

therefore essential to consider the relationship between feedback, performance and dropout

k When I started teaching online, I faced many challenges because I did not receive the training to demonstrate ways to transition from a traditional classroom to an online one. As an aside, I wonder if students that struggled in the traditional classroom setting face challenges when they enroll in virtual schools that continue to follow the traditional "brick and mortar" curriculum model?

APPENDIX A: SORTING UTTERANCES– ECONOMIC

Tech availability and benefits favour the rich

k — Apple (2003) also offers that technology has led to pre-packaged curricula with materials created outside of the realm of the teacher, loss of professional dispositions associated with good teaching, a further stratifying of society due to the inability of lower socio-economic areas in acquiring the needed technological advances.

Schools contribute to skills shortage by keeping students too long/out of the workplace

Ac — Colleges appear to be keeping young people out of the workplace for an additional four years and enabling them to continue to exist without the need to participate as full members of the larger adult society.

i — Schools thus produce shortages of skilled persons. A good example is the diminishing number of nurses in the United States, owing to the rapid increase of four-year B.S. programs in nursing. Insisting on the certification of teachers is another way of keeping skills scarce.

Third parties have to subsidize enrichment programs to supplement traditional learning

Sw — In the 1970s, you had parents spending about $2500/year on enrichment activities for their kids.
Now, in the states you have almost $10,000, a little over $9500 on enrichment activities for their kids in a year. There is this imperative to get your kids out of the system to supplement and augment to support that kind of creative learning, that team-based learning--that is so important to augment those STEM systems.

Sw — Schools are increasingly, all over the United States, offering really awesome supplemental after school programs and they take advantage of that. And there are third party actors – project Lead the Way. Independent organization that builds creative STEM based programs into schools. It is not expensive, a lot of it is free.

i — Should parents have the right to earn skill credit for their children? Since such an arrangement would give further advantage to the privileged classes, it might be offset by granting a larger credit to the underprivileged.
The operation of a skill exchange would depend on the existence of agencies which would facilitate the development of directory information and assure its free and inexpensive use.

i — provide all citizens with greater access to the real life of the city. Special tax incentives could be granted to those who employed children between the ages of eight and fourteen for a couple of hours each day if the conditions of employment were humane ones.

Let market forces and personal mission guide skill acquisition and development

i — If the goals of learning were no longer dominated by schools and schoolteachers, the market for learners would be much more various and the definition of "educational artifacts" would be less restrictive.

i — I envisage...an educational passport or an "edu-credit-card" provided...at birth. Such credit would permit most people to acquire the skills most in demand, at their convenience, better, faster, cheaper, and with fewer undesirable side effects than in school.

Sw — How do you engage the mid-career professional in this journey of continuous learning by doing? ... lots of experiments ...Vocademy, Code Academy, Lynda.com...New credentialing frameworks like Degreed and Credly that aren't rigid if-then linear frameworks that you would typically find in a higher ed...community colleges are doing creative things, in this area. How do you navigate that complexity, build on what you know, figuring out what you need to know to do what you need to do. That is the question of our time.

i — A good educational system should have three purposes: it should provide all who want to learn with access to available resources at any time in their lives; empower all who want to share what they know to find those who want to learn it from them; and, finally, furnish all who want to present an issue to the public with the opportunity to make their challenge known.

Financial security and incentives elude educators

Ac — Teachers, like employees in any system, try to ensure their job security by requiring students to be taught subjects they, the teachers, know

i — So long as the older professions monopolize superior income and prestige it is difficult to reform them. ... Schoolteachers are overwhelmingly badly paid and frustrated by the tight control of the school system.

Fi — How are professors teaching MOOCs financially rewarded for their efforts? And how will they be rewarded in the future?

...what motivates university administrators (apart from the fear of being left behind) to allocate their faculty members' time to MOOC students, 95% or more of whom do not attend their university?

i — The teacher of skills needs some inducement to grant his services to a pupil. There are at least two simple ways to begin to channel public funds to noncertified teachers. One way would be to institutionalize the skill exchange by creating free skill centers open to the public

ROI / Overhead matter to education, too

i — ...between 1965 and 1968 over three billion dollars were spent in U.S. schools to offset the disadvantages of about six million children. ...Title One...most expensive program...in education, yet no significant improvement can be detected in the learning of these "disadvantaged" children.

i — Bolivia the government has financed a TV station...The money now tied up in TV installations throughout Latin America could have provided every fifth adult with a tape recorder...money would have sufficed to provide an almost unlimited library of prerecorded tapes

Fi — "Nothing has more potential to lift more people out of poverty." From an economic perspective, many people believe that MOOCs will address the fundamental challenge to contain the costs of teaching more students using fewer resources.

i — an independent educational profession of this kind would welcome many people whom the schools exclude. ... establishment and operation of educational networks would require some designers and administrators, but not in the numbers or of the type required by the administration of schools

i — Not only education, but social reality itself has become schooled. It costs roughly the same to school both the rich and poor in the same dependency

Ro — As long as they share the goal of increasing student revenues while reducing faculty costs, however, Rawlings and his colleagues on the new Global Learning Council are unlikely to abandon MOOC-related principles altogether.

Sk — So if there are things they can do to increase their profitability or reduce the price of running their programs, i.e. online programs and hundreds of students take it without any real major resources in terms of space or extension faculty, of course they are going to be interested in that because it will improve the bottom line. You know there is a board of governors that keep an eye on this. One thing we don't have are shareholders. It is not publicly traded, but like a family business.

Ro — I see international students as a value to everyone's learning and experience and being in Canada adds value to their lives. But I know that College sees them as a revenue stream. They really do and there are programs in some colleges that are run entirely as revenue streams. No question that these are big business, they are big education businesses. They are not colleges that are run like businesses, and they are not businesses that are run like colleges. They are big education businesses.

Experiences and skills = credentials and currency

i — A much more radical approach would be to create a "bank" for skill exchange. Each citizen would be given a basic credit with which to acquire fundamental skills. Beyond that minimum, further credits would go to those who earned them by teaching, whether they served as models in organized skill centers or did so privately at home...Only those who had taught others... would have a claim on the time of more advanced teachers.

i — A skill exchange needs currency or credits or other tangible incentives in order to operate, even if the exchange itself were to generate a currency of its own.
A peer-matching system requires no such incentives, but only a communications network.

Sw — ... all those experiences formal and informal, on the job, doing and learning, snap together to a credential.
And earn that credential over the course of your life. Wouldn't it be great. I've been talking to some colleagues in the audience about the idea that, "What if you earn credentials that aren't stupid".
What if it were a machine agent?

Required workplace skills change faster than curricula (no longer guarantee relevant jobs)

Sw — So I came to realize, that after going through this process, our education system was built for another era, with infrastructure that was created between 1880-1930 which is a specific phase of the industrial revolution. It was made to support that economy, that society not ours.
I want to be clear think that that infrastructure worked for that era. Where education was about preparing for people through radical, deep specialization to operate hierarchical organizations to solve relatively simple problems, compared to the many wicked problems we are dealing with today.

Ely — Public acceptance of new information technologies will stimulate and facilitate the use of instructional technology in schools and homes.
Pressure on educational institutions to use these new technologies will sometimes outstrip the ability of educators to revise their approach to teaching. This will lead to massive teacher training, professional development and eventual reform of primary and secondary education.

Mc — According to research at Gartner, for example, one-third of all jobs will be converted into software, robots, and smart machines by as early as 2025.

Ac — Because of the rapid development of new knowledge and the rapid obsolescence of the old, adults past school age increasingly want further education for one or both of two reasons: they either want to increase their work-related competence, or engage in learning for its own sake

Mc — 65 percent of children in grade school today are predicted to work in jobs that have yet to be invented. In fact, all of these changes are converging toward what some are now describing as a "Third Industrial Revolution"

Mc — Fifty years ago, a company's tenure on the S&P 500 lasted 60 years. Today that time span is less than 15 years. At this rate, by 2027, 75 percent of companies on the index will be companies that have yet to be created.

Ac — Educators deciding what subjects students should be taught — a very large proportion of students will not practice in the end for which they were educated, and because the rate of innovation is constantly increasing.

Mc — Education has traditionally prepared individuals for work, but work is now changing too quickly for the latest professional skills to be easily translated into curriculum. The value of design learning is that it provides the right methodology for this changing reality. Most importantly it mirrors the iterative learning and solution building that characterizes the world of work after schooling.

Ma — I think sometimes instructors fail to comprehend how challenging it is to be a student in today's economy and workforce. There is no guarantee for a job and going into excruciating debt causes severe anxiety.
And it is almost not good enough to get a job but get a job that matters to you. For whatever reason, maybe it is the people, the type of work, type of environment, it just resonates with you as a person. And it has a "cultural fit" for you. Most people struggle to find that. But when they do, that is when

Digital technology can improve education delivery & employability (efficiency)

In — in the UK, the "raising of standards" of teaching and learning has become intertwined with the use of ICT.
The use of digital technology for improving the delivery of education has enormous potential to raise standards and increase employability. (David Blunkett, UK Minister for Education and Employment, 2001)

Fi — One of the most central points of discussion thus far has been the low completion rate for courses (used by the opponents of MOOCs as evidence of their limitations)
If 100,000 people sign up for a course, the vast majority may do so without any intention of finishing it; but a 4% completion rate still means that 4000 people finished the course. This number may be larger than that of a faculty member teaching courses in a residential university over many years.

k — Technology should not be used to "process" students through an education system merely to improve throughput without considering the cost. Rather, opportunities to utilize technology to enhance should be embraced... with a mind on what we're missing out on if we spend our resources on the technology.

k — Preston: Schools can adopt technology for a variety of reasons, but I believe all of these distill down to two categories: 1. Utilizing technology to enhance/extend what we can do (Podcasts, apps)
2. Utilizing technology to improve efficiency . (MOOCs, online universities and standardized testing)...whenever efficiencies are introduced, we risk dehumanization and whenever enhancements are introduced (which are often costly) ... the full potential of technology to improve education/learning are realized.

APPENDIX A: SORTING UTTERANCES– ENVIRONMENTAL

Despite tech's potential to enrich learning, MOOCs are losing students

k — I'll assert that technology-infused education moves WAY beyond traditional face-to-face education in that it offers a richer set of experiences, and these must be understood and embraced not in competition with face-to-face education but along side it.

Ir — MOOCs lack sustained engagement, dropout rate as high as 90%
Recently, the contribution of factors more directly related to the nature of MOOCs such as poor incentives to complete, difficulties understanding content and lack of support to address these difficulties have been identified

Tr — expectations about MOOCs are often framed within the traditional instructor-driven model, despite the fact that the mode of delivery has changed. We therefore need to make this shift in terms of our expectations and the type of explanation sought.
However, high levels of drop out may only be fully addressed ... by examining learners' actual experiences and preferences.

Physical spaces are necessary for tech-facilitated ideas to come to fruition

k — J Flynn: Although technology can bring people together and make the sharing of information more rapid and efficient, it is not until people have come together in a physical community that ideas and positions coalesce and change happens.
But it was not until people were in solidarity, in the streets and voting booths, that the technology made a difference.

Self-directed learning is much more common online

Fa — In the 2.0 classroom, students have a large measure of control over their own learning. While the instructor might develop learning outcomes for the class, the curriculum will be largely driven by student feedback, as every class will have different needs and preferences. Students have the freedom to select the technologies that best meet their needs and connect with information that is meaningful to them.

i — ...matching the right teacher with the right student when he is highly motivated in an intelligent program, without the constraint of curriculum.

Fi — People engage in self-directed learning if they have--or are able to develop--an (often idiosyncratic) interest and passion for a domain of knowledge or an activity.
Whether or not a particular learning environment (e.g., a specific MOOC course or MOOC platform) succeeds depends mostly on whether students can learn what they want and when they want it, freed from the restrictions of courses consisting of desirable and undesirable content that has been segmented into majors and degree programs.

Fa — In this learning landscape there is a need to rethink models for teaching and learning in order to replace outmoded "closed classroom" models which place emphasis on the delivery of information by an instructor and/or from a textbook rather than being learner-centric (Mcloughlin and Lee, 2008).

Online platforms expand community resources & "time on task" beyond the campus

Fi — There may be a number of objectives that are better served by MOOCs, such as learning communities defined by shared interests rather than shared location, and access by individuals to lectures that they would not have other- wise. Just as Amazon offers more books than any physical bookstore

k — Online material increases access to review the material as many times as they'd like and for those that were ill
Communication mechanisms outside of class increase the depth of attention to individual students as well as "mass mailing" reminders and content outside class; this increases time on task beyond a "three hours of contact per week" traditional lecture course

Ma — Because of a snow day... we all agreed to meet on Facebook Messenger at the same time on a given day.
We all met, and I went over what we were doing and then I scheduled what I was going to present in the physical class with 10-15 minute critiques where they can privately message me, and chat with me about their work.
They didn't feel like they missed a class. Was it less magical or meaningful, I don't know.

Assessment standards are centrally prescribed and slow to change

Ac — We evaluate people by what they can do and how well they can do it, not by such test scores as are currently used to set "standards."

Fa — The skills required for an individual to successfully find, evaluate and use information are different from what they were just a decade ago when the ACRL Information Literacy Competency Standards for Higher Education were developed, and students need to be prepared for a world that requires continuous informal learning...

