Mapping the New Education Ecosystem

Introduction to the Special Issue by Professor William Kuskin

This is Major Tom to Ground Control
I'm stepping through the door
And I'm floating in a most peculiar way
And the stars look very different today
David Bowie "Space Oddity"

We teach in a time of disruption.[1] For higher education, this disruption feels omnipresent—in the global problem of educational access, in the popular migration from the broad curriculum of the liberal arts toward a narrow set of technical skills geared to employment, in the increasing inability of educated people to discern fact from fiction, to find a common language capable of bridging difference. The moment seems to imperil the core qualities of our charge as teachers: the importance of individual instruction in critical thinking, the necessity of sustained self-reflection for well-being, the benefits of disinterested imaginative exploration to well-being, and the validity, indeed the nobility, of our shared profession. Like all periods of genuine change, it is colored with the urgency of a crisis. Yet because the crisis appears pervasive, the urgency is defuse, and so the solution remains far from obvious—does it lie in retrenchment into the traditional university disciplines, in the abandonment of the comprehensive curriculum in favor of technical training, or in a new interdisciplinary curriculum. Nevertheless, the university system itself is premised on disruptive energy, on a dynamic of interrogation and revision that drives intellectual creation.[2] If we teach in a time of disruption, we must also recognize that disruption is one of our most powerful tools for the production of new

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[1] Famously and provocatively described by John L. Hennessy, President of Stanford, as a "Tsunami." See his keynote speech, "The Coming Tsunami in Educational Technology," delivered at the 2012 Computing Research Association, and summed up in the article by Jack Rosenberger, "John L. Hennessy on 'The Coming Tsunami in Educational Technology,'" *Communications of the ACM*, 23 July 2012, http://cacm.acm.org/blogs/blog-cacm/153706-john-l-hennessy-on-the-coming-tsunami-in-educational-technology/fulltext.

[2] See, for example, Richard DeMillo, *Abelard to Apple: The Fate of American Colleges and Universities* (MIT Press, 203).

knowledge. The university structure is designed to harness disruption for individual education and for global transformation.

This special issue of *Voprosy obrazovaniya / Educational Studies Moscow* investigates twenty-first century e-learning. The collection is inspired by the first annual eLearning Stakeholders and Researchers Summit, held in Moscow in October 2017. Sponsored by the National Research University Higher School of Economics and the global online learning platform, Coursera, the summit featured speakers from across Russia and the world, and from public and private sector institutions. Together, these speakers took up the transformations in educational policy and teaching practice necessary to accommodate the disruptive potential of e-learning at scale.

Scaled e-learning is a powerful marker of our moment. First launched in 2006, Massive Open Online Courses (MOOCs) exploded into the global consciousness in 2012 as a potential for change in the business practices of higher education.[3] In part, MOOCs contained a utopian promise: the best of higher education delivered openly across the internet.[4] In part, they also seemed a ruse—the infusion of Silicon Valley rhetoric into an institution defined by tradition, the depersonalization of the learning experience, and, above all, the massive enrollment numbers that did not lead to equally large completion rates.[5]

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[3] Named in 2008 by Dave Cormier and Bryan Alexander, Massive Open Online Courses rose to prominence in 2011 with three courses presented by Stanford University: Sebastian Thrun and Peter Norvig's "Introduction into AI," which boasted an enrollment of 160,000 students; Andrew Ng's "Machine Learning," which had an enrollment of over 100,000 students; and Jennifer Widom's "Introduction to Databases, "which had an enrollment of 115,00.

[4] *The New York Times* named 2012 "The Year of the MOOC," (Laura Pappano, 2 November 2012, http://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html?pagewanted=all&_r=1&). A number of institutions quickly embraced MOOCs: San Jose State developed a MOOC undergraduate curriculum, and Georgia Institute of Technology, in partnership with AT&T, devised a low-cost MOOC MS in Computer Science. Both San Jose State and Georgia Institute of Technology worked with Udacity, a company spun off from the initial Stanford MOOC by Thrun. Since then, a number of universities have developed scaled programs. For a fuller bibliography, see the essays in section one.

