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Pedagogy for a Plugged-in Age, Independent Study 2017

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ANDREW HLADKYJ SUMMER 2017 SFIN6898 INDEPENDENT STUDY

PEDAGOGY
FOR A PLUGGED-IN AGE

EMPLOYABILITY
COMMUNITY BUILDING
ACTIVE LEARNING
CUSTOMIZED LEARNING
PEOPLE-FIRST
CODE OF CONDUCT
OPTIMAL USE
ACCESSIBILITY
CURRENCY
VIABILITY
CONDUCIVE SPACES
ADAPTIVE SPACES
NO BOUNDS
TWO WAY STREET
GRASSROOTS
CLEAR LEADERSHIP
LIFELONG MISSION
HUMANISTIC
FLUIDITY
CHOICE

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FOREWORD

Lay of the Land Technology and Pedagogy Foundation for MRP

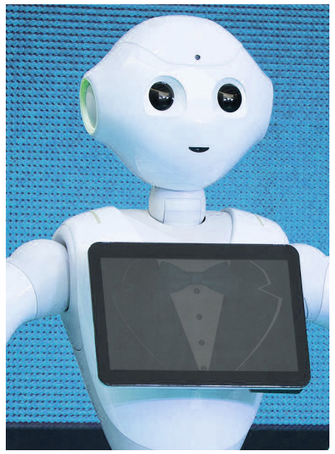


Figure 1: Robots like Softbank's Pepper are now in an Ontario classroom near you, but "not everyone thinks humanoid helpers are as practical as they are cute." (Boutsalis, 2017)

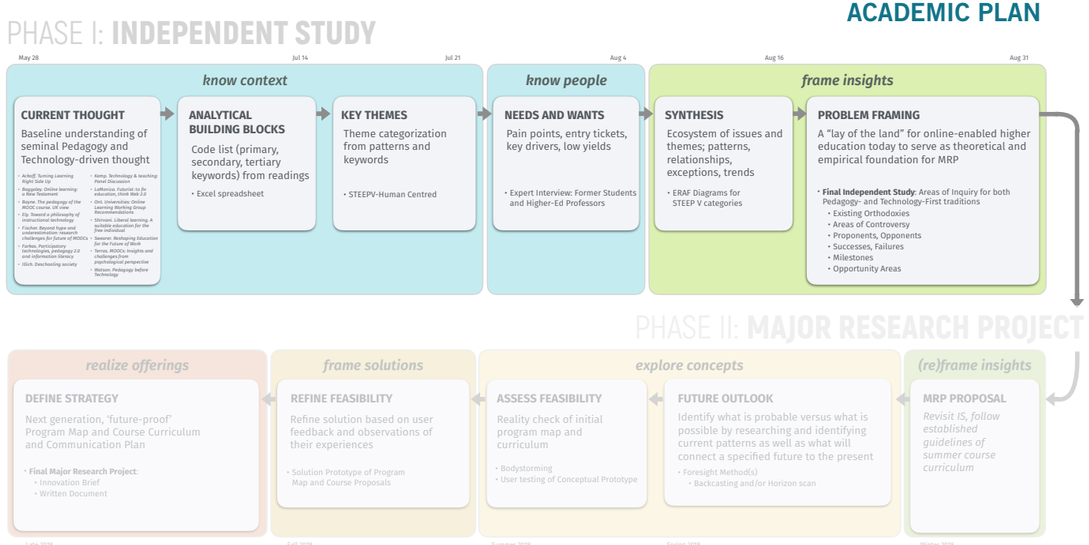
Studying the future of higher education is particularly important to me as I embark on my journey to lead and reshape Sheridan College's Web Design Graduate Certificate Program, where I have been recently appointed Coordinator.

Without doubt, technology will figure heavily in the future of higher education and, more immediately, in the curriculum that I have been asked to redesign and teach. Indeed, our students must effectively harness technical tools to create engaging interfaces and experiences. New media and platforms continue to emerge. Institutions increasingly push for digital course delivery, testing its bounds in both scope and scale.

Despite the hype surrounding technology and its large-scale disruption of education, many tech-led attempts to revolutionize learning fail to gain traction. Schools and pedagogy, technological trappings aside, are as recognizable today as ever. Are we being distracted, then, by the wrong (albeit shiny) question when we ask "Is Pepper the future of education?" Should we be pondering a more essential one, to wit: "What is Pepper?" At his/her/its core, Pepper is an expression of a bigger ideal whose realization eludes the educational system and merits focus: the synergistic union of humanistic values and technological power to advance student learning.

In pursuit of this ideal, this Independent Study was designed to fit within a larger academic plan (see below) and aims to lay the theoretical and empirical groundwork for my Major Research Project (MRP): Designing and prototyping a human-centred, future-proof curriculum and framework for online-enabled higher education.

ACADEMIC PLAN



HUMAN-CENTRED **STEEP V**

METHOD

Social Technological Economic Environmental Political Values

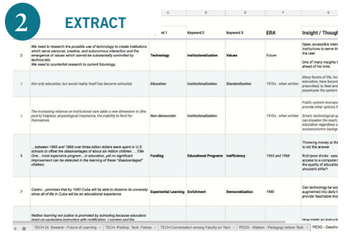
HUMAN-CENTRED STEEP V WORKFLOW

1 REVIEW

- *Baggaley. Online learning: a New Testament*
- *Bayne. The pedagogy of the MOOC course. UK view*
- *Ely. Toward a philosophy of instructional technology*
- *Fischer. Beyond hype and underestimation: research challenges for future of MOOCs*
- *Farkas. Participatory technologies, pedagogy 2.0 and information literacy*
- *Illich. Deschooling society*
- *Kemp. Technology & teaching: Panel Discussion*
- *LaMonica. Futurist: to fix education, think Web 2.0*
- *Ont. Universities: Online Learning Working Group Recommendations*
- *Shirvani. Liberal learning. A suitable education for the free individual*
- *Swearer. Reshaping Education for the Future of Work*
- *Terras. MOOCs: Insights and challenges from psychological perspective*
- *Watson. Pedagogy before Technology*

Seminal works and expert interviews

2 EXTRACT

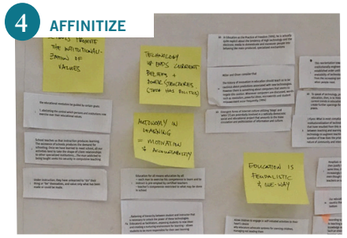


270+ quotations and ideas (utterances) cross-referenced by source

3 CATEGORIZE

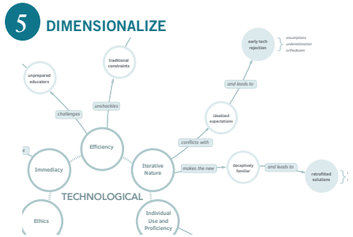
Utterances assigned to STEEP V "buckets" based on hypothesized inclusions

4 AFFINITIZE



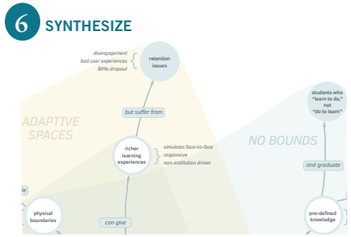
Sort and summarize utterances by key themes. Review and regroup as needed

5 DIMENSIONALIZE



Structure themes into actants and actionable components

6 SYNTHESIZE



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

Primary and secondary sources were tapped to build a knowledge base for this phase of the research. In an effort to achieve balance, breadth, and depth of opinion, secondary sources comprising seminal works, academic papers, and canonical texts (including those from online journals, blogs, and technology keynotes) were split between thought leaders in the fields of education, technology, or both.