Ely — The advocates of a constructivist approach are often opposed by the behaviourists who contend that evaluation must be based on the learner's performance.
The debate continues and will probably be resolved by indicating that for certain types of objectives (skills, for example) behavioural objectives are necessary and for other objectives (cognitive outcomes, for example) constructivist approaches are more appropriate.

Tr — We propose that a learner-driven pedagogical approach seems particularly applicable to MOOCs on two counts: firstly, the sheer numbers of students enrolling indicates that there will be enormous potential variability in the learning profile of each student. Secondly, a heterogenical approach affords the expansive flexibility required to support a student body whose motivations for engagement are largely uncharted.
However, , a full understanding of learner skills and preferences is required

Sw — University of Texas in Austin are also deploying new tech that require participation in these extra curricular activities to occur at that scale like a Blockchain-driven micro credentialing system
that you can access and keep secure online that is stackable with your normal coursework and builds into a degree.
I think the experiments that are happening at different universities can ripple across the entire system in a particular state and region and that is probably the only way it can happen at this point.

Schools program learning to stop after graduation

Ac — Universities, technical schools and employers should provide "competence maintenance" programs. These programs would continuously survey developments in designated areas and report them regularly to subscribers

Sk — It means that we must all become lifelong learners and the goal of our schools should be to make each of us a self-motivated learner.
For the university, it means that we must move away from trying to fill students with information that becomes quickly outdated and, instead, prepare students for active and continuous involvement in learning

Sw — ...[This idea that] you start off as a kid, go to school, get a degree, get certified go and work, very if-then world, very linear.
We know the real world is different, than that. There is a journey that we embark on. We experience places and toolsets, teams and skills, we learn all this by doing. But the learning institution is not set up to credential that. To help us move through that. And that has to change.

Sk — To put it simply, we want to create free minds, not ideological ones.
An education that prepares students for the future relies on a strong foundation built in the past and an equally strong preparation that enables them to continue to learn every day of their lives.

i — Neither learning nor justice is promoted by schooling because educators insist on packaging instruction with certification. Learning and the assignment of social roles are melted into schooling.
Instruction is the choice of circumstances which facilitate learning. Roles are assigned by setting a curriculum of conditions which the candidate must meet...to make the grade. School links instruction but not learning to these roles.

A self-selected environment (peers, topics, modes) is an ideal environment

I — most important consequences of deschooling and the establishment of peer-matching facilities would be the initiative which "masters" could take to assemble congenial disciples. ...opportunity for potential disciples to share information or to select a master.

Learner-centric environments still need structure & guidance

Tr — Learners using MOOCs must not only manage the increased demands of self-regulation within the context of their course, but they must also need to draw upon their executive resources to help them remain focused on the task at hand and avoid the potential distractions of other online activities.

i — the educational path of each student would be his own to follow, and only in retrospect would it take on the features of a recognizable program. The wise student would periodically seek professional advice: assistance to set a new goal, insight into difficulties encountered, choice between possible methods.

Fi — The global reach of MOOCs will provide an opportunity to confront and acquaint learners with different ways of thinking.
But the particular challenges of courses reaching beyond the borders of individual countries need to be carefully explored, including how to establish a common ground and a shared understanding by incorporating locally relevant issues, needs, and understanding.

Fa — The autonomy of the learner is still offset by some measure of control from the instructor. The instructor is responsible for creating a positive learning environment for everyone, which sometimes means exerting control to prevent problems and other times hanging back to allow the free flow of ideas between students.

i — The strongly motivated student who is faced with the task of acquiring a new and complex skill may benefit greatly from the discipline now associated with the old-fashioned schoolmaster who taught...by rote.

i — Learners need experienced leadership when they encounter rough terrain. The 1st calls for knowledge of human learning and of educational resources (pedagogy), the 2nd for wisdom based on experience in any kind of exploration.... Schools package these functions into 1 role--& render the independent exercise of any of them if not disreputable at least suspect.

Tr — pedagogical and psychological considerations are intertwined...pertinent for MOOC- based learning where the student body is largely unknown and the pedagogical underpinnings are often grounded in the complex interaction of the motivations and preferences of the instructor and their institution

Ely — I recently tried teaching myself how to code before coming into the program. I learned a bit but not nearly as much as instructor trouble shoot that gave me issues. I value that interaction with hands on courses. It is the guidance.

Schools are setup to dispense knowledge in pre-defined blocks

i — School is inefficient in skill instruction especially because it is curricular. In most schools a program which is meant to improve one skill is chained always to another irrelvisant task.

Ac — Mass education was explicitly developed to mold naturally unruly children into compliant, obedient young people. Inspired by the Industrial Revolution, schools were, and still are, designed and operated as much like factories as possible.

i — School pretends to break learning up into subject "matters," to build into the pupil a curriculum made of these prefabricated blocks, and to gauge the result on an international scale

Sw — So learning today boxed up and compartmentalized, into a set of well-worn genres, in the case of education, we got these 'Majors'. Think about it, abstract it for a moment. It is ridiculous. We got 30 to 40 majors. Think of the complexity of the world those majors are going out into.
Whereas the Netflix model, learning happens on these branching pathways, as subscribers learn about entertainment they might not know exists yet.

Fi — Learning about focuses on the accumulation of intellectual capital, organized into curricula that stress the communication of culturally central theories, facts, and skills. A curriculum of this sort is most naturally structured as a sequence of educational objectives

Sw — What we have, is moving from a world of learning to do, and that is learning a stock of knowledge, is what universities are setup to do, to deploy that stock of knowledge into a relatively stable career. We need to move from that to doing to learn.

In — frequent mismatch between the intentions behind school ICT policies and their operation in practice. Pupils are often practising low level skills, and there are often insufficient opportunities to apply the ICT skills, learnt in separate ICT classes, to work in other subjects.

In — So the alternative is for different subject departments to deliver to component parts of the ICT curriculum.
A familiar pattern is for history or geography to take on databases, English for wordprocessing, and science or mathematics for modelling

Schools are isolating places detached from the real world

Fa — what we teach regarding information literacy must change to match the current social, educational, and technological environment.

i — only school is credited with the principal function of forming critical judgment, and, paradoxically, tries to do so by making learning about oneself, about others, and about nature depend on a prepackaged process.

i — Classroom attendance removes children from the everyday world of Western culture and plunges them into an environment far more primitive, magical, and deadly serious. ... The attendance rule makes it possible for the schoolroom to serve as a magic womb, from which the child is delivered periodically at the school days and school year's completion until he is finally expelled into adult life.

i — Teaching...may contribute to certain kinds of learning under certain circumstances. But most people acquire most of their knowledge outside school, and school...has become a place of confinement

In — Indeed, acquiring ICT tool skills may be relatively easy but gaining wisdom to use them effectively is not.

In — Pupils are hampered from gaining such wisdom because they are learning these skills in isolation. It is sad to see pupils use a spreadsheet without a genuine need to explore and model a relationship in the data they are manipulating.

In — Learning to be focuses less on teaching mathematics and more on what it means and takes to be a mathematician.
Engage students in personally meaningful problems, encourage teachers to model problem- solving activities in front of or alongside their students rather than lecturing.

In — unbridgeable gulf that separates the world of school and the world outside. Schools are uninteresting places in which the interests and questions of the children have no relevance to what they are required to learn in the classroom. Teachers continue to teach subject matter not children"

Ac — The best way of treating a problem cannot be determined without looking at it from as many different disciplinary perspectives as possible. Problems do not fall (or belong) into disciplines. Nevertheless, those that identify a problem generally try to solve it by manipulating the variables with which their discipline is familiar.

Schools are frozen in time

k — Galileo could only gape and mutter touring NASA's Johnson Space Center. Columbus would quake with terror in a nuclear sub. But a 15th century teacher from the University of Paris would feel right at home in a Berkeley classroom. (p. 11)

Sh — Clark Kerr, the former pres. of the Univ. of California... observed that if one took the year 1520 as a starting point, there were only 75 institutions in the Western world that still exist in recognizable forms...these include churches, parliaments, and 70 universities...some buildings, with professors and students doing much the same things, and with governance carried on in much the same way.

Ro — I think the concept of the classroom is broken. The way people learn now and educate themselves has little to do with sitting in a classroom with puddle desks. I think the the idea of a learning experience has to be agnostic of any rooms or any institutions.

Ir — I recognize that is the simplest delivery methods to me. A school can pack 1000 people into a room and say they learning just based on that.
So I think that delivery method of someone lecturing is outmoded because people get tenure. So people don't need to be challenged, with tenure you are allowed to have controversial thoughts and have controversial opinions to pursue academia without the need for results but it can lead to stagnation and non desire to innovate. Especially if you are a researcher and you don't want to teach but it is something you are forced to do. That lecture delivery system and idea of tenure is valuable but needs to be reevaluated.

APPENDIX A: SORTING UTTERANCES– POLITICAL

Schools are discriminatory to students and teachers

i — the educational revolution be guided by certain goals:
i — 2. liberate the sharing of skills by guaranteeing freedom to teach or exercise them on request.

i — The disestablishment of schools could also end the present discrimination against infants, adults, and the old in favor of children throughout their adolescence and youth.

i — At their worst, schools gather classmates into the same room and subject them to the same sequence of treatment in math, citizenship, and spelling. At their best, they permit each student to choose one of a limited number of courses. In any case, groups of peers form around the goals of teachers.

Schools promote the institutionalization of values

i — the educational revolution be guided by certain goals:
i — 1. abolishing the control which persons and institutions now exercise over their educational values.

i — Under instruction, they have unlearned to "do" their thing or "be" themselves, and value only what has been made or could be made.

i — School teaches us that instruction produces learning. The existence of schools produces the demand for schooling. Once we have learned to need school, all our activities tend to take the shape of client relationships to other specialized institutions....The man addicted to being taught seeks his security in compulsive teaching.

Technology up-ends current beliefs + power structures (Tech has politics)

kh — Emergent forms of Internet culture utilizing 'blogs' and 'wikis' [?] are potentially involved in a radically democratic social and educational project that amounts to the mass circulation and politicization of information and culture.

kh — Miller and Olson consider that

The history of innovation in education should teach us to be cautious about predictions associated with new technologies. However, there is something about computers that seems to negate this caution. Whenever computers are discussed, words such as revolution, powerful ideas, microworlds and student empowerment occur frequently. (196k)

kh — Despite his early adoption of technology, Freire did not possess a naïve or technophilic attitude. To the contrary, in Education as the Practice of Freedom (1976), he is actually quite explicit about the tendency of high technology and the electronic media to domesticate and maneuver people into behaving like mass-produced, specialized mechanisms

i — The emerging counterculture reaffirms the values of semantic content above the efficiency of increased and more rigid syntax. ... This reorientation toward personal surprise rather than institutionally engineered values will be disruptive of the established order until we dissociate the increasing availability of technological tools which facilitate encounter from the increasing control of the technocrat of what happens when people meet.

kh — To speak of technology, politics and the reconstruction of education, then, is to historicize and critically challenge current trends in education towards using the tools at hand to create further openings for transformative and liberatory praxis.

h — J Flynn: What is most complicating about the institutionalization of technology and the pedagogical shifts that have resulted from this move is the fine line created between teaching and learning online and the use of technology to augment teaching and learning ....the difficult question of how does the privileging of technology alter the nature of community and interaction is begged....

Autonomy in learning = motivation + accountability

i — Education for all means education by all -- each man to exercise his competence to learn and to instruct is pre-empted by certified teachers - teacher's competence restricted to what may be done in school

i — We need to research the possible use of technology to create institutions which serve personal, creative, and autonomous interaction and the emergence of values which cannot be substantially controlled by technocrats. We need to counterfoil research to current futurology.

Fa — ...flattening of hierarchy between student and instructor that is necessary to unlock the power of these technologies. (Educators) as facilitators...exposing students to new ideas and creating a nurturing environment for learning - allows students to be more responsible for their own learning.

i — the educational revolution be guided by certain goals:
i — 4. liberate the individual from the obligation to shape his expectations to the services offered by any established profession--opportunity to draw on the experience of his peers

Education is feudalistic and one-way

i — Hospitals render home care increasingly impossible--and then justify hospitalization as a benefit to the sick. At the same time, the doctor's legitimacy and ability to work come increasingly to depend on his association with a hospital, even though he is still less totally dependent on it than are teachers on schools

Ac — Our educational system is the only major institution in our country that officially recognizes autocracy...students at the bottom

Fa — According to Huang and Behara (2007) traditional approaches to teaching were developed in an environment where knowledge was scarce and only held by experts.
Such an environment generated behavioral theories of learning, where the focus was on the learned instructor transmitting knowledge to the student.

The role of student in the behavioral model was largely passive; simply taking in the knowledge that they were given and then demonstrating what they learned through assessment

Fa — ...students felt that their opinion was the final word and trumped all previous contributions. This status issue is especially heightened when the instructor has a central role in evaluating work and assigning grades. One ethnographic study of classroom blogging found that many students attempted to make what they wrote conform to instructor expectations (Hemmi et al., 2009).

La — Seely Brown argued that education is going through a large-scale transformation toward a more participatory form of learning.

