Necessity is the Father of Transformation

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For more than four decades, I've been working to transform industrial-era education (one-size-fits-all teaching-by-telling & learning-by-listening). One insight I've gained is people believe they need additional resources to transform standard practices, but—when people have extra assets—they use these to do more of the same: old wine in new bottles. Transformation comes primarily when people have no choice, when the current model cannot be sustained and they must do something radically different. Now, civilization is in crisis, and educators cannot make every home into a remote classroom. The issue is whether we will use this opportunity to create a more effective, universal model of instruction based on modern knowledge about learning, a system that provides *every* student the support to reach their full potential through strategies for personalization such as LEAP Innovations framework (2020). If we succeed, when COVID-19 is under control education will not revert to established suboptimal and unfair practices, but instead will sustain a "new normal" of universal, blended, personalized, lifelong learning.

Transforming to become *much* better is crucial. A couple years ago, I discussed ways in which the future will be quite different than the immediate past: a world-wide interdependent civilization shaped by economic turbulence from artificial intelligence and globalization, climate change, and advanced social and immersive media (Dede, 2018). A forthcoming co-edited book (Dede & Richards, 2020) describes the looming challenge/opportunity of a coming, epic half-century whose intensity of disruption will rival the historic period civilization faced from 1910-1960: two world wars, a global pandemic, a long-lasting economic depression, and unceasing conflicts between capitalism and communism. To fulfill their responsibilities in preparing students for a turbulent, disruptive future, educators at every level are now faced with developing young people's capacity for unceasing reinvention to face an uncertain and changing workplace, and for inventing and mastering occupations that do not yet exist. Our students must develop personal dispositions for "thriving on chaos": creating new value, reconciling tensions and dilemmas, and assuming moral/ethical agency on equity and respect for diversity (OECD, 2018). To accomplish this, they will need knowledge and skills underemphasized in current curriculum standards and omitted from today's high-stakes summative tests: fluency of ideas, social perceptiveness, systems thinking, originality, and conflict resolution (Bakhshi, Downing, Osborne, & Schneider, 2017). This is a much higher standard for educational outcomes than what we are accomplishing with industrial-era practices and structures of schooling.

Three dimensions of transformation

The focus of the Silver Lining for Learning initiative is on sharing partial models for transformation that provide useful mechanisms for many alternative approaches—rather than one-size-fits-all "solutions" that mirror the weaknesses of our current system. For example, some participants might share strategies for how to accomplish learning-by-doing in classrooms, at scale; others might share approaches for educator capacity building, at scale. In that spirit, I briefly discuss three themes out of many important in our collective efforts to evolve transformative models.

Teaching based on guided, collaborative learning by doing

The National Research Council's *How People Learn* report (National Academies of Sciences, Engineering, and Medicine, 2018) emphasizes the importance of creating an educational ecosystem in which many different niches provide support for personalizing instruction across cultures and contexts. With support from the National Science Foundation and the US Department of Education, my colleagues and I in the EcoLearn group at Harvard's Graduate School of Education have developed ecosystem science curricula based on immersive authentic simulations. An example is EcoXPT, a middle school curriculum we are releasing for free use by teachers and parents: https://ecolearn.gse.harvard.edu/projects/ecoxpt

Figure 1: Virtual ecosystem in EcoXPT

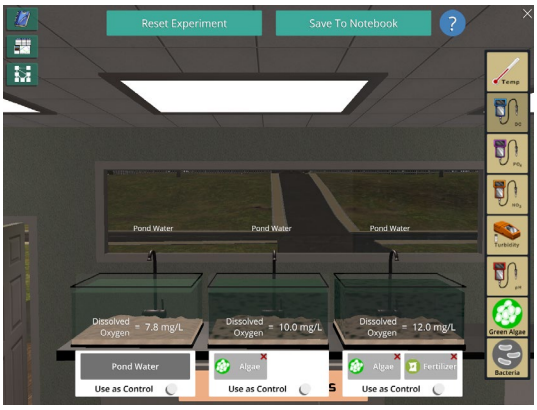

Figure 2: Experiments in EcoXPT

The three-minute video on the EcoXPT website gives a sense of how this type of immersive experience is a model of guided learning-by-doing practical and scalable in both classrooms and homes. I hope you will examine this and also share other illustrations of effective, personalized learning-by-doing.