This literature review was then validated by primary sources, composed of four 30-minute, semi-structured expert interviews with college-level design educators, administrators, and students (both current and former). For respondent profiles and discussion guides, please see Appendix I and J.

Human-Centred STEEP V

Given this study's goal of establishing a "lay of the land" to examine technology and pedagogy in the context of higher education, an environment scan using the STEEP V framework (Social, Technological, Economic, Environmental, Political, Values) seemed like a natural fit in the beginning. Upon reviewing existing studies, however, this would have resulted in heavy overlap with past SFI submissions and presented too macro a view of education for my goal of developing a technology curriculum anchored on humanistic values.

To this end, I adapted this method 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.

The output of this Human-Centred STEEP V is actionable and threefold: (1) High-level motivations / truths on which to base curriculum design principles, (2) Levers and tensions that designers must capitalize on in curriculum development, and (3) Initial "design dilemmas" or points of view that can spark reframing of digital pedagogy for the MRP.

The exhibit above outlines the Human-Centred STEEP V process followed.

HUMAN-CENTRED **STEEP V**

SOCIAL

Inclusion criteria: *Collaboration* *Relationships* *Teamwork* *Community* *Networks* *Participation* *Peers* *Mentoring* *Skill Sharing* *Accessibility*

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

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 and 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).

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 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 soft 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) 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

SOCIAL CIRCLES

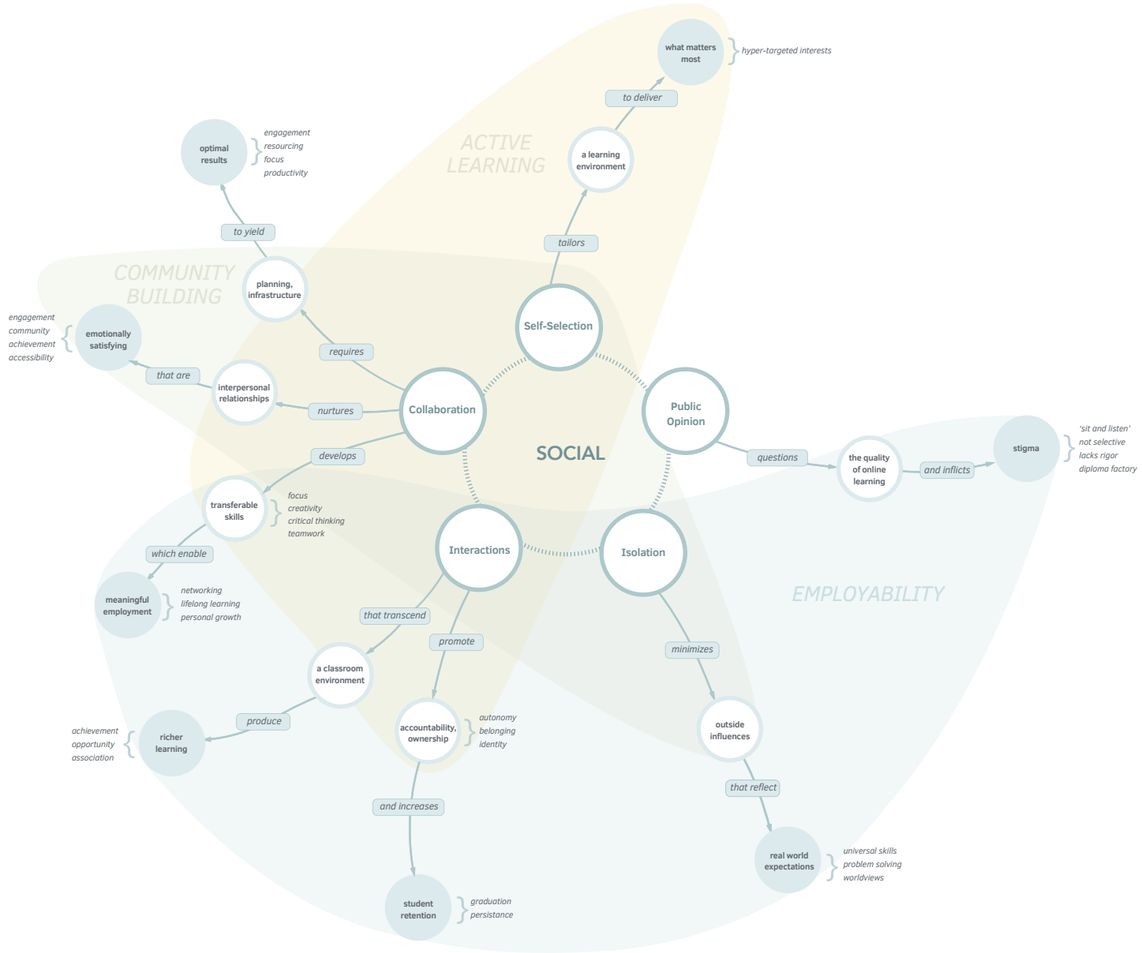


Figure 2: Social dimensions and motivations

how they evaluate students for collaboration (LaMonica, 2006) or communicate collaboration as a learning outcome (Farkas, 2012).

Social interactions promote accountability and 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).

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?

> *"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**

Social interactions outside traditional environments promote learning

The idea of learning outside the classroom is not a new one. For years, colleges have offered internships and co-ops to help students gain experience and lifelong skills. 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).

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

Illich (1971) had formidable foresight in calling for "radical alternatives to school" whereby a networked service facilitated matching "persons who at a given moment shared the same specific interests." 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 like wikis or blogs allows students to take part in online communities where they can learn from and be evaluated by not only their peers but also external experts and knowledge networks. Thus, students are armed with a diverse knowledge repository no longer limited to the instructor (Farkas, 2012).

Interpersonal relationships are emotionally satisfying

Much emphasis is placed on students' intellectual growth and perhaps not enough on their emotional well being.

Illich (1971) writes about the delight and surprise in unexpected questions and how "priceless" and "true" a partnership between master and pupil can be. 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). The amount of access to educators, both online and in person, can promote a strong sense of community among students, which may improve retention and enrolments (Kemp et al., 2014).

Where do we go from here?

For future course design to be successful, it must incorporate social principles based on three motivations: Active Learning, Community Building, and Employability.

The following table unpacks the social motivations around which to craft course design principles. The insights established in the previous section were dimensionalized visually in parallel structure in Figure 2 to highlight potential areas of intervention (levers) as well as problem reframing considerations (tensions, design dilemmas).