Rather than treat pedagogy as the transfer of knowledge from teachers who are experts to students who are receptacles, educators should consider more hands-on and informal types of learning.

La — In first year calculus, it was a guy putting stuff on a blackboard and so you had to fend for yourself. You had your textbook and that's it. So bunch of us in the class, organized study groups, because it was a service class, there were education students, business students and all that. So we held study groups, and I would walk people through how to do stuff. We would work exercises in the book until we got it.

The road to fully entrepreneurial ecosystems is riddled with obstacles (administrative)

Fa — Some advocates of pedagogy 2.0 argue that the classroom should be totally open to the web, allowing people outside of the class to participate in the dialogue. This brings up privacy issues...Family Educational Rights and Privacy Act (FERPA)... some students may not feel comfortable sharing their reflections in such an open environment

Fa — ...students are largely accustomed to a hierarchical and lecture-based learning experience where learning materials are provided for them. It can take time and effort for students to acclimate to such a flat, fluid and free learning environment.

w — Most focus on the apparent reluctance of teachers to use IT in their classrooms, relating this to a deficit model of teachers who are characterised as technophobic, or too traditional in their teaching style, or reluctant to adopt change.

Sw — Big question now is how do you build together a personalized learning, adaptive learning, legacy type learning, peer kinds of learning that occurs in entrepreneurship and collaborative – collaboratorium spaces at universities, innovation spaces... how do you build all that together into a coherent learning experience? That's what we haven't nailed yet.

Sw — At the University of Texas, we responded to this initial disruption by trying making the boundaries around the design program more permeable. And act as a connector to between academic sectors and disciplines across campus.

I have to tell you that doing that was really hard. We rode hard against the cross currents of radical academic specialization. It wasn't easy.

Ely — "In our field, the only constant is change."

If there is any new dimension to the philosophy held by many professionals in the field it is change itself--the readiness to consider, test and adopt new procedures and processes in the goal of obtaining more efficient and effective learning

i — Today the school system, and especially the university, provides ample opportunity for criticism of the myth and for rebellion against its institutional perversions. But the ritual which demands tolerance of the fundamental contradictions between myth and institution still goes largely unchallenged

Flawed policy + leadership undermine success and change

w — So schools still have to grapple with two rationales--one associated with learning the "ICT tools and skills" to reflect the use of ICT in the adult world, and the other to actually use the tools to further the rest of the curriculum. This confusion of purpose has inevitably been compounded by the practical and technical difficulties of implementing a flawed policy in schools.

w — An alternative analysis of this reluctance, which I propose here, is that despite the hype and massive injection of funds, UK policy has been characterised by a lack of clarity of objectives. The overriding problem is a dichotomy of purpose.

Rg — Did you notice whether anyone among this group is an expert in online education? Moocs?? They are the worst people to represent "standards" for good online education. We are having online learning standards set by a group of brick & mortar heavyweights and two MOOC entrepreneurs that are still thrashing about trying to understand online learning. Here's a serious case of the blind leading the blind that will have adverse effects on the future of online learning. It's worse than that. It's the blind attempting to lead the sighted.

w — By 1995 it was apparent that the attempt to maintain the dual role of IT, as a tool to deliver the curriculum and as a subject with a skills basis in its own right, was under substantial strain. In the Dearing National Curriculum review, IT capability was characterized by an ability to use IT tools ...
"to give pupils opportunities, where appropriate, to develop and apply their IT capability in their study of National Curriculum subjects". So the role of a tool to support subject based learning has been reduced to a mere recommendation.

Entrepreneurial sub-ecosystems are emerging within legacy environments

Sw — I travelled around the world and see this really interesting phenomenon beginning to occur. You have these maker spaces. And innovation spaces and entrepreneur spaces. I'm sure the U of T has them. And they are forming these ecosystems on campus that aren't connected to the department or even the departmental faculty.

i — the educational revolution be guided by certain goals:
i — 3. liberate the critical and creative resources of people by returning to individual persons the ability to call and hold meetings--now monopolized by institutions

Ac — Students should design their own educational programs without being constrained by "requirements." Their designs should be reviewed by experienced practitioners.

Sw — Parsons school of design in Manhattan...
We connected with government, non-profit, other institutions, and businesses. The new school is an amazing, scrappy, crazy place.

In many ways it should sort of embody the future... And even there...we were innovating on top of infrastructure that was built for another era.

w — It was the nature of the school with 1500 students for the entire university. If I took math at Waterloo, it would have been a completely different experience. But here, I remember where it was the three of us. We would take turns lecturing each other each week. Basically we had a 400 level class that was not being offered. So the prof asked what do you want to learn, we picked a topic, it was something outside of his realm, so he did some research and brought something first and that was a great experience. Because in order to explain it to someone with a PhD that is going to challenge you, you have to know your stuff.

Participate + co-create, don't simulate

i — highly motivated persons who wanted to acquire near-native fluency in a second language. When they are faced with a choice between carefully programmed instruction in a lab or drill sessions with two other students and a native speaker following a rigid routine, most choose the second. For most widely shared skills, a person who demonstrates the skill is the only human resource we ever need or get.

Fi — Engaging learners as active contributors in cultures of participation can lead to co-constructing knowledge, coping with problems where the answer is not known, and reconceptualizing courses

Participatory pedagogy gives learners the opportunity to act as agents who can create course content in Web 2.0 environments.

Ma — I befriended a great instructor in the industrial design program at Sheridan. We had so many overlapping ideas on those type of things; how important the materiality is ...we felt it would be very fruitful to do a collaborative teaching experience. So we brought both of our classes together. The feedback we received was quite positive so we are going to do it again this year.

i — junior-high-school resistance movement students slogan... "participation not simulation" ...disappointed that this was understood as a demand for less rather than more education

Fa — Few things in recent years have been more disruptive to education than participatory technologies and Web 2.0. Web 2.0 was built on an "architecture of participation," where users are both consumers and producers of information.

La — Seely Brown argued that education is going through a large-scale transformation toward a more participatory form of learning.

Rather than treat pedagogy as the transfer of knowledge from teachers who are experts to students who are receptacles, educators should consider more hands-on and informal types of learning.

Democratic dialogue in classrooms promotes learning

Ac — Taught that the only permissible questions are ones for which their teachers have answers. (Cannot ask "Why can't children divorce their parents?")

i — It should use modern technology to make free speech, free assembly, and a free press truly universal and, therefore, fully educational.

Fa — Lecturing should be replaced by dialogue in the classroom and instructors should provide more questions for students to discuss than concrete answers. Students should be able to explore the answers to questions without feeling like there is only one right answer, since there is no one correct approach to research...

helps students to develop core skills and dispositions while they are learning how to find, evaluate and use information.

Fa — Therefore, it is important that instruction either start with formative assessment – which can happen prior to class - or an informal discussion about where students are and what they feel they need to learn. Therefore, curriculum and pedagogy will flow from the specific needs of the students

w — I argue that we need to re-frame the ideas of intervention itself away from the technological model. What is needed is an intervention of educational philosophy and debate. Teachers themselves must contribute to this debate, one for which they are both well suited and informed.

APPENDIX A: SORTING UTTERANCES– VALUES

"Students" should be able to choose their "teacher" (source of learning)

i — Matching partners for educational purposes initially seems more difficult to imagine than finding skill instructors and partners for a game. One reason is the deep fear which school has implanted in us, a fear which makes us censorious.

i — In a deschooled society professionals could no longer claim trust of their clients on the basis of their curricular pedigree... Instead... it should be possible, at any time, for any potential client to consult with other experienced clients of a professional about their satisfaction with him by means of another peer network. Such networks could be seen as public utilities which permitted students to choose teachers or patients their healers.

Technology dehumanizes learning/education

w — education for a viable future:
1. The blindness of knowledge;
2. The principles of relevant knowledge;
3. Teach the human condition
4. Teach a world identity
5. Confront uncertainties;
6. Teach understanding
7. Ethics of humanity

Eb — ...each of these developments is learner-centered. As education and training becomes more dependent upon media and technology it is likely that concern for humanistic values will emerge as a countering force. In this sense, a philosophy of humanistic technology will develop and serve as an undercurrent in various aspects of instructional design

k — The exchange of ideas, be it from teacher to student in the most traditional sense or whole class in the purest Deweyean manifestation, has been the keystone of the teaching and learning process.

However, in the last decade or more, teaching has been ripped from the realm of human endeavors and morphed into a technological leviathan that is slowly usurping the soul of the profession.

Sb — In this age of unparalleled change and uncertainty, it is vitally important that America's great universities remain a constant -- something durable that we have inherited from those original 70 European universities.

In other words, there is a general recognition that our universities carry social and public obligations that transcend their institutional needs and desires.

Ir — Rather than spearhead the adoption of change by others, however, the enthusiasm of the innovators seem to inhibit their colleagues, who identified the innovators as mavericks, different from them (Watson, 1993b).

It would seem that this is the reality behind Fullan's (1991) statement that "In many ways the more committed an individual is to the specific form of change, the less effective he or she will be in getting others to implement it".

Define learning by missions not majors

Ac — There should be no entrance requirements to undergraduate education. There should be exit requirements, but only when students want certification of an expertise in a selected area of study.

Tr — advent of MOOCs now heralds a sea change in the nature and purpose of learning at a practical level. Credit attainment now quite starkly appears to be only one of a myriad other reasons for course enrolment;

While the intrinsic value of learning per se has long been recognized, MOOCs whether by accident or by design can facilitate learning, that is, at best, only loosely tied to assessment and accreditation

Sb — In education, our challenge is to figure out how to prepare people for multiple careers and, most likely, for careers that do not yet exist.

Educating for change demands helping our young people learn how to learn and at the same time build a solid educational foundation that goes beyond a narrow approach or single discipline to educate the whole person.

Ma — There is no question we are moving to a more away from a rote society. Young people do not value information for information sake. If I need to know anything, like the definition of libertarian, I could look that up or talking to my phone to get that information. Understanding the complexity of existence of life, society and culture, and translating that meaningful skills and knowledge is our business today.

And also, the biggest things under the hood is to get students to think critically and learn how to learn. To be better self learners and continue learning and question things and think critically about virtually anything. That is what we are in the business of.

Freedom to fail is key to success–just do it.

Sw — So if learning to do is like learning to write sheet music ten years before you ever pickup an instrument, doing to learn is like improvisation. Being aware of context and your team, learning in the moment and applying what you know.

supported beautifully by people like Tony Wagner, the Harvard Educator; "It is not what you know, but what you can do with what you know".

Sw — A lot of the tech company leaders in Silicon Valley went to Montessori schools. There is a reason. Learning by doing is the core of Montessori. A lot to do with the experimentation.

Quest to Learn www.q2l.org (game-based), learning by doing, project based.

Ac — Complex problem solving is natural to children. From the moment of birth, nearly all their activity relates to a vast number of interrelated real-life problems... They are masters at using trial and error to solve problems.

Ac — Given the freedom to fail without censure, students will often challenge themselves to work hardest on their weaknesses.

Education's output should be wisdom and life skills, not mastery of transient tools

Fa — teaching transferrable information skills...(not) Focusing on teaching students how to use tools that will likely not exist (at least in their current form) within five years...make students more information literate in the long-term...skills that students will need for life-long learning and critical inquiry

Ac — It is wisdom that we should seek more than anything else—the ability to make value judgments, to know the consequences of our actions, and to learn from our mistakes.

Fa — While the development of a "critical stance", "confidence and self-direction", "creativity" and the ability to "collaborate with others" certainly need to be developed in a K-12 curriculum, they are also core skills that need to be taught and emphasized in higher education as well (American Association of School Librarians, 2007, p. 4).

Ma — We teach them about 15% of anything related to design. We actually teach them very little. They learn everything else by other avenues where it is online or from friends, classmates—all these other avenues. One thing we can do is create a mentality about building up or learning those things one their own and get better at it and absorbing that information.

Ur — For me, the biggest thing about my undergrad was the social aspect and learning how to be a person, rather than the content of what I was learning. That was the ultimate piece.

Because the content, I could have learned any of what I learned there, the physical content, in a book. But what I couldn't learn was how to think, how to form an opinion, how to argue that opinion. And to make friends. And that was really big.

A "super teacher" embraces and manages student diversity (skills, preferences, opinions)

Ty — Consideration of learner skills and preferences is good pedagogy, and such consideration becomes even more important in the context of MOOCs where learners have greater autonomy and control over the resources they select and the pace at which they work...essential that we not only recognize these preferences but also have a full understanding of the skills that enable independent learning and the psychological capacities that underpin them.

Fa — Since exposure to a diversity of ideas is so critical to learning, the instructor will also need to step in and introduce divergent viewpoints when he or she sees students only seeking out ideas that confirm their beliefs. The role of instructor is more complex in this environment, because they need to constantly adjust their approach based on the changing needs of the class. In many ways, they are more like a moderator in an online community ...

Fi — Challenges and problems with user-created content:

• Material created by students is often considered excessive and/or irrelevant.
• Most students associate a higher value with teacher-provided material than peer contributions
• The volume of ideas and comments can disorientate learners, difficulties in discerning which information is relevent

i — An educational revolution depends on a twofold inversion: a new orientation for research and a new understanding of the educational style of an emerging counterculture.