Social media as vehicles for motivated, shared learning

Compared to two decades ago, we have a near-universal, powerful communications infrastructure for developing new models of education: the world-wide web, mobile devices, and social media. In particular, social media enable building online communities for creativity, collaboration, and sharing. This is a proven, engaging method of group-based learning, with apps tailored for different objectives, topics, preferences in how to learn, and developmental stages. I believe the design of new models for formal education should be based on the devices and media people already are using for informal learning.

As a caution about this, social media are also redefining what, how, and with whom we learn in ways that challenge and alter classic definitions of knowledge (e.g., textbooks, encyclopedias, scholarly journals)—without much thought about the implications of this (Dede, 2016). For example, in Wikipedia, "knowledge" is constructed by negotiating compromises among various points of view. This raises numerous questions: How do teachers help students understand the differences between facts, opinions, and values—and how do we help them appreciate the interrelationships that create "meaning"? In an epistemology based on collective agreement, what does it mean to be an "expert" with sufficient subject knowledge to have valid views on a topic? We risk sinking in a swamp of alternative "facts" and fake "truths," yet cannot ignore the bottom-up value of diverse perspectives and on-the-ground insights frequently lacking in top-down classic knowledge.

For the last several millennia, scholars have wrestled with various definitions of "wisdom" (Birren & Svensson, 2005). Historical conceptions of individual wisdom stress an integrated perspective that includes expertise about the pragmatics of individual and social life, as well as the natural world; attitudes and behaviors based on considerations of virtue and morality; and an awareness and acceptance of one's own fallibility and limitations. Wise cultures are seen as collectively having these characteristics and as maximizing the development of wise persons through generating and sharing wisdom, in part through communal reflection and social dialogue. I believe our current crisis and turbulent future stems in part from people privileging either classic or crowd-sourced "knowledge" over wisdom based on complementarity. I believe new models of education should combine the epistemologies of top-down classical knowledge and bottom-up social media to help students assume personal agency in achieving equity and appreciating diversity, in resolving tensions and dilemmas, and in fostering learning in ways that respect others' cultures and contexts.

Unlearning by all stakeholders in education

Whatever models emerge, they must include strategies that help those now involved in education—both providers and students—to transformatively change their behaviors. In my opinion, the biggest barrier we face in this process of reinventing our current methods, models, and organizations for these activities is unlearning. We have to let go of deeply-held, emotionally-valued identities in service of transformational change to a different, more effective set of behaviors (Kegan & Lahey, 2009). This is both individual (an instructor transforming practices from presentation and assimilation to active, collaborative learning by students) and institutional (a higher education institution transforming from degrees certified by seat time and standardized tests to credentials certified by proficiency or competency-based measures).

Unlearning requires not only novel intellectual insights and approaches but also individual and collective emotional and social support for shifting our identities—not necessarily in terms of fundamental character and capabilities, but in terms of how those are expressed as our context shifts over time. Building on the work of Bailenson (2018) and Slater & Sanchez-Vivez (2016), my colleagues and I at Harvard are studying how immersive media (virtual reality, multi-user virtual environments, mixed reality, augmented reality) can enhance unlearning in service of transformational change. I believe the success of any transformative model for education will rest on its inclusion of powerful methods for unlearning and capacity building in the people who will implement this new approach.

I hope my articulation of these three themes is helpful as all of us collectively develop an educational ecosystem of alternative models that transform learning, using the dark clouds in the present to enable a bright future.

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