DESIGN CONSIDERATIONS

MOTIVATIONS	KEY DIMENSIONS	LEVERS	TENSIONS	DESIGN DILEMMAS
ACTIVE LEARNING The pursuit of highly personal learning outcomes through individual drive and co-creation of knowledge.	Self-Selection	Learning Environment	Choice / Need to Succeed	Why would students choose who can be part of their class?
	Interactions	Accountability, Ownership	Blame / Responsibility	Why do students from non-social environments struggle with accountability?
COMMUNITY BUILDING An inclusive, well-organized circle that creates emotionally satisfying relationships.	Isolation	Outside Influences	Interaction / Isolation	Why does education need social interactions outside the classroom?
	Interactions	Classroom Environment	Skills / Workplace Culture	Why are employers looking for transferable skills fostered by collaboration?
	Collaboration	Interpersonal Relationships	Competition / Co-operation	Why are rules necessary when collaborating?
EMPLOYABILITY A program that is highly respected and valued by employers, students, and the public.	Collaboration	Transferable Skills	Employment / Fulfilment	Why does emotional fulfilment matter in learning?
	Collaboration	Planning Infrastructure	Engagement / Productivity	Why are students from non-social environments less employable?
	Public Opinion	Quality of Online Learning	Accessibility / Recognition	Why do people look down upon online learning students?

HUMAN-CENTRED **STEEP V**

TECHNOLOGICAL

Inclusion criteria: *Software* *Network* *Media* *LMS* *Machine Learning*
Equipement *ICT* *Social Networks* *Devices* *IT Personnel*

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

Do technologies have politics?

This research uncovered seven key technological dimensions (Digital Media, Efficiency, Ethics, Function, Immediacy, 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 MOOC agenda (Fischer, 2014).

Technology is an extension of the person, not a replacement

From blogs to wikis, innovative tools 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 and 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 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 (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). Similarly, early Massive Open Online Courses (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 labeled 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 MOOCs 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.

TECHNOLOGY TROPES

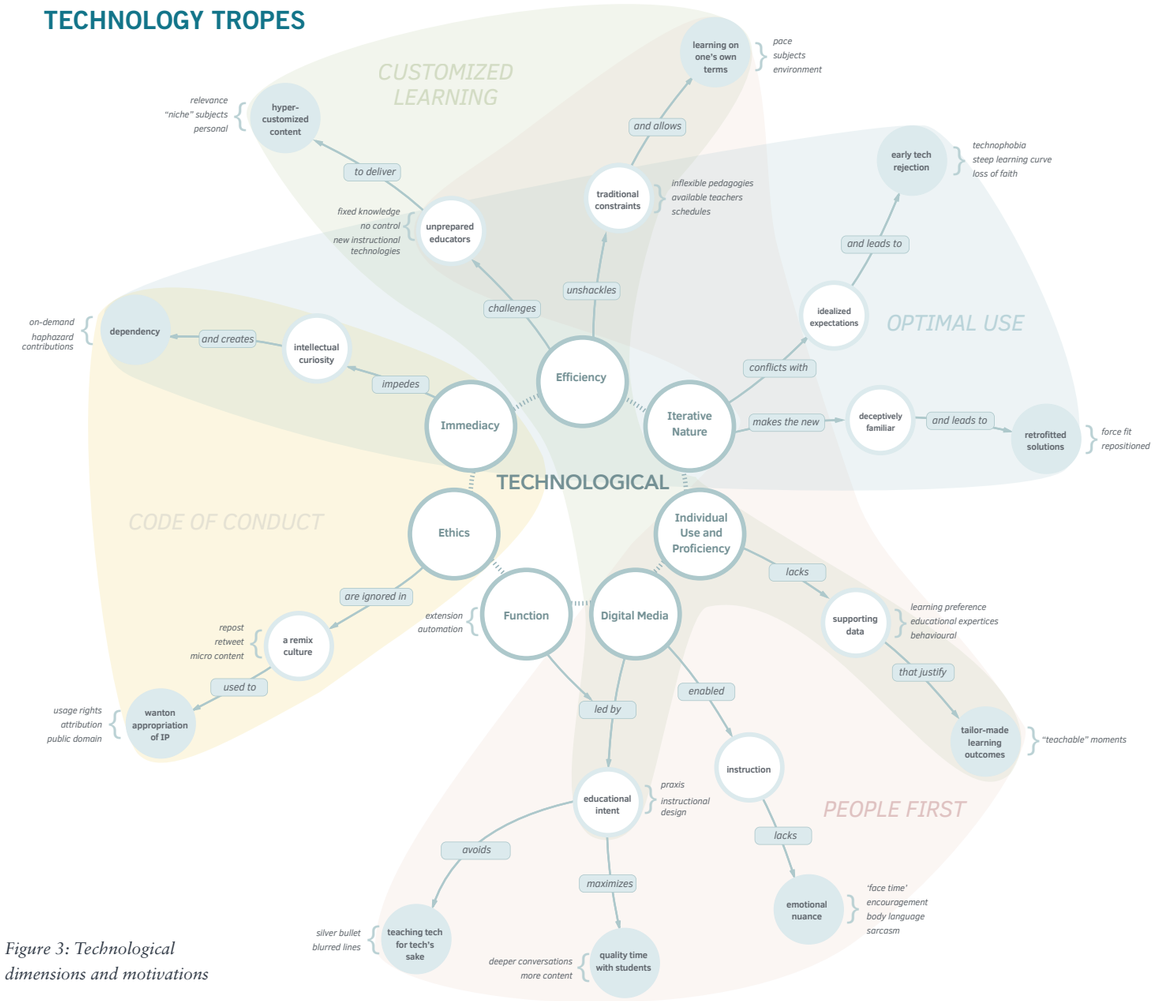


Figure 3: Technological dimensions and motivations

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 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).

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

> *I like to use sarcasm and humor when I teach. 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.* **Steven Page**

sequence of the syllabus, texts chosen, assessments created, and pacing of the material" (Kemp et al., 2014). With pre-defined 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 a MOOC setting where participation, autonomy, and constant feedback are more critical to keep students engaged from a distance and stem dropout (Baggaley, 2013; Farkas, 2012).

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).

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; Kemp et al., 2014; Lv., personal communication, August 5, 2017).

Where do we go from here?

For future course design to be successful, it must incorporate technological principles based on four motivations: Code of Conduct, Customized Learning, Optimal Use, and People First.

The following table unpacks the technological motivations around which to craft course design principles. The insights established in the previous section were dimensionalized visually in parallel structure in Figure 3 to highlight potential areas of intervention (levers) as well as problem reframing considerations (tensions, design dilemmas).

DESIGN CONSIDERATIONS

MOTIVATIONS	KEY DIMENSIONS	LEVERS	TENSIONS	DESIGN DILEMMAS
CODE OF CONDUCT Clear policies on the acceptable use of technology in interactions with people and intellectual property	Ethics	A Remix Culture	Attribution / Appropriation	Why does technology enable unethical appropriation of intellectual property?
	Immediacy	Intellectual Curiosity	Dependency / Autonomy	Why is it easy for technology to foster dependency and superficiality?
CUSTOMIZED LEARNING Efficient tools that let students create and pursue learning pathways as unique as they are	Individual Use and Proficiency	Supporting Data	Variability / Scale	Why do schools confuse having or teaching technology with applying it?
	Efficiency	Unprepared Educators	Relevance / Engagement	Why are educators unprepared for customized learning?
	Digital Media	Educational Intent	Availability / Effectiveness	Why don't schools know how their students use technology to learn?
OPTIMAL USE A culture of learning that embraces iteration and experimentation in the use of technology	Iterative Nature	Deceptively Familiar	Comfort / Innovation	Why is it so common to force fit new technology into existing constructs?
	Iterative Nature	Idealized Expectations	Extension / Limitation	Why is technology's role limited to extending (not replacing) human capabilities?
PEOPLE FIRST A program that puts technology in the service of students and teachers, not the other way around	Digital Media	Instruction	Encouragement / Indifference	Why does technology need to be humanized?
	Efficiency	Traditional Constraints	Personalization / Constraints	Why would students look to technology for personalized learning?