Learning is a continuous and lifelong endeavour of (self) discovery

Sw — We need a sense from a higher ed point of view, we need to get students to move from majors to missions. Passionate personal missions that they pursue throughout their lives with and without co-created learning pathways with AI

Fa — For education to prepare students for the world they will need to learn in throughout their lives, it is necessary to shift from a focus on delivery of knowledge to discovery of knowledge.

Fa — Knowledge is no longer thought of as immutable; something one can learn once and forever be considered informed. In many professions, what one needs to know to be considered informed is constantly changing, making it necessary to think of learning as a continuous life-long endeavor.

Au — Education should be a lifelong enterprise, a process enhanced by an environment that supports, to the greatest extent possible, the attempt of people to "find themselves" throughout their lives.

True learning happens outside the classroom

i — Castro...promises that by 1980 Cuba will be able to dissolve its university since all of life in Cuba will be an educational experience

Au — The objective of education is learning, not teaching. There are many different ways of learning; teaching is only one of them

Sh — ...implied understanding that teaching and research in our universities involve not just the transfer of specialized or technical information but a commitment to developing the whole person.

...the solution to our challenges is not to isolate our scholars – but to connect them to others– both in and beyond the academy.

i — School prepares for the alienating institutionalization of life by teaching the need to be taught. Once this lesson is learned, people lose their incentive to grow in independence; they no longer find relatedness attractive, and close themselves off to the surprises which life offers when it is not predetermined by institutional definition.

Ma — I think people learn with hands on experiences. If you want to learn about wildlife, you go to wildlife. Want to learn more about plants, you go to Allen Gardens and look at plants. Not just look at a picture of them, you smell and touch them.

I think the educational experience is the perpetual field trip in both physical and virtual and augmented spaces.

Ch — I was in grade 7, and this teacher had a whole interesting life. He was a breeder of exotic water fowl. He had a hobby farm with exotic looking ducks. Sometimes we would go to a field trip to his farm. It had nothing to do with the curriculum but it was where he had an interest. Was there curriculum based value, I don't think so. But there was value.

Ur — You would see the same six teachers over and over. You would have parties at a prof's house with wine and cheese and chat. As we got to know them, we could build that intimacy and get excited to teach and get feedback on what we knew and get understanding. Rather than writing on a blackboard, we had discussions about math.

Knowledge is not fixed, it is nimble and adaptive

Fa — Howrka and Rees (2009) state: ...we must change (how) knowledge is perceived: not as something that is an activity, a process of finding out."

the way we teach information literacy is in need of an update.

Sw — I am not saying deep knowledge is not important, it is. But I think, really what educational institutions and universities should be focusing on is creating deep learning mindsets.

Around learning agility to help people passionately and continually navigate complexity over the course of their lives. And I contend that increasing that will be done by machine intelligence.

Au — Building on design thinking, we believe that design learningwill come to serve as a foundation to improving formal education...Rather than assuming that the purpose of education is simply the transfer of fixed knowledge, design learning facilitates the development of the entrepreneurial dispositions and skills necessary to adapt to rapid social and technological change.

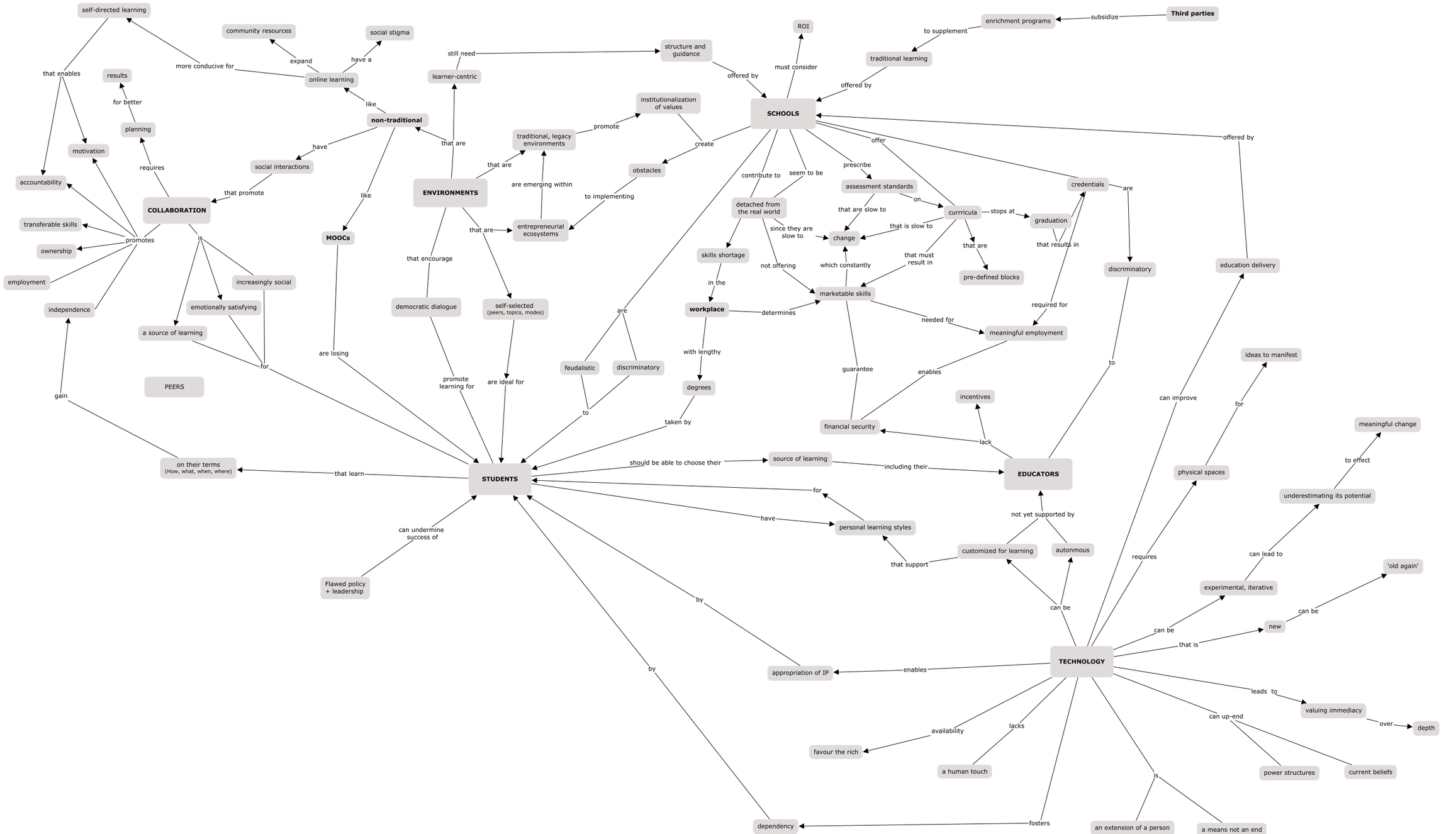
Learner autonomy + self-motivation = achievement

Fa — Increased learner autonomy give students a greater sense of responsibility for their learning and has been shown to improve student achievement (McLoughlin and Lee, 2008).

Ma — If you approach it as just being like school—I am here because I have to be here. I am paying to be here so I should probably be here.

But if you approach it from a career stand point and "Why am I here", I want something better for myself. I want a chance to break into an industry that I have been trying to break into for some time.

Au — Without motivation, no amount of teaching can produce learning...can not be imposed on students


self-directed learning
that enables
more conducive for
community resources
expand
social stigma
have a
online learning
like
results
for better
planning
motivation
requires
non-traditional
have
social interactions
that promote
COLLABORATION
accountability
transferable skills
promotes
ownership
employment
independence
gain
is
increasingly social
emotionally satisfying
a source of learning
for
PEERS
on their terms
(How, what, when, where)
that learn
STUDENTS
still need
structure and guidance
learner-centric
that are
ENVIRONMENTS
traditional, legacy environments
promote
institutionalization of values
that are
are emerging within
entrepreneurial ecosystems
obstacles
create
to implementing
that are
that encourage
democratic dialogue
self-selected
(peers, topics, modes)
promote learning for
are ideal for
like
MOOCs
are losing
Flawed policy + leadership
can undermine success of
offered by
ROI
must consider
SCHOOLS
Third parties
subsidize
enrichment programs
to supplement
traditional learning
offered by
offer
offered by
contribute to
seem to be
prescribe
assessment standards
on
detached from the real world
since they are slow to
that are slow to
change
currricula
stops at
graduation
that is slow to
that are
pre-defined blocks
that must result in
that results in
credentials
are
discriminatory
skills shortage
not offering
which constantly
in the
workplace
determines
marketable skills
needed for
required for
meaningful employment
are
feudalistic
discriminatory
to
with lengthy
degrees
taken by
guarantee
enables
financial security
incentives
lack
source of learning
should be able to choose their
including their
EDUCATORS
for
personal learning styles
have
that support
customized for learning
not yet supported by
autonmous
can be
education delivery
ideas to manifest
for
can improve
physical spaces
requires
meaningful change
to effect
underestimating its potential
can lead to
experimental, iterative
can be
'old again'
can be
new
that is
TECHNOLOGY
by
appropriation of IP
enables
by
dependency
fosters
leads to
valuing immediacy
over
depth
can up-end
power structures
current beliefs
availability
favour the rich
lacks
a human touch
is
an extension of a person
a means not an end

INTERVIEW DISCUSSION GUIDES: EDUCATORS

June 5, 2017 - Professor (Code: Ch)

Technology plays a big role in teaching. What do you consider technology?
Follow up depending on the answer (day-to-day life or in education)

How has College bureaucracy been a barrier to something that you tried to implement in the program or curriculum?
What are the tensions?

Is there an example where they supported you?

Do you consider the College a big business?
Acting too much like one or not enough?

Can you recall an inspiring figure or teacher that made a lasting impact?
Please describe an example

What if one of the Web Design non-studio courses was taught online? Which one would you pick — and why?

If you could turn back time, what is the one thing you would change in your role as an educator
(or program coordinator)?

August 4, 2017 - Professor (Code: Ma)

Technology plays a big role in teaching. What do you consider technology?
Follow up depending on the answer (day-to-day life or in education)

Students come in with varying levels of technical proficiency, especially in first year. How do you manage this?

What do you think are the biggest challenges that students face based on your experiences with them?

Can you speak to an example of successful collaboration in the classroom?
Any examples where collaboration led to sub-optimal results and why?

What if one of your studio courses was taught online, any comments?

If you could create the ideal teaching environment, what would that be like for you?
Please describe an example

INTERVIEW DISCUSSION GUIDES: EDUCATORS

June 27, 2018 - Professor, University of British Columbia (Code: Cu)

How do you anticipate the role of design educators evolving in the decade?

How does technology facilitate collaboration among students and educators?

With post-secondary students having self-directed and autonomous learning options,
where do you see the educator role fitting in?

What are your thoughts on online course delivery?
Probe: Human nuance, blended approaches

Describe what lifelong learning means to you, outside of a structured, post-secondary environment?

June 29, 2018 - Professor, Illinois Institute of Technology (Code: Ba)

How do you see the student experience changing in the future?

How do you anticipate the role of design educators evolving in the decade?

What are your thoughts on online course delivery?
Probe: Human nuance, blended approaches

What are your thoughts on design schools partnering with industry
and having them more involved in curriculum?

Describe what lifelong learning means to you, outside of a structured, post-secondary environment?

July 3, 2018 - Digital Pedagogy Specialist, McMaster University (Code: Mo)

How do you see the student experience changing in the future?
Follow up : Ways students can customize their learning?

How do you anticipate the role of educators evolving in the next decade?
Follow up : Any thoughts on adaptive technologies?

What are your thoughts on online course delivery?

What are your thoughts on higher education partnering with industry?

As a specialist in digital pedagogy, what does lifelong learning mean to you?
Follow up: How might that be nurtured while students are still in school?

INTERVIEW DISCUSSION GUIDES: STUDENTS

August 3, 2017 - Graduate, Sheridan College Web Design Graduate Certificate Program (Code: Ad)

What counts as technology to you?
Follow up depending on the answer (day-to-day life or in education)

Why did you choose the program(s) that you did? What were you trying to accomplish?

What do you think of the idea that one of your old studio courses would be taught online?
Probe: What would work? What wouldn't work for you? Why / not?

Thinking of your experiences at Sheridan, which aspects do you think prepared you the most for your current job? What were you not ready for? *Probes: Technology, life skills, team*

What do you think were the biggest challenges your instructors faced during your time?

What do you think the future holds for the technology in the classroom?

If you could change one and only one thing about your higher-ed experience, what would that be and why?

August 5, 2017 - Graduate Student OCAD University (Code: Lv)

What counts as technology to you?
Follow up depending on the answer (day-to-day life or in education)

What are schools still doing that is way past the best-before date?

Would you describe your undergrad experience as collaborative? Why? Why not?
Probe: What role did technology play in that collaboration?

Do you feel your experience with educators has been a one-way relationship?

Do you feel your education has prepared you for the future?
Probe: Role technology could have played in preparing you (helped you / hindered you)?

If you could change one and only one thing about your higher-ed experience, what would that be and why?