[5] Early studies took some of the initial excitement away from MOOCs by tabulating their completion rates at about 4% and assessing that they are largely completed by an educated, male, western, student body seeking expanded credentialing. Thrun himself announced the San Jose venture "a lousy product." See Tamar Lewin, "After Setbacks, Online Courses Are Rethought," New York Times, 10 December 2013, http://www.nytimes.com/2013/12/11/us/after-setbacks-online-courses-are-rethought.html, which cites the report by Gayle Christensen, Andrew Steinmetz, Brandon Alcorn, Amy Bennett, Deirdre Woods, and Emanuel, Ezekiel, "The MOOC Phenomenon: Who Takes Massive Open Online Courses and Why?," 6 November 6, 2013, available at the Social Science Research Network, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2350964, and the paper, by Laura Perna, Alan

The tensions of the transformative power of technology, its alternation between utopic and dystopic promise, became real to me in fall 2013, when the University of Colorado Boulder piloted four MOOCs on the Coursera platform.[6] In this group, I taught a version of my bricks-and-mortar lecture, "Comics Books and Graphic Novels."[7] The course ran for two iterations. The first had approximately 37,000 students, the second about 32,000.

The course's homepage was designed by Tim Foss, an MFA from the University of Colorado Boulder's fine arts program (image one[8]). Foss drew it as a comic book cover in the style of Marvel Comics, circa. 1965, fitting for a comic-book MOOC. The cover depicted me, floating in outer space, tethered by an oxygen line to my spacecraft, reading a comic book, my radio antenna sending out a signal. I digitally mapped Foss's image so that the students could use it as an alternative to Coursera's navigation bar to access the course's various features. The image came to illustrate my experience teaching the course more accurately than I could have ever predicted. By week two, after months of recording lectures and writing assignments over the summer and early fall, I had become despondent, going on record in an interview as complaining, "this has been the most unpleasant teaching experience of my life."[9] What I had found was that I was as fixed as the course webpage, structured by the digital mode as the content-provider in a massive and impersonal digital environment. A colleague, Michael Breed, upon looking at Foss's drawing, reflected that I was Bowie's Major Tom alone in a one-way communication circuit—"Can you hear me, Major Tom? / Can you hear me, Major Tom? / Can you hear…" More dis-

Ruby, Robert Boruch, Nicole Wang, Janie Scull, Chad Evans, Seher Ahmad, "The Life Cycle of a Million MOOC Users," MOOC Research Initative Conference, 5 December 5, 2013 available at http://www.gse.upenn.edu/pdf/ahead/perna_ruby_boruch_moocs_dec2013.pdf.

[6] The University of Colorado Boulder fielded two graduate courses in Engineering, a course in Power Electronics taught by Robert Erickson and a course in Linear and Integer Programing by Sriram Sankaranarayanan and Shalom D. Ruben. It also piloted an introductory Physics course, Physics I, taught by Michael Dubson. All four courses were on the original Coursera platform, since replaced. Only Prof. Erickson redesigned his course for the new platform.

[7] My MOOC was not the first to use comic books, an honor that belongs to Christina Blanch and her course "Gender Through Comic Books," created by Ball State in November 2012 and taught through the Canvas learning management system. See https://www.canvas.net/courses/gender-through-comic-books.

[8] Comics Books and Graphic Novels Homepage. Designed by William Kuskin; illustrated by Tim Foss. https://sites.google.com/colorado.edu/kuskinimageone/home

[9] Joel Warner (2013) CU's William Kuskin Takes Comics Seriously. *Westword*, 24–30 October. https://www.westword.com/news/cus-william-kuskin-takes-comics-seriously-5122327

connected than Tom, who at least had two-way communication with Ground Control for a while, I was the Wachowski's Brothers' Neo, living in a mediated reality, my body networked to the demands of a robotic structure, my brain feeding a giant machine system.

The very moment I realized Major Tom's isolation, I also saw his vision of the stars in the virtual spacescape before me. Cut off from the world, Tom steps through his spaceship door into a new world. His perspective is forever changed. Similarly, no sooner did I find myself cut off from my class, isolated by very web that constructed me as an authority on comics, teacher of tens of thousands, but alone, than I began to receive emails from around the globe, scores of emails, reporting how important the course was to its participants. The feedback constituted my students as individuals and gave me a way of interacting with them other than as content-provider. Cool Snake, the thirteen-year old in Portugal needed a little extra time for his essay because his parents had taken him to a movie the night before. That was certainly possible. Barbie