HUMAN-CENTRED **STEEP V**

ECONOMIC

Inclusion criteria: *Supply & Demand* *Profit & Loss* *Funding & Budgets* *Market Forces & Realities* *Profitability* *Financial Picture* *Value Webs*

> *"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**

People have individual, not just collective, worth and 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, 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.

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 and personal mission guide skill acquisition and 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).

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

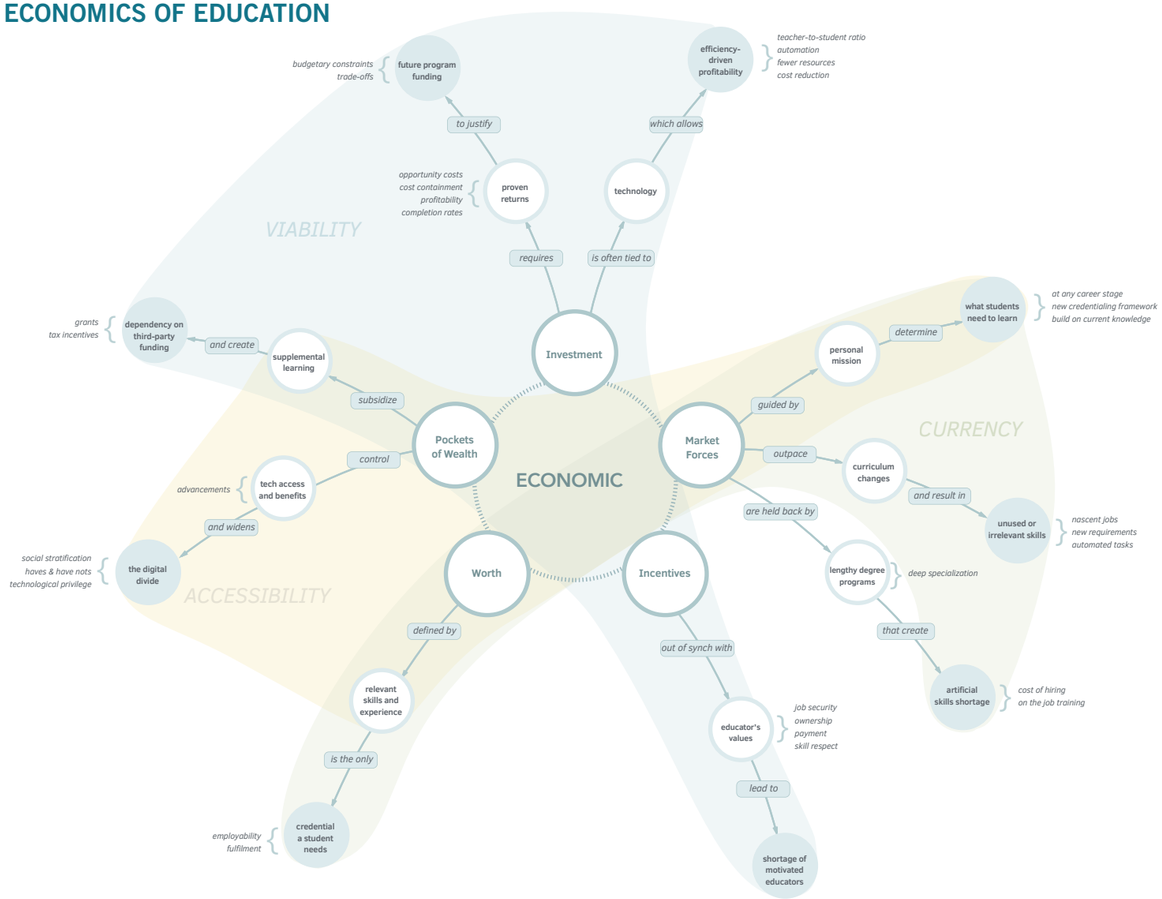


Figure 4: Economic dimensions and motivations

personally meaningful without the rigid, linear system inherent in legacy institutions (Swearer, 2017).

Tech availability and 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).

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).

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 secu-

> *"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."* **Interview**

rity (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, 2008).

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.

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).

HUMAN-CENTRED **STEEP V** **ECONOMIC**

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.

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, 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).

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

Where do we go from here?

For future course design to be successful, it must incorporate economic principles based on three motivations: Accessibility, Currency, and Viability.

The following table unpacks the economic motivations around which to craft course design principles. The insights established in the previous section were dimensionalized visually in parallel structure in Figure 4 to highlight potential areas of intervention (levers) as well as problem reframing considerations (tensions, design dilemmas).

DESIGN CONSIDERATIONS

MOTIVATIONS	KEY DIMENSIONS	LEVERS	TENSIONS	DESIGN DILEMMAS
ACCESSIBILITY Equal opportunity to have and to use technology to fuel one's personal learning mission	Worth	Tech Access and Benefits	Tech Costs / Admin. Budgets	Why is the digital divide still widening despite tech availability?
	Pockets of Wealth	Supplemental Learning	Public Demand / Static Curricula	Why is supplemental learning dependent on third-party funding?
	Market Forces	Personal Mission	Market Demand / Personal Interests	Why don't market forces determine what students need to learn?
VIABILITY A financially efficient business model that does not sacrifice student and faculty engagement	Investment	Proven Returns	Metrics / Funding	Why is future funding based on proven returns?
	Incentives	Educator's Values	Compensation / Expectations	Why are incentives for educators lacking?
	Investment	Technology	Tech Costs / Profitability	Why is investment often tied to technology?
CURRENCY Skills and experiences that are in tune with personal goals and ahead of industry demands	Market Forces	Curriculum Changes	Market Pace / Static Curricula	Why is curricula out of pace with industry?
	Worth	Relevant Skills and Experience	Employability / Certification	Why are skills and experience defined by certification?
	Market Forces	Lengthy Degree Programs	Market Demand / Tuition Income	Why are degree programs so lengthy?

HUMAN-CENTRED **STEEP V**

ENVIRONMENT

Inclusion criteria: *Infrastructure* *Processes* *Operations* *Physical Space* *Silos* *Departments* *Educational Systems* *Organizational Rituals*

> *"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**

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).