INTERVIEW DISCUSSION GUIDES: STUDENTS

July 3, 2018 - Adjunct Professor, Graduate Student OCAD University (Code: Kp)

How do you see the student experience changing in the future?
Follow up : Ways students can customize their learning?

How do you anticipate the role of educators evolving in the next decade?
Follow up : Any thoughts on adaptive technologies?

What are your thoughts on online course delivery?

What are your thoughts on higher education partnering with industry?

What does lifelong learning mean to you?
Follow up: How might that be nurtured while students are still in school?

2017 Learning Technologies Symposium
October 11–12, 2017
Mills Library L504, McMaster University, 1280 Main Street West, Hamilton, ON

The Learning Technologies Symposium (LTS) is an annual event that brings together faculty, staff, and students from the region to share innovations, connect on project ideas, and exchange best practices.

Reshaping Education for the Future of Work
May 30, 2017
MaRS Centre (Auditorium), 101 College Street, Toronto, ON

A presentation by Randy Swearer, VP of education at Autodesk, about the importance of developing new ways of learning—both inside and outside of traditional educational institutions—that help graduates adapt to changing professions and new skills requirements.

SXD: Kickstart
March 13, 2017
MaRS Discovery District, 101 College Street, Toronto, ON

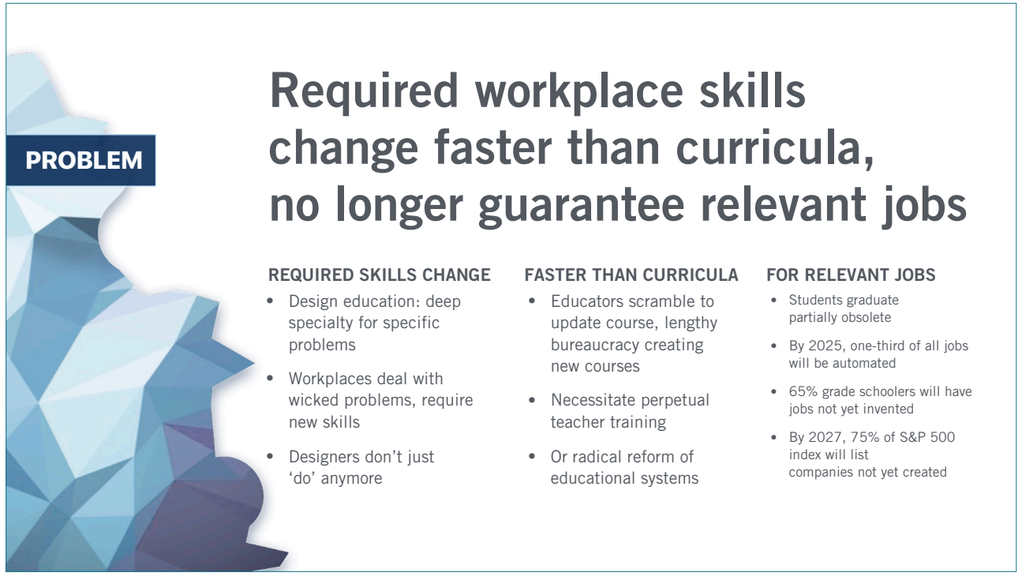
eCampusOntario showcases projects from Student-Experience Design Studio, where 25 students from across the province came together to look at the present and future of online and technology-enabled learning in Ontario.

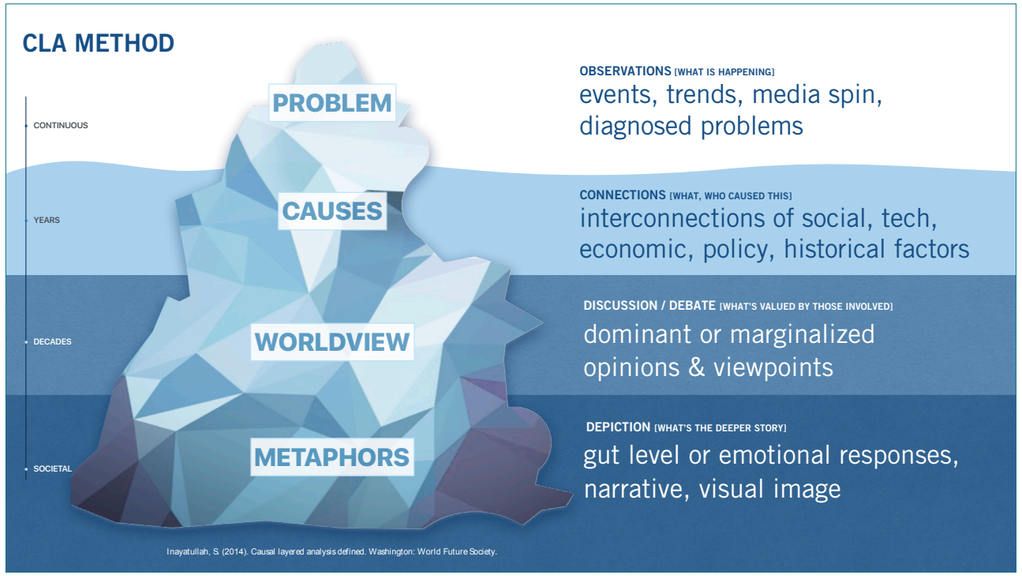
RSD5 2016: Relating Systems Thinking and Design (RSD5) 2016 Symposium
October 13-15, 2016
MaRS Discovery District, 101 College Street, Toronto, ON

The symposium series has the intention to promote and foster the emerging dialogue of rethinking systems approaches in design.

ARTIFACTS

These handouts were distributed to participants so they can reference notes on the workshop's topic and the four layers of the Causal Layered Analysis method that structured the session.





APPENDIX E: CAUSAL LAYERED ANALYSIS WORKSHOPS

CAUSAL LAYERED ANALYSIS WORKSHOP DETAILS

- Workshop A (Recent Graduates): June 26, 2018 at OCAD University, 205 Richmond St. West, Toronto ON
- Workshop B (Design Educators): July 11, 2018 at OCAD University, 205 Richmond St. West, Toronto ON

PARTICIPANT CRITERIA

- Workshop A: Currently working as a designer and, in the last three years, has graduated from a post-secondary, technology-enabled design program
- Workshop B: Professor of a post-secondary, technology-enabled interaction design program
- Able to attend a two-hour in-person session in the Toronto area

PARTICPANT PROFILES

Recent Graduates

- AD: Digital Designer, graduate of Web Design Graduate Certificate Program, Sheridan College
- DS: Senior Service Designer, graduate of York / Sheridan Program in Design
- EK: UX Designer, graduate of York / Sheridan Program in Design
- MA: Senior Service Designer, graduate of Strategic Foresight & Innovation, OCAD University
- MK: Graphic Designer, graduate of York / Sheridan Program in Design
- NH: Design Professional, graduate of Strategic Foresight & Innovation, OCAD University

Design Educators

- DW: Professor, Interaction Design, Sheridan College
- IZ: Professor, Visual Creative Arts, Sheridan College
- MG: Adjunct Professor, York / Sheridan Program in Design
- RA: Professor, York / Sheridan Program in Design

APPENDIX F: MORPHOLOGICAL SYNTHESIS WORKSHOPS

DISCUSSION GUIDE

Moderator's guide offered the participant context and prompts to help generate a future scenario.

CONSIDERATIONS

- reimagine 'traditional' post-secondary design education 10-15 years in the future
- the learning experience is tech-enabled and learner-centric (not reliant on educators) consider where tech will be a decade from now and how that may change how we learn
- one card can "lead" the scenario, but please consider aspects from each card

WORKSHEET

What would be most different about this design learning future?

How and where does learning take place?

What does collaboration look like in this design learning scenario?

How is technology utilized to optimize the learning experience?

DISCUSSION GUIDE (CONT.)

Briefly describe the administration of this design learning future

_____

_____

_____

What would be the biggest obstacle?

_____

_____

_____

What would you call this program? _____

MORPHOLOGICAL SYNTHESIS WORKSHOPS (ONE-ON-ONE)

- Workshop A (Recent Graduates): September 28, 2018 at OCAD University, 205 Richmond St. West, Toronto ON
- Workshop B (Design Educators): December 6, 2018 at OCAD University, 205 Richmond St. West, Toronto ON

PARTICPANT CRITERIA

- Workshop A: Currently working as a designer and, in the last three years, has graduated from a post-secondary, technology-enabled design program
- Workshop B: Professor of a post-secondary, technology-enabled interaction design program

PARTICPANT PROFILES

Recent Graduates

- CV: Designer, graduate of Strategic Foresight & Innovation, OCAD University
- JT: Senior Project Designer, graduate of Strategic Foresight & Innovation, OCAD University

Design Educators

- JA: Adjunct Professor, Interaction Design, Sheridan College
- RA: Professor, York / Sheridan Program in Design

HUMAN-CENTRED STEEPV CARDS

Participants were given 20 cards face down and asked to randomly pick one card for each of six back side colours (i.e. the lead motivation for a specific factor) to end up with six cards in total.

SO•1

ACTIVE LEARNING

The pursuit of highly personal learning outcomes through individual drive and co-creation of knowledge.

SO•2

EMPLOYABILITY

A program that is highly respected and valued by employers, students, and the public.

SO•3

COMMUNITY BUILDING

An inclusive, well-organized circle that creates emotionally satisfying relationships.

TE•1

CUSTOMIZED LEARNING

Efficient tools that let students create and pursue learning pathways as unique as they are

TE•2

OPTIMAL USE

A culture of learning that embraces iteration and experimentation in the use of technology

TE•3

PEOPLE FIRST

A program that puts technology in the service of students and teachers, not the other way around

TE•4

CODE OF CONDUCT

Clear policies on the acceptable use of technology in interactions with people and intellectual property

EC•1

VIABILITY

A financially efficient business model that does not sacrifice student and faculty engagement

EC•2

CURRENCY

Skills and experiences that are in tune with personal goals and ahead of industry demands

EC•3

ACCESSIBILITY

Equal opportunity to have and to use technology to fuel one's personal learning mission

EN•1

ADAPTIVE SPACES

Fluid environments that mold physically, procedurally, and technologically to student feedback and the outside world

EN•2

NO BOUNDS

An eye-opening learning landscape that is not walled in by time, space, or orthodoxy

EN•3

CONDUCIVE SPACES

Student-defined learning environments supported by expert guidance and venues to implement ideas

PO•1

CLEAR LEADERSHIP & POLICY

Holistic and widely understood direction built on institutional diversity and student success

PO•2

TWO-WAY STREET

A democratic mindset that encourages dialogue and feedback for positive change

PO•3

GRASSROOTS

A willingness to take a bottom-up approach to designing the future of the program

VA•1

CHOICE

The confidence to put students in the driver's seat of their education

VA•2

FLUIDITY

A readiness to embrace the unknown and quickly change course in the name of progress

VA•3

HUMANISTIC

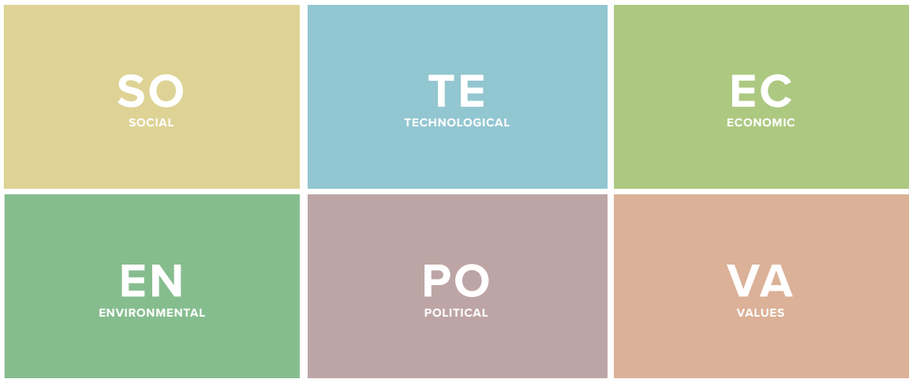
A celebration of each student as a unique, whole being who wants to achieve