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 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, 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

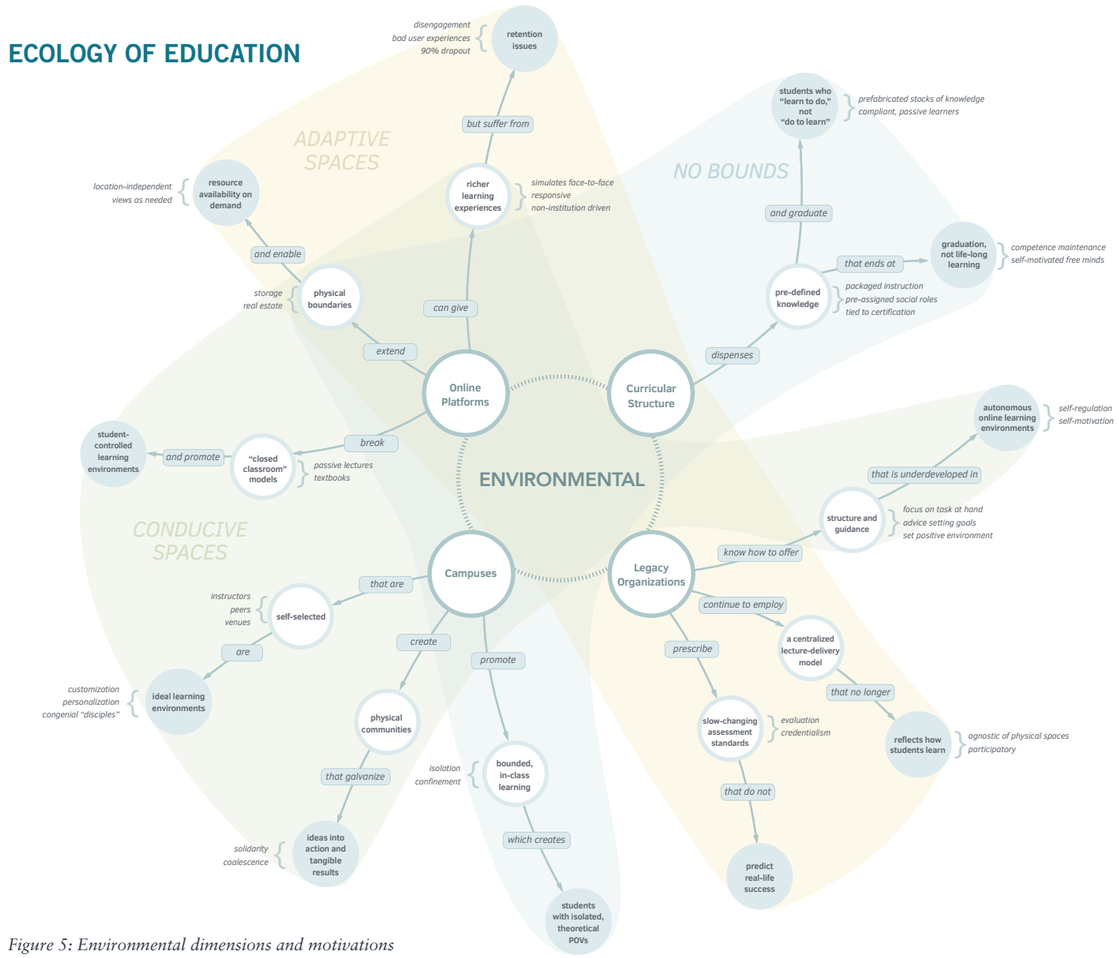


Figure 5: Environmental dimensions and motivations

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, 2008).

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 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 counselor" 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

> *"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."* **Larry Spence**

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 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 stunts 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, 2008).

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).

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, 2008; Swearer, 2017; Watson, 2001).

Where do we go from here?

For future course design to be successful, it must incorporate environmental principles based on three motivations: Adaptive Spaces, Conducive Spaces, and No Bounds.

The following table unpacks the environmental motivations around which to craft course design principles. The insights established in the previous section were dimensionalized visually in parallel structure in Figure 5 to highlight potential areas of intervention (levers) as well as problem reframing considerations (tensions, design dilemmas).

DESIGN CONSIDERATIONS

MOTIVATIONS	KEY DIMENSIONS	LEVERS	TENSIONS	DESIGN DILEMMAS
ADAPTIVE SPACES Fluid environments that mold physically, procedurally, and technologically to student feedback and the outside world	Legacy Organizations	Slow-Changing Assessment Standards	Outdated Assessments / Industry Expectations	Why are organizations slow to update assessment standards?
	Legacy Organizations	A Centralized Lecture-Delivery Model	Student Engagement / Legacy Culture	Why are centralized lecture-delivery models still used by organizations?
	Online Platforms	Physical Boundaries	Demand / Availability	Why does on-demand resource availability matter?
	Online Platforms	Richer Learning Experiences	Richer Experiences / Retention Issues	Why do online platforms suffer from retention issues?
CONDUCIVE SPACES Student-defined learning environments supported by expert guidance and venues to implement ideas	Campuses	Physical Communities	Ideas / Activism	Why are physical communities needed to galvanize ideas into action?
	Campuses	Self-Selected	Personalized Environment / Legacy Culture	Why are self-selected campuses ideal learning environments?
	Online Platforms	"Closed Classroom" Models	Student-Controlled / Legacy Culture	Why is self-directed learning harder to achieve in a bricks and mortar classroom?
	Legacy Organizations	Structure and Guidance	Guidance / Autonomy	Why are structure and guidance underdeveloped in autonomous learning environments?
NO BOUNDS An eye-opening learning landscape that is not walled in by time, space, or orthodoxy	Campuses	Bounded, In-Class Learning	Confinement / External Influences	Why does in-class learning create students with isolated, theoretical points of view?
	Curricular Structure	Pre-Defined Knowledge	Learn To Do / Do To Learn	Why can't a curricular structure dispense knowledge on-demand?

HUMAN-CENTRED **STEEP V**

POLITICAL

Inclusion criteria: *Hierarchies* *Balance of Power* *Governance* *Policy* *Power Relationships* *Agendas* *Extent of Impact or Influence*

> *"Our educational system is the only major institution in our country that officially recognizes autocracy"* **Russell Ackoff**

After centuries of unchallenged rule, higher education's leaders and administrators are facing resistance from disgruntled students and outsiders who see a better way.

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).

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). 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).

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).

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).