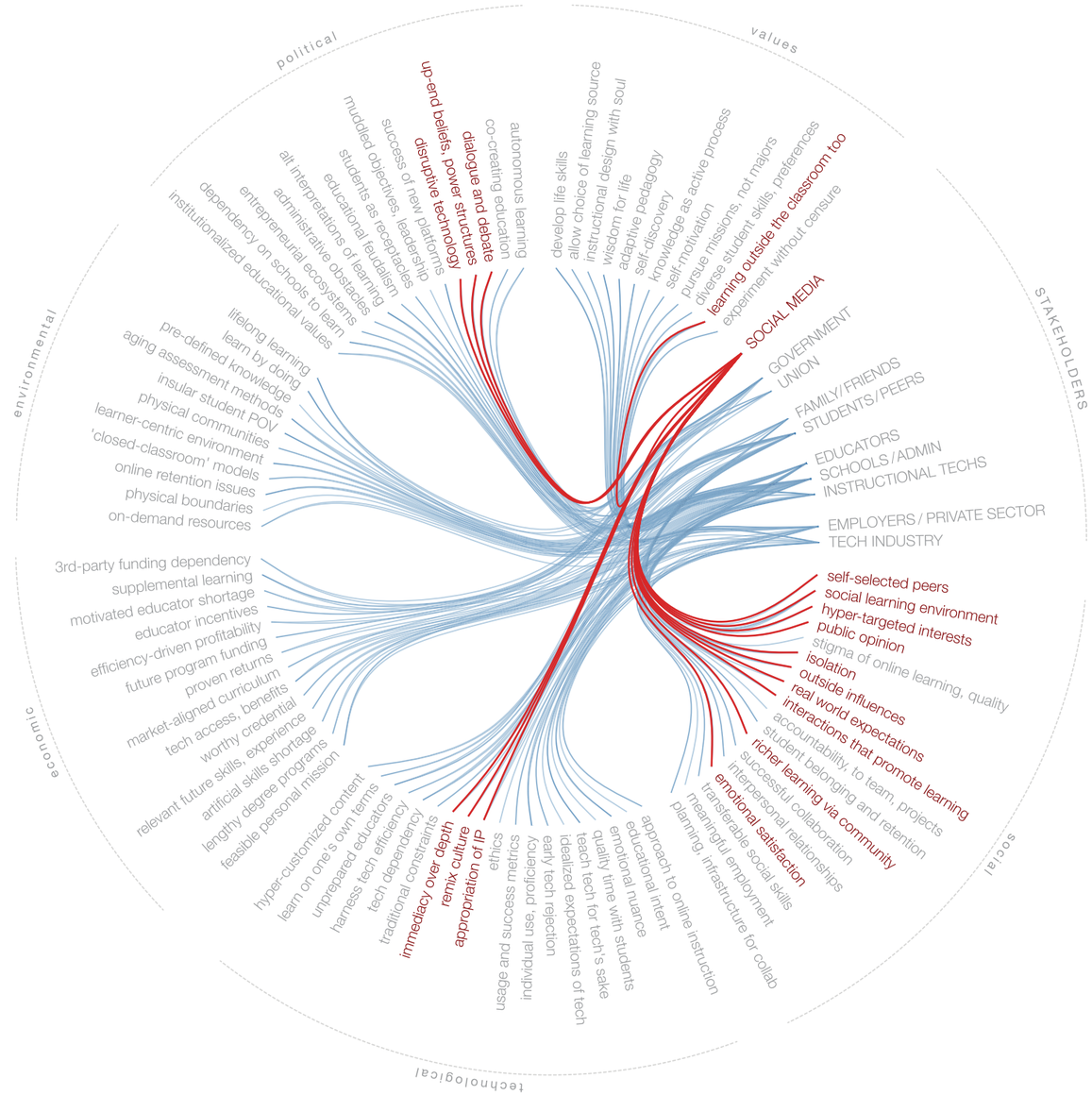
VA•4

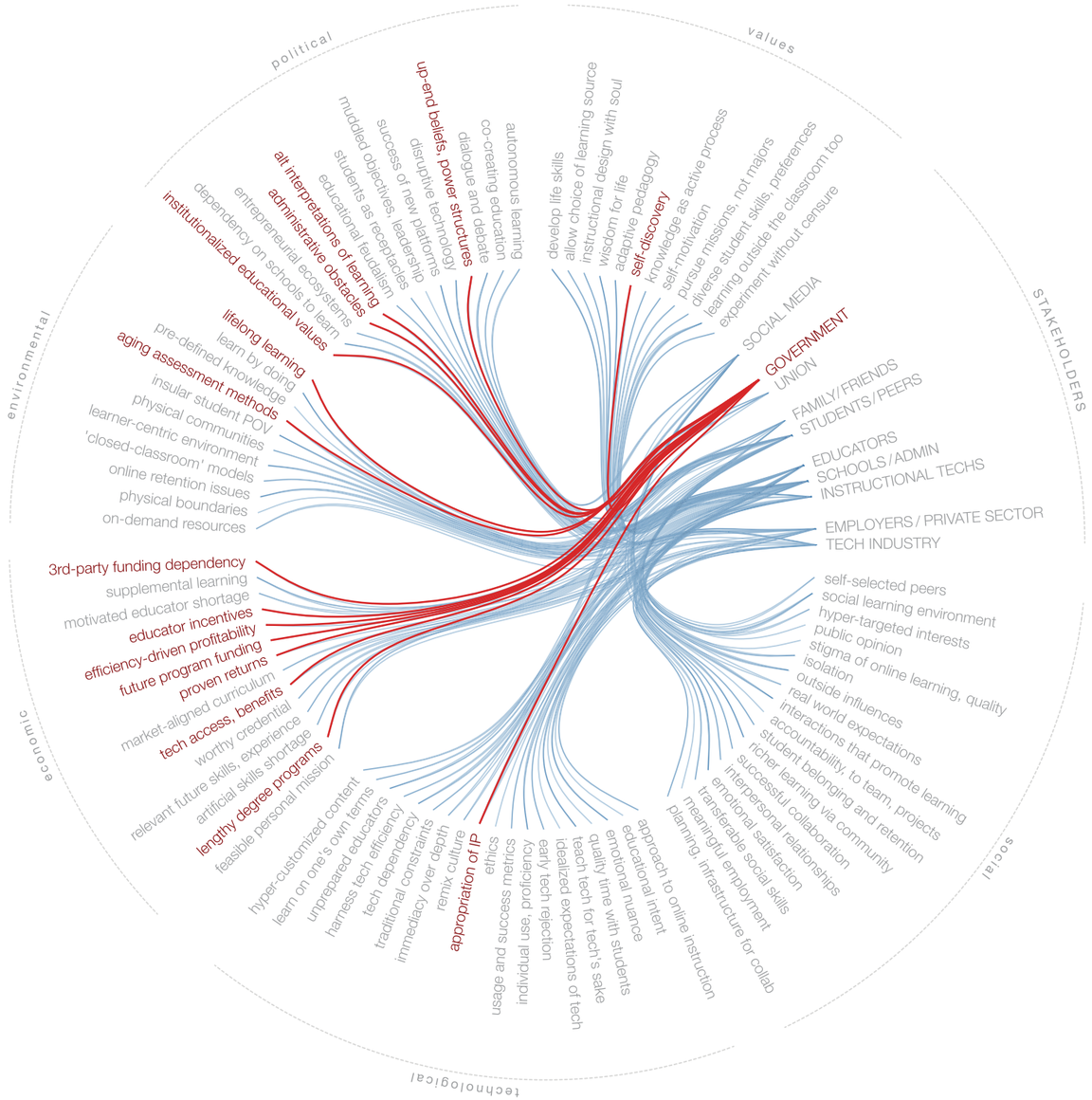
LIFELONG MISSION

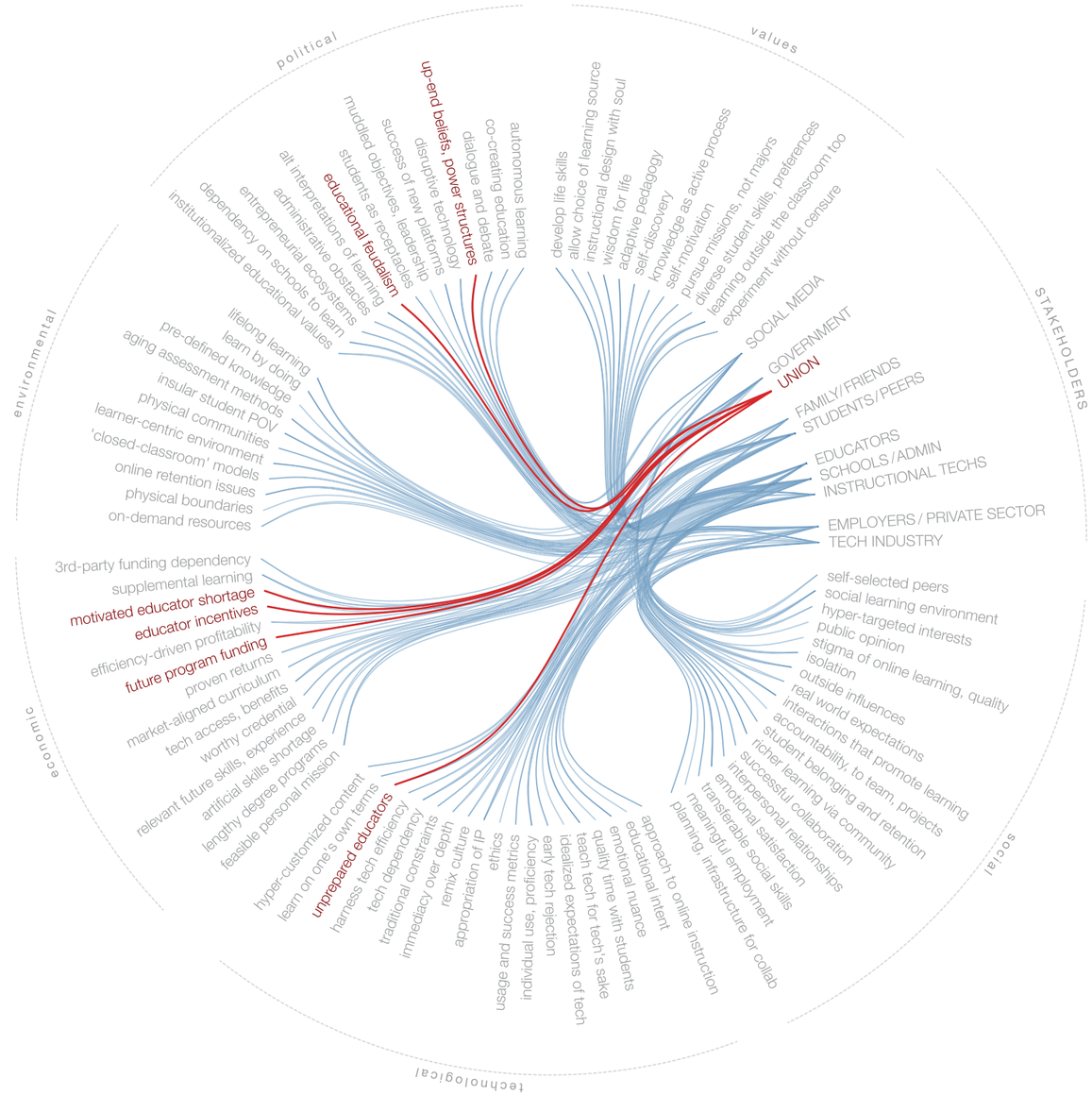
A tireless quest of self-discovery that doesn't stop at graduation

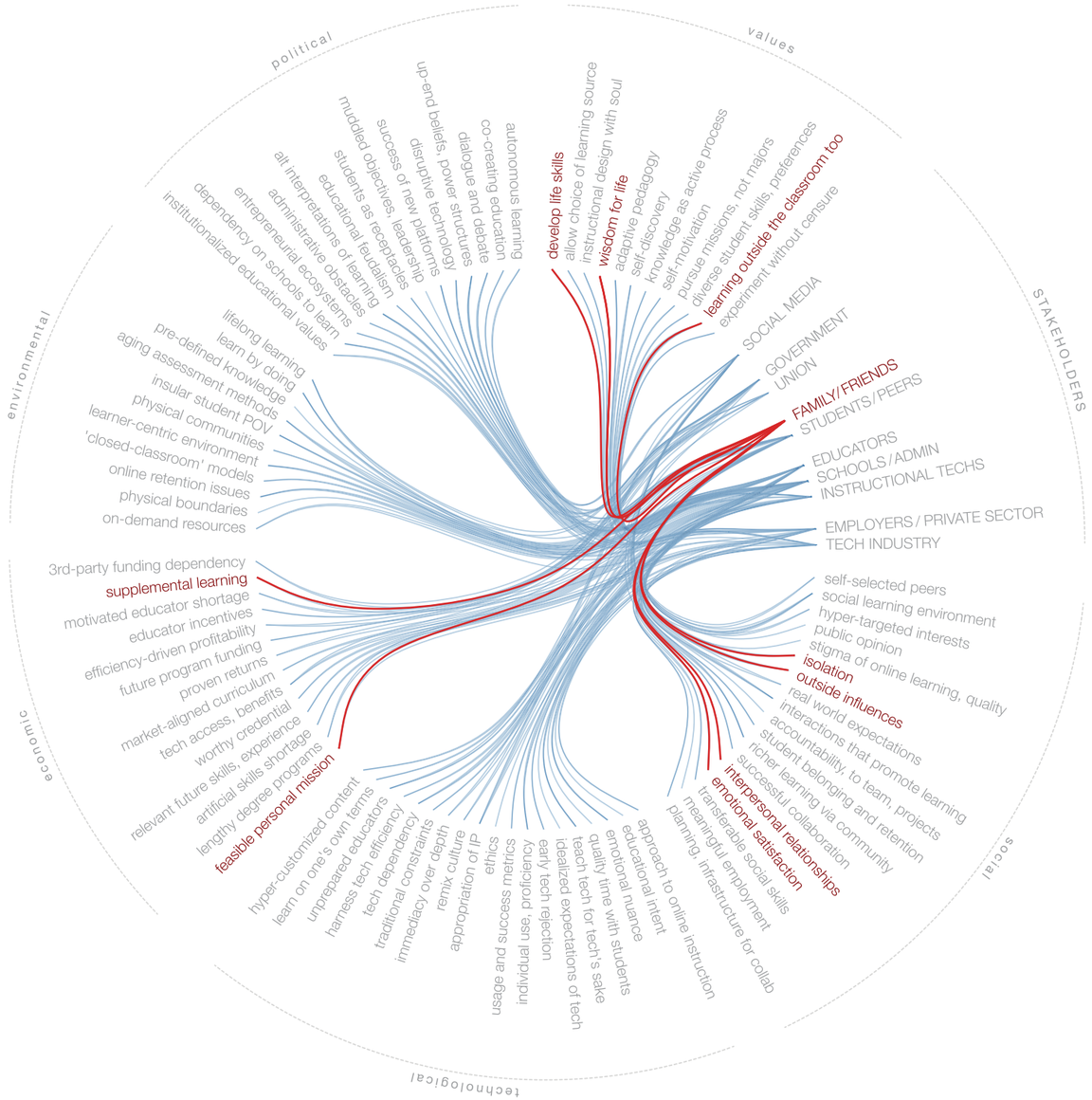
Back side of morphological synthesis cards (one per category shown).
Participants select from all twenty cards with the back side up.

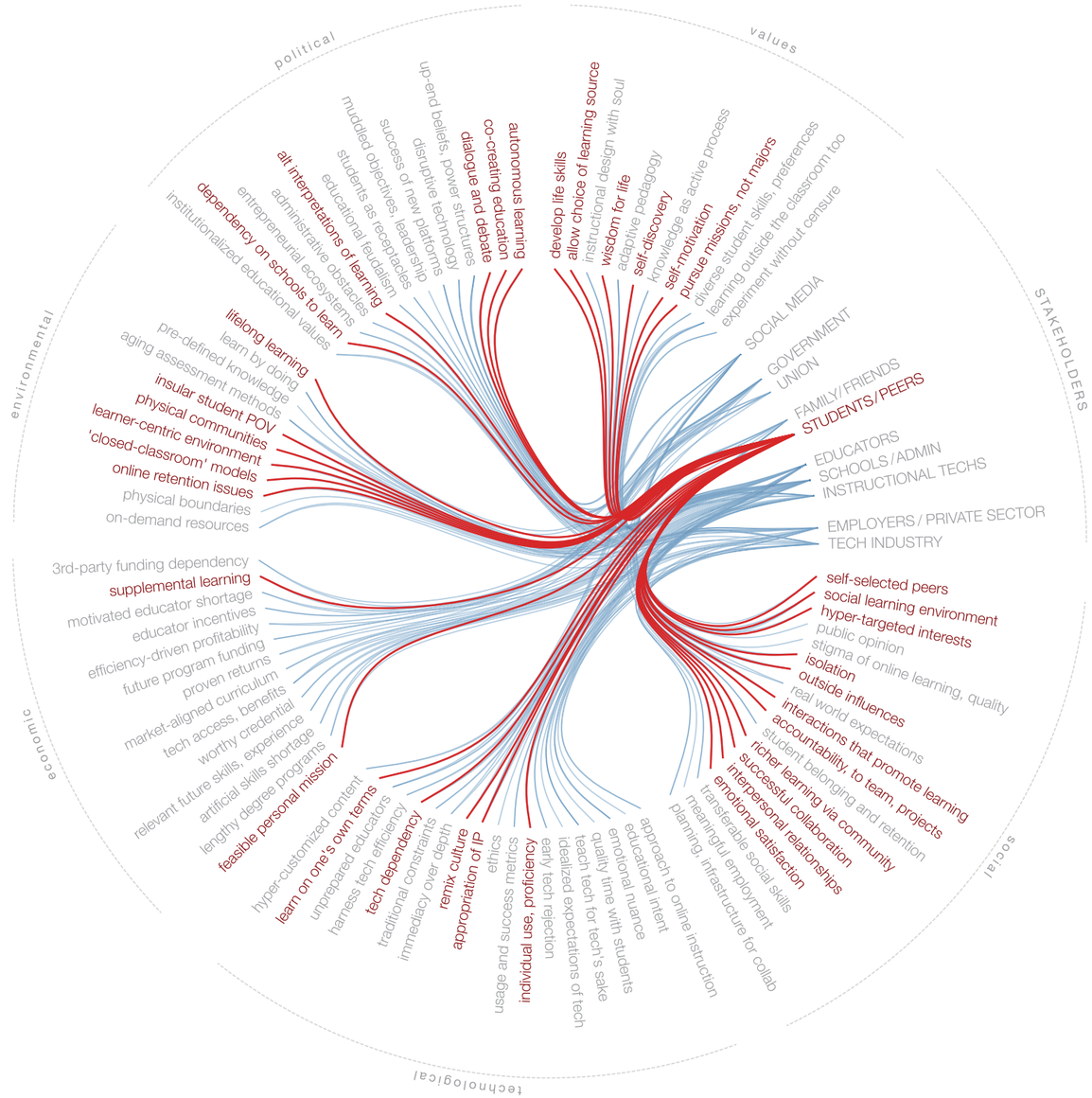


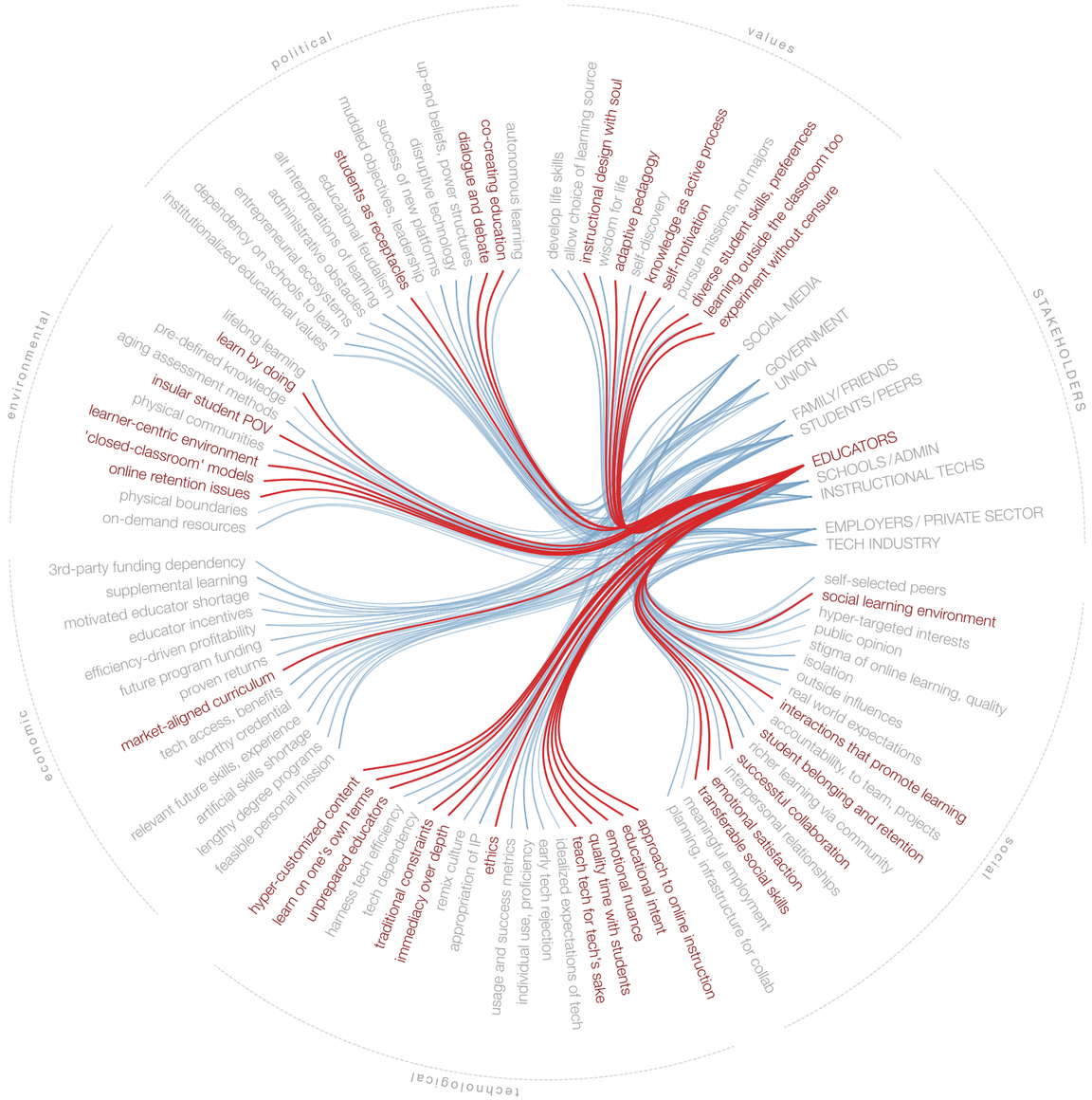


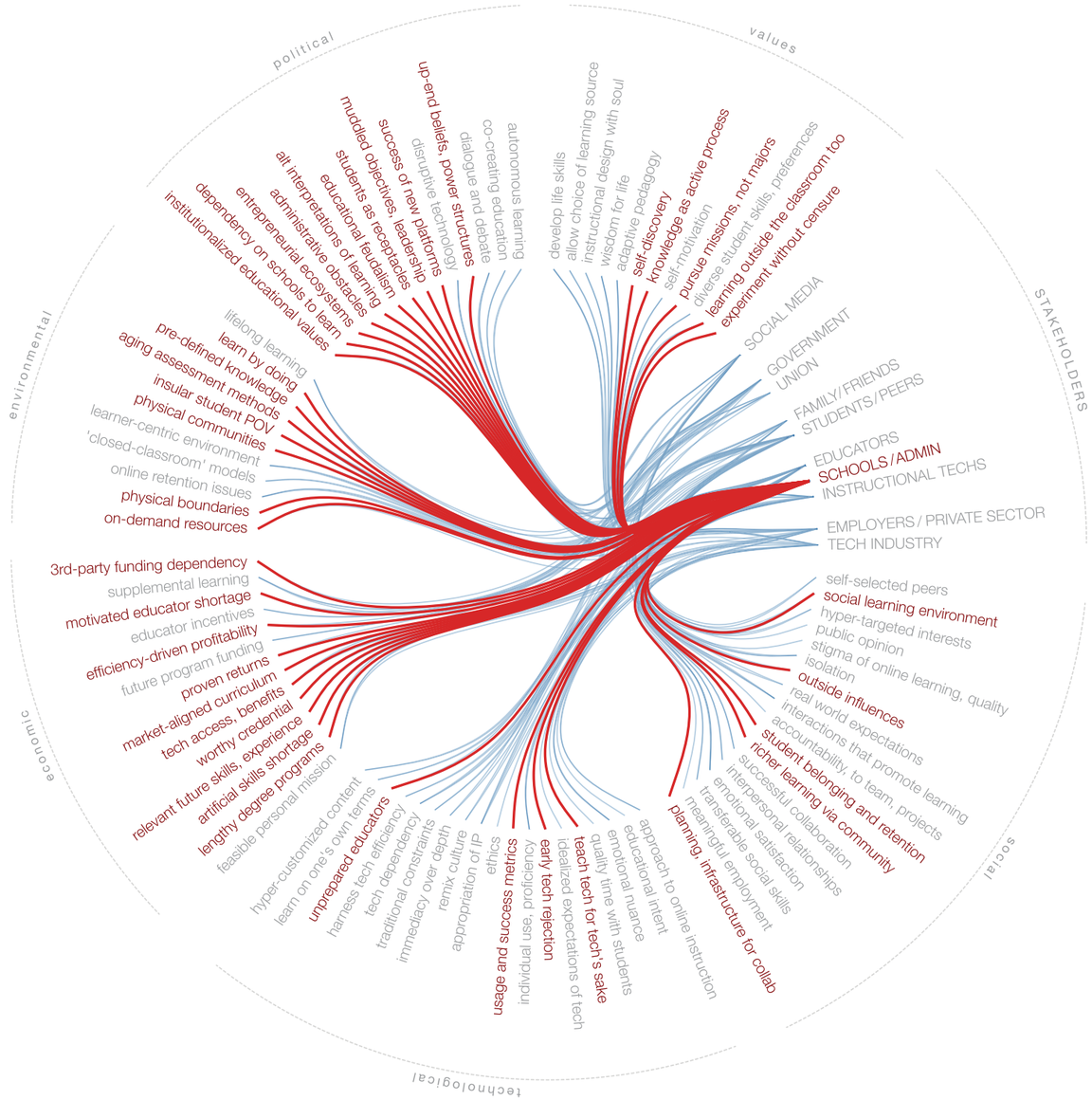

political
values
stakeholders
social
technological
economic
environmental
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
up-end beliefs, power structures
disruptive technology
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
alt interpretations of learning
administrative obstacles
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/ PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
student belonging and retention
richer learning via community
successful collaboration
interpersonal relationships
emotional satisfaction
transferable social skills
meaningful employment
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
idealized expectations of tech
early tech rejection
individual user proficiency
usage and success metrics
ethics
appropriation of IP
remix culture
immediacy over depth
traditional constraints
tech dependency
harness tech efficiency
unprepared educators
learn on one's own terms
hyper-customized content