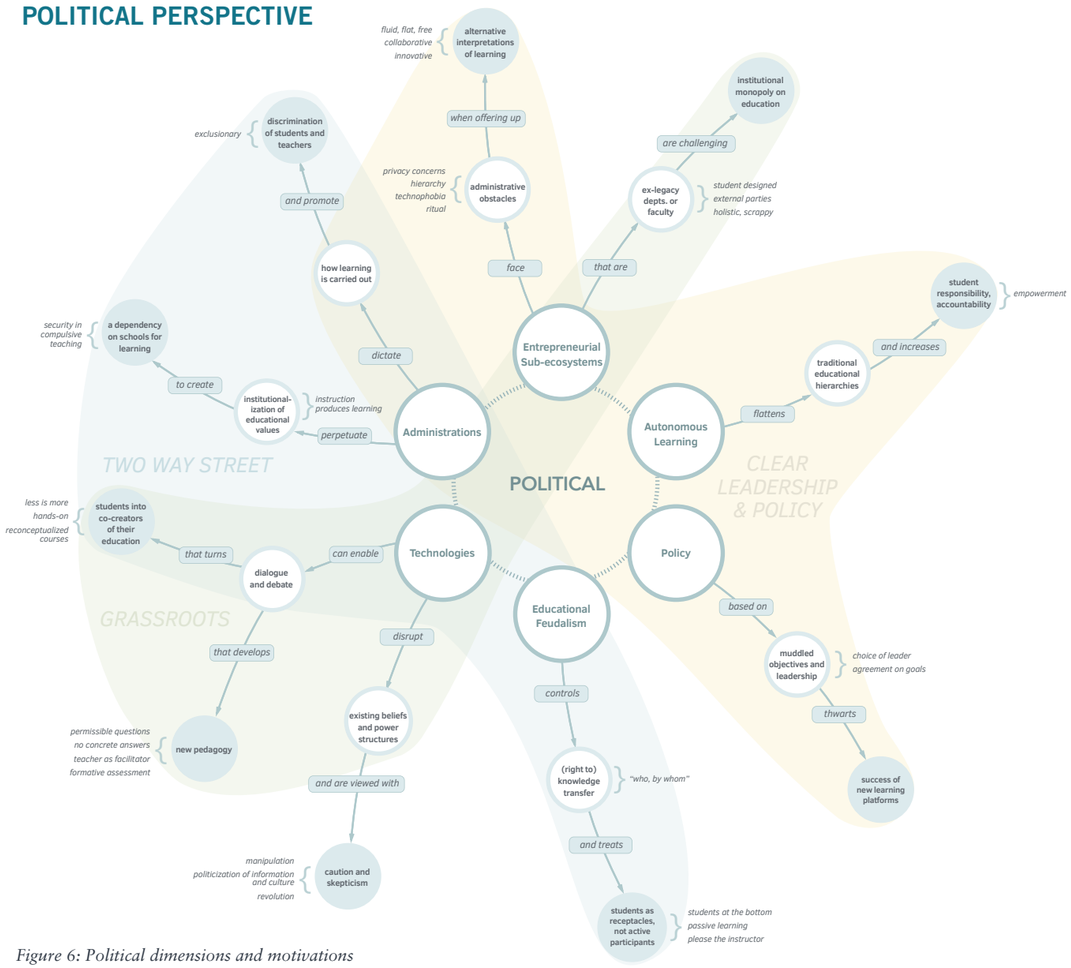


Figure 6: Political dimensions and motivations

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).

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) 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), that is: drawing on peer experience and harnessing technology to create channels of personal and creative expression independent of any institution.

> *"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."* **Martin LaMonica**

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, 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).

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 exploratory 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, 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 (2008) described 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).

Where do we go from here?

For future course design to be successful, it must incorporate political principles based on three motivations: Clear Leadership & Policy, Grassroots, and Two-Way Street

The following table unpacks the political motivations around which to craft course design principles. The insights established in the previous section were dimensionalized visually in parallel structure in Figure 6 to highlight potential areas of intervention (levers) as well as problem reframing considerations (tensions, design dilemmas).

DESIGN CONSIDERATIONS

MOTIVATIONS	KEY DIMENSIONS	LEVERS	TENSIONS	DESIGN DILEMMAS
CLEAR LEADERSHIP & POLICY Holistic and widely understood direction built on institutional diversity and student success	Policy	Muddled Objectives and Leadership	Dubious Objectives / Quality of Learning	Why do new online platforms suffer from muddled objectives and leadership?
	Autonomous Learning	Traditional Educational Hierarchies	Autonomy / Accountability	Why don't more schools promote autonomous learning when it increases student responsibility and accountability?
	Entrepreneurial Sub-ecosystems	Administrative Obstacles	Change / Red Tape	Why are innovative learning initiatives facing administrative obstacles?
GRASSROOTS A willingness to take a bottom-up approach to designing the future of the program	Technologies	Existing Beliefs and Power Structures	Empowerment / Threat	Why do existing power structures view technologies with caution and skepticism?
	Technologies	Dialogue and Debate	Openness / Teacher's Role	Why is dialogue and debate needed when developing new pedagogy?
	Entrepreneurial Sub-ecosystems	Ex-Legacy Depts. or Faculty	Entrepreneurial Spirit / Monopolies	Why are external parties challenging the institutional monopoly on education?
TWO WAY STREET A democratic mindset that encourages dialogue and feedback for positive change	Educational Feudalism	(Right to) Knowledge Transfer	Active Learning / Passive Learning	Why are students treated like receptacles and not active participants in knowledge acquisition?
	Administrations	Institutionalization of Educational Values	Dependency / Autonomy	Why do administrators create a dependency on schools for learning?
	Administrations	How Learning is Carried Out	Prescribed Learning / Discrimination	Why is educational delivery dictated by school administrators?

HUMAN-CENTRED **STEEP V**

VALUES

Inclusion criteria: *Sacred Cows* *Orthodoxies* *Basic Tenets* *Religion* *Schools of Thought* *Principles* *Deeply Held Truths* *Guiding Star* *"Commandments"* *Bible*

> *"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."* **Interview**

Deeply-held truths are highly personal and serve as a compass that guides each individual in their unique journey of learning. Do schools know what makes each student tick?

This research uncovered seven key political 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 de-schooled 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 the 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, 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).

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 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, 2008; Farkas, 2012).