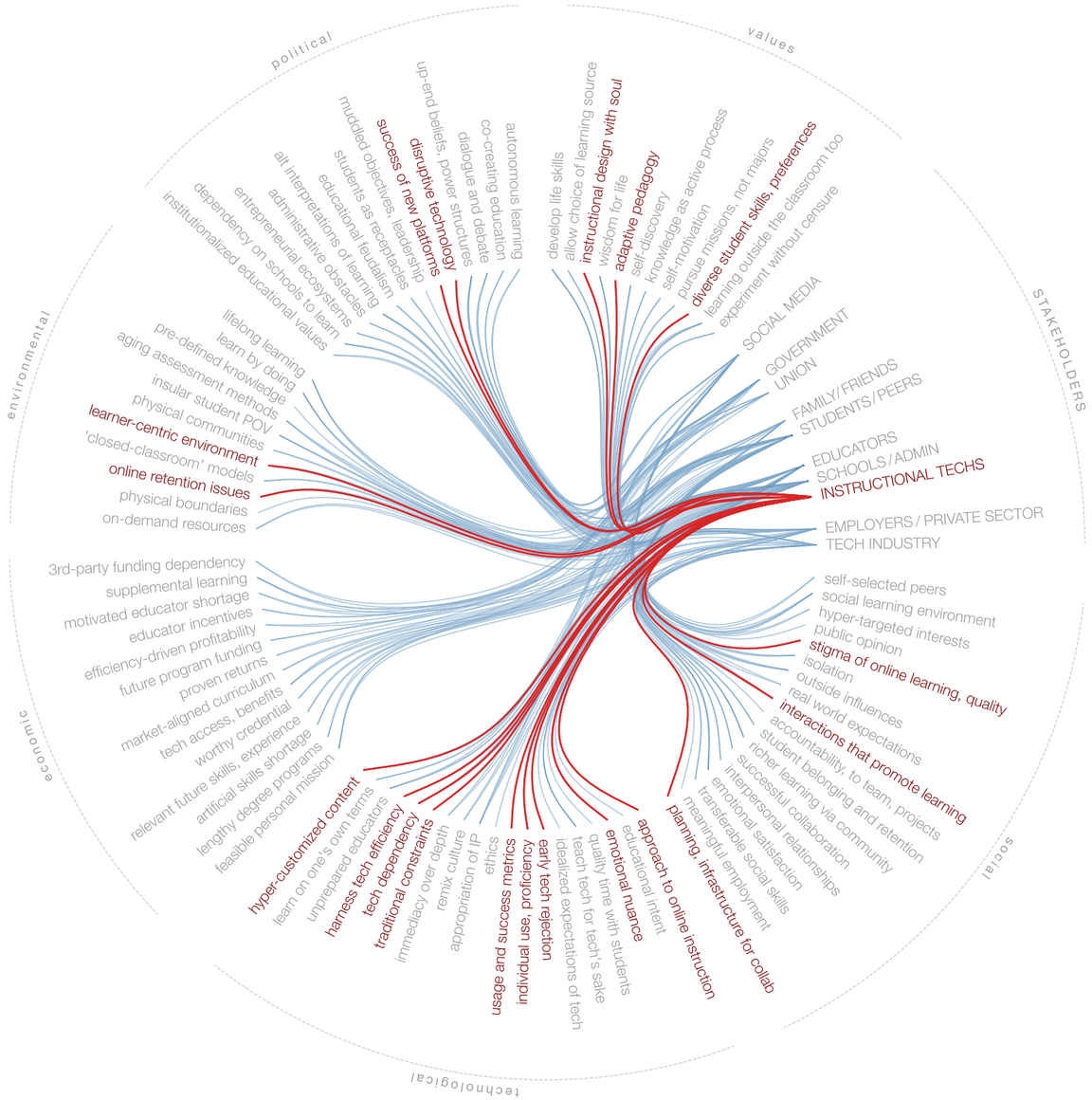

political
values
stakeholders
social
technological
economic
environmental
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
up-end beliefs, power structures
disruptive technology
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
alt interpretations of learning
administrative obstacles
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/ PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
student belonging and retention
richer learning via community
successful collaboration
interpersonal relationships
emotional satisfaction
transferable social skills
meaningful employment
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
idealized expectations of tech
early tech rejection
individual user proficiency
usage and success metrics
ethics
appropriation of IP
remix culture
immediacy over depth
traditional constraints
tech dependency
harness tech efficiency
unprepared educators
learn on one's own terms
hyper-customized content

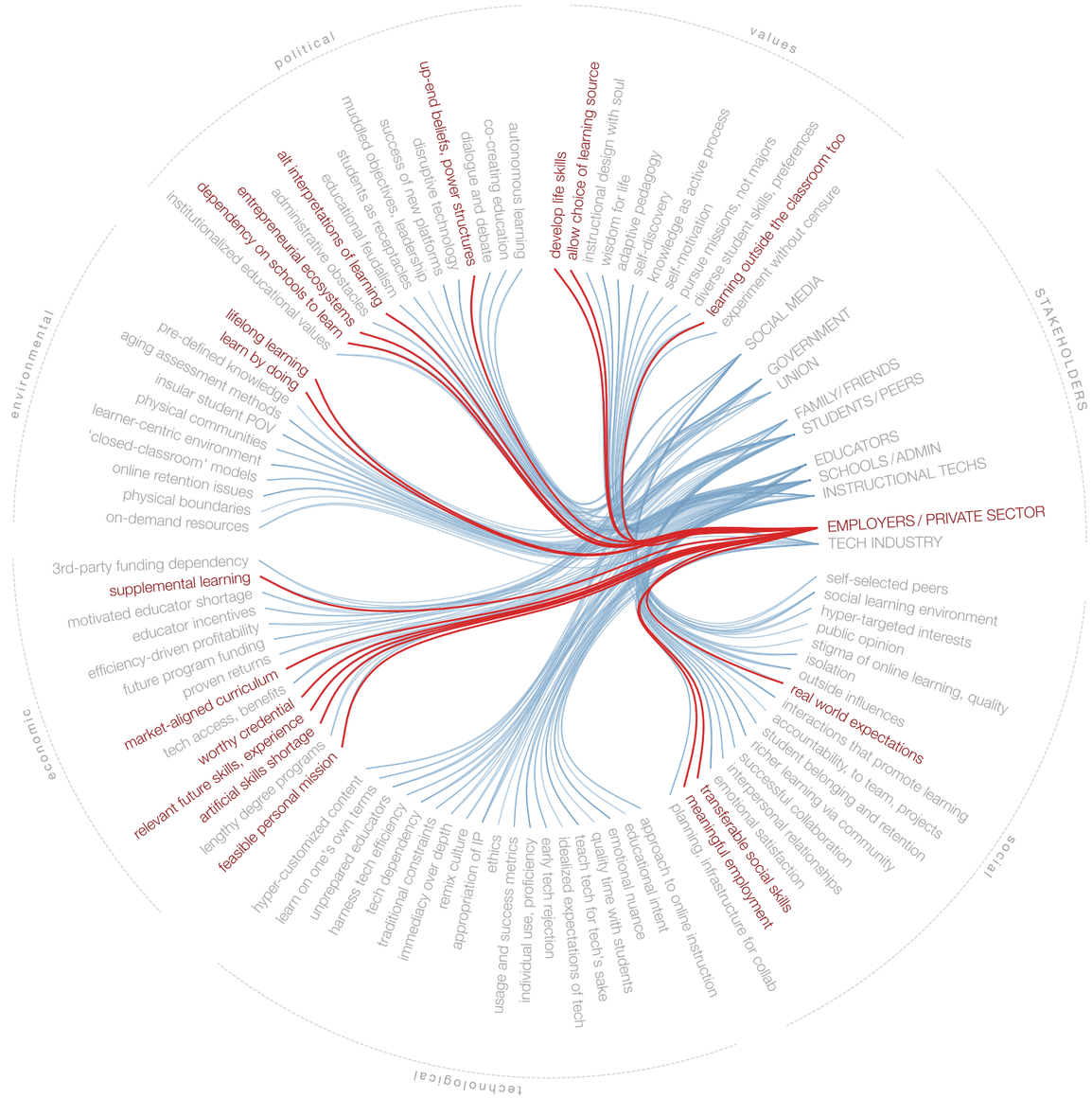

political
values
STAKEHOLDERS
environmental
economic
social
technological
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
up-end beliefs, power structures
disruptive technology
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
alt interpretations of learning
administrative obstacles
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
student belonging and retention
richer learning via community
successful collaboration
interpersonal relationships
emotional satisfaction
meaningful employment
transferable social skills
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
idealized expectations of tech
early tech rejection
individual use, proficiency
usage and success metrics
ethics
appropriation of IP
remix culture
immediacy over depth
traditional constraints
tech dependency
unprepared educators
harness tech efficiency
learn on one's own terms
hyper-customized content


political
values
STAKEHOLDERS
environmental
economic
social
technological
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
up-end beliefs, power structures
disruptive technology
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
alt interpretations of learning
administrative obstacles
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
student belonging and retention
richer learning via community
successful collaboration
interpersonal relationships
emotional satisfaction
meaningful employment
transferable social skills
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
idealized expectations of tech
early tech rejection
individual use, proficiency
usage and success metrics
ethics
appropriation of IP
remix culture
immediacy over depth
traditional constraints
tech dependency
unprepared educators
harness tech efficiency
learn on one's own terms
hyper-customized content


political
values
stakeholders
social
technological
economic
environmental
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
disruptive technology
up-end beliefs, power structures
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
alt interpretations of learning
administrative obstacles
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
richer learning via community
interpersonal relationships
student belonging and retention
successful collaboration
emotional satisfaction
transferable social skills
meaningful employment
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
early tech rejection
idealized expectations of tech
usage and success metrics
individual use, proficiency
ethics
remix culture
appropriation of IP
traditional constraints
tech dependency
harness tech efficiency
immediacy over depth
unprepared educators
learn on one's own terms
hyper-customized content


political
values
stakeholders
social
technological
economic
environmental
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
disruptive technology
up-end beliefs, power structures
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
alt interpretations of learning
administrative obstacles
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
richer learning via community
interpersonal relationships
student belonging and retention
successful collaboration
emotional satisfaction
transferable social skills
meaningful employment
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
early tech rejection
idealized expectations of tech
usage and success metrics
individual use, proficiency
ethics
remix culture
appropriation of IP
traditional constraints
tech dependency
harness tech efficiency
immediacy over depth
unprepared educators
learn on one's own terms
hyper-customized content


political
values
stakeholders
environmental
economic
social
technological
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
up-end beliefs, power structures
disruptive technology
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
administrative obstacles
alt interpretations of learning
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/ PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
student belonging and retention
richer learning via community
successful collaboration
interpersonal relationships
emotional satisfaction
transferable social skills
meaningful employment
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
idealized expectations of tech
early tech rejection
individual use, proficiency
usage and success metrics
ethics
appropriation of IP
remix culture
immediacy over depth
traditional constraints
tech dependency
harness tech efficiency
unprepared educators
learn on one's own terms
hyper-customized content


political
values
stakeholders
environmental
economic
social
technological
develop life skills
allow choice of learning source
instructional design with soul
wisdom for life
adaptive pedagogy
self-discovery
knowledge as active process
self-motivation
pursue missions, not majors
diverse student skills, preferences
learning outside the classroom too
experiment without censure
autonomous learning
co-creating education
dialogue and debate
up-end beliefs, power structures
disruptive technology
success of new platforms
muddled objectives, leadership
students as receptacles
educational feudalism
administrative obstacles
alt interpretations of learning
entrepreneurial ecosystems
dependency on schools to learn
institutionalized educational values
lifelong learning
learn by doing
pre-defined knowledge
aging assessment methods
insular student POV
physical communities
learner-centric environment
'closed-classroom' models
online retention issues
physical boundaries
on-demand resources
3rd-party funding dependency
supplemental learning
motivated educator shortage
educator incentives
efficiency-driven profitability
future program funding
proven returns
market-aligned curriculum
tech access, benefits
worthy credential
relevant future skills, experience
artificial skills shortage
lengthy degree programs
feasible personal mission
SOCIAL MEDIA
GOVERNMENT
UNION
FAMILY/FRIENDS
STUDENTS/PEERS
EDUCATORS
SCHOOLS/ADMIN
INSTRUCTIONAL TECHS
EMPLOYERS/ PRIVATE SECTOR
TECH INDUSTRY
self-selected peers
social learning environment
hyper-targeted interests
public opinion
stigma of online learning, quality
isolation
outside influences
real world expectations
interactions that promote learning
accountability, to team, projects
student belonging and retention
richer learning via community
successful collaboration
interpersonal relationships
emotional satisfaction
transferable social skills
meaningful employment
planning, infrastructure for collab
approach to online instruction
educational intent
emotional nuance
quality time with students
teach tech for tech's sake
idealized expectations of tech
early tech rejection
individual use, proficiency
usage and success metrics
ethics
appropriation of IP
remix culture
immediacy over depth
traditional constraints
tech dependency
harness tech efficiency
unprepared educators
learn on one's own terms
hyper-customized content

APPENDIX G: STAKEHOLDER INFLUENCE MAPS - TECH INDUSTRY