VENERATED VALUES

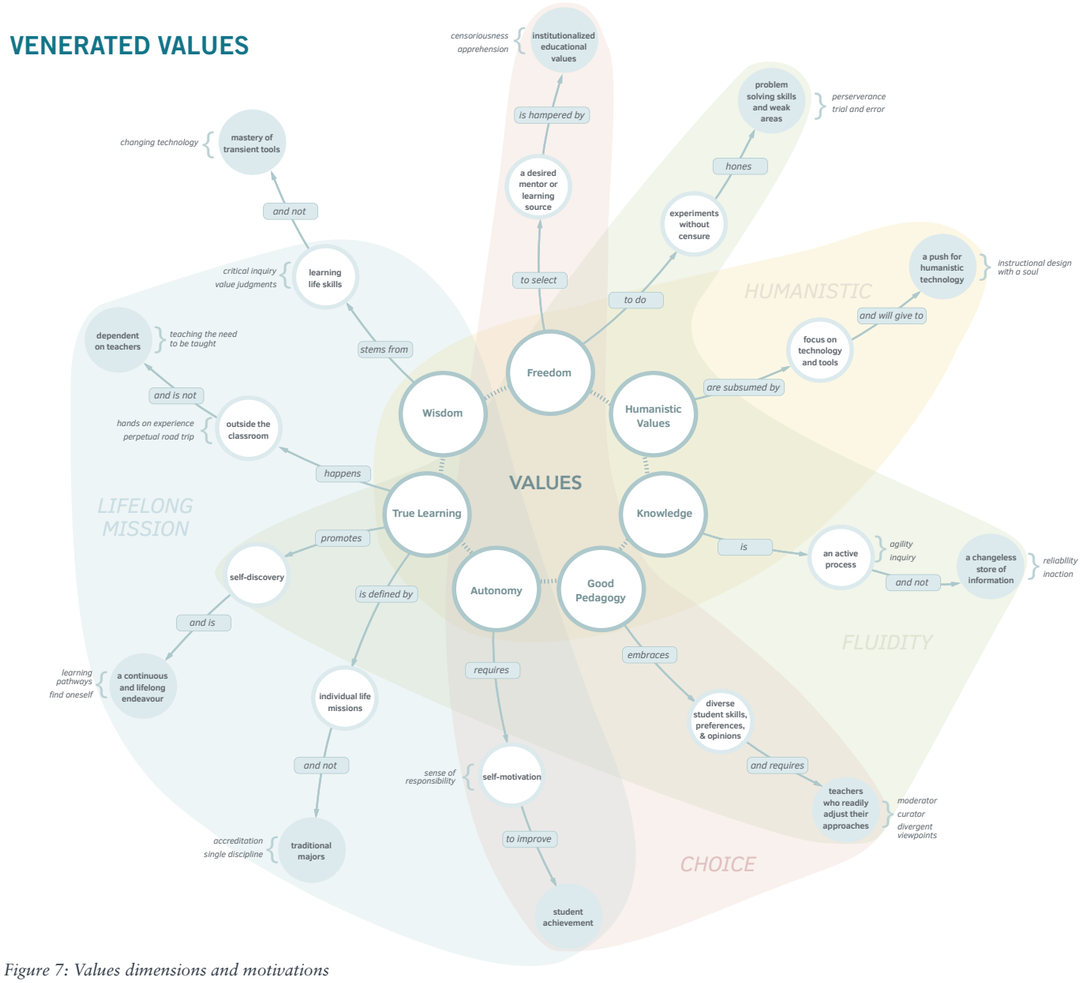


Figure 7: Values dimensions and motivations

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, 2008) and a "commitment to developing the whole person" (Shirvani, 2015). 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.

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).

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).

Learner autonomy + self-motivation = achievement

Teaching cannot produce learning without motivation (Ackoff, 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 and Lee, 2008).

> *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**

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, 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, 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, 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 do we go from here?

For future course design to be successful, it must incorporate value principles based on four motivations: Humanistic, Fluidity, Lifelong Mission, and Choice.

The following table unpacks the value motivations around which to craft course design principles. The insights established in the previous section were dimensionalized visually in parallel structure in Figure 7 to highlight potential areas of intervention (levers) as well as problem reframing considerations (tensions, design dilemmas).

HUMAN-CENTRED **STEEP V** **VALUES**

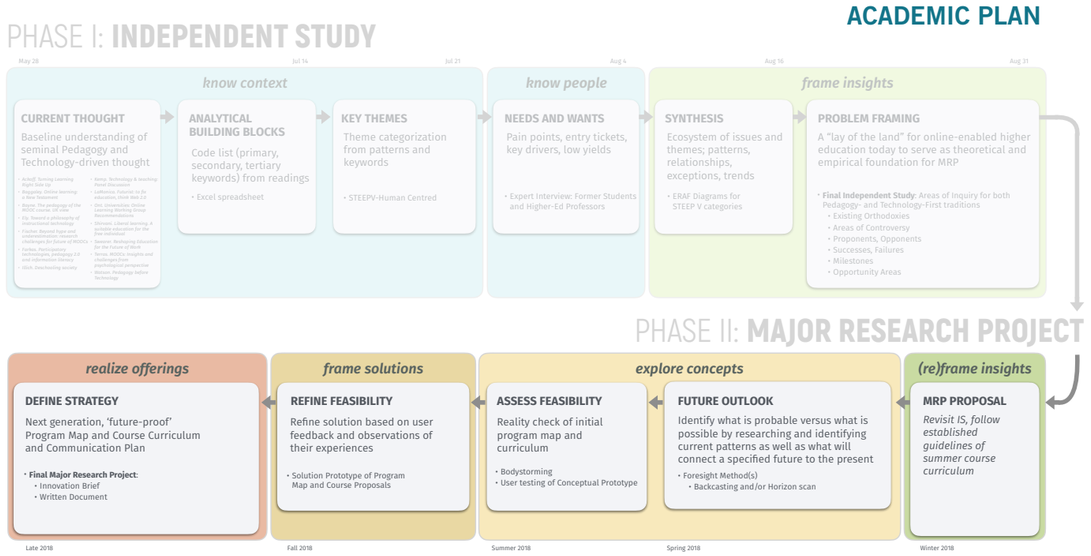
DESIGN CONSIDERATIONS

MOTIVATIONS	KEY DIMENSIONS	LEVERS	TENSIONS	DESIGN DILEMMAS
HUMANISTIC A celebration of each student as a unique, whole being who wants to achieve	Humanistic Values	Focus on Technology and Tools	Human-Centred / Tool-Centred	Why are humanistic values subsumed by a focus on technology and tools?
FLUIDITY A readiness to embrace the unknown and quickly change course in the name of progress	Knowledge	An Active Process	Inquiry / Inaction	Why is knowledge not automatically an active process?
	Freedom	Experiment Without Censure	Trial and Error / Failure	Why does experimenting without censure hone problem-solving skills?
	Good Pedagogy	Diverse Student Skills, Preferences, and Opinion	Diverse Learner / Flexible Educator	Why don't teachers adjust their approaches to achieve good pedagogy?
LIFELONG MISSION A tireless quest of self-discovery that doesn't stop at graduation	Wisdom	Learning Life Skills	Learning / Mastery	Why are transient tools being taught when they don't lead to widom?
	True Learning	Outside the Classroom	Dependency / Discovery	Why doesn't true learning happen inside the classroom?
	True Learning	Self-Discovery	Discovery / Commitment	Why is true learning a lifelong endeavour?
	True Learning	Individual Life Missions	Single Discipline / Multiple-Disciplines	Why don't traditional majors reflect life missions?
CHOICE The confidence to put students in the driver's seat of their education	Freedom	A Desired Mentor or Learning Source	Choice / Barriers	Why do students allow institutions to restrict their choice for learning?
	Autonomy	Self-Motivation	Autonomy / Motivation	Why does autonomy require self-motivation?

EPILOGUE

Road to Major Research Project *Reflection*

ACADEMIC PLAN



As this independent study comes to a close, I could not help but notice the similarities between what I wrote about in the preceding pages and my own experiences as a student conducting this research.

Going in, I had mentally placed Technology and Pedagogy in separate (presumably opposing) silos that I could compare and contrast cleanly with parallel questions. Surely, thought leaders would fall squarely in one camp or the other. As in life, I soon realized that the truth lay somewhere in between and that the relevant question was not for vs. against, pros vs. cons, or even watershed moments, but rather how to make the two function effectively as one. As such, this study evolved into a search for universal, human-centered, and unifying "truths" (subjective as they may be) that would form the ideological basis for how technology and pedagogy would be designed in the course I am spearheading at Sheridan College.

The design dilemmas posed at the end of each section will be the starting point for Phase II of my academic plan (see above). These questions have been phrased to elicit uncomfortable responses, some of which are already percolating as of this writing. Could the relationship between technology and students be parental in nature? Or is it more a cloak that lets one express identity without real world consequences?

The answers will provide rich underpinnings for the curriculum design principles that will inform the reframing, concept exploration, and prototyping stages of my MRP. This independent study has been truly eye-opening for me.

The journey continues.

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CREDITS

Icons *Images* *Transcripts*

Icons

The Noun Project
https://thenounproject.com

For icons used on pages 7, 11, 15, 19, 23, 27

Levers icon: Nick Abrams, US
Key Dimensions icon: Ryan Spiering, US
Tensions icon: parkjisun
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Image

Wikimedia
https://commons.wikimedia.org/wiki/File:Pepper_at_Opening_Ceremony_of_the_28th_Tokyo_International_Film_Festival_(22401702656).jpg

For image used on page 2

APPENDICES

Utterances *Sorting Exercises* *Concept Map* *Discussion Guide*

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.
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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.*
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Legend for Sorting Utterances Appendix B to G

APPENDIX B: SORTING UTTERANCES–SOCIAL

Sorting Utterances *Concept Map* *Discussion Guide*

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)

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)

Ch 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.

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.

Ma 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.

Dy 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 for 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 individualized feedback 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.

Pa 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 C: SORTING UTTERANCES–TECHNOLOGICAL

Sorting Utterances *Concept Map* *Discussion Guide*

•Technology lacks Emotional nuance (Human Touch)

k Steven Page: 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?

Fi 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.

•Little is known about students' personal learning styles + how they actually 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?"

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.

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.

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

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.

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

•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 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 driven 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

•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.

Fi 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?

Dy 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.

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).

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 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.

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

Fi 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.

Re 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?

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.

Re 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 makes it easier to appropriate intellectual property unethically

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.

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

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.

Un 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.

•What is new is old again

Fa Teaching is still largely focused 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.

Dy 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;

Ne 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

Ne 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?

•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 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.

k 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.

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-20) helpless: physiological impotence, the inability to fend for themselves

Lu 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.

APPENDIX D: SORTING UTTERANCES– ECONOMIC

Sorting Utterances *Concept Map* *Discussion Guide*

APPENDIX E: SORTING UTTERANCES– ENVIRONMENTAL

Sorting Utterances *Concept Map* *Discussion Guide*

APPENDIX F: SORTING UTTERANCES– POLITICAL

Sorting Utterances *Concept Map* *Discussion Guide*

Schools are discriminatory to students and teachers

i — the educational revolution be guided by certain goals:
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:
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.

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.

w — 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. (196x)

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.

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

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:
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.

Ey — "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.

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:
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 G: SORTING UTTERANCES– VALUES

Sorting Utterances *Concept Map* *Discussion Guide*

"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.

w — 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.

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.

Le — 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

Sb — ...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.

Le — 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

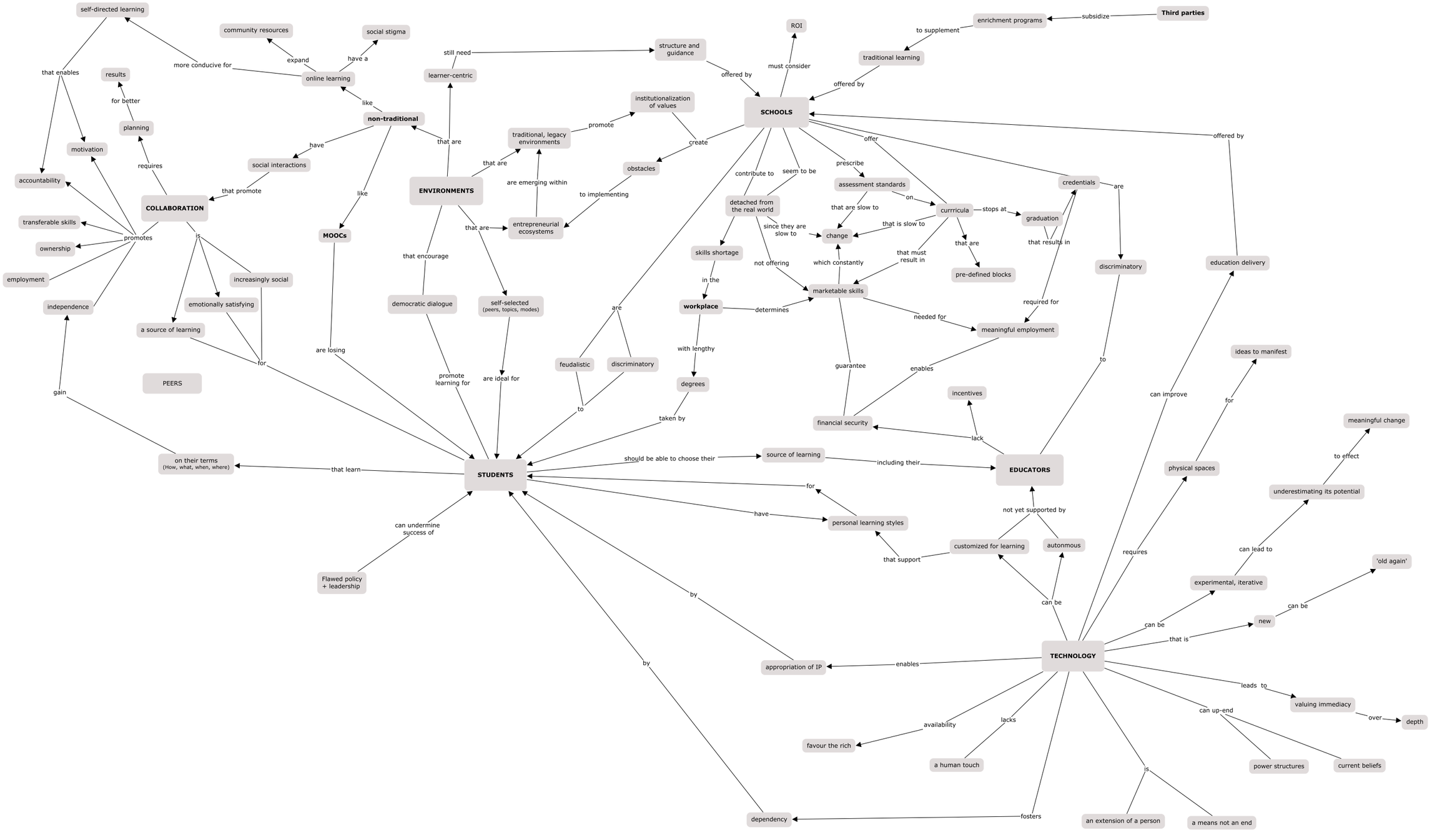
Freedom to fail is key to success—just do it.

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.


self-directed learning
that enables
results
for better
planning
motivation
accountability
requires
transferable skills
promotes
ownership
employment
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community resources
expand
social stigma
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COLLABORATION
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increasingly social
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a source of learning
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traditional, legacy environments
promote
institutionalization of values
create
obstacles
to implementing
are emerging within
entrepreneurial ecosystems
that encourage
democratic dialogue
promote learning for
that are
self-selected
(peers, topics, modes)
are ideal for
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SCHOOLS
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needed for
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that results in
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discriminatory
offered by
education delivery
Third parties
subsidize
enrichment programs
to supplement
traditional learning
offered by
to
can improve
requires
physical spaces
for
ideas to manifest
underestimating its potential
to effect
meaningful change
can lead to
experimental, iterative
can be
'old again'
new
can be
that is
can be
TECHNOLOGY
leads to
valuing immediacy
over
depth
can up-end
power structures
current beliefs
is
an extension of a person
a means not an end
fosters
dependency
by
enables
appropriation of IP
by
availability
favour the rich
lacks
a human touch
EDUCATORS
not yet supported by
customized for learning
autonmous
including their
source of learning
should be able to choose their
STUDENTS
that learn
on their terms
(How, what, when, where)
for
personal learning styles
that support
have
can undermine success of
Flawed policy + leadership

INTERVIEW DISCUSSION GUIDES: EDUCATORS

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)?

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 with this?

What do you think 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: STUDENTS

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?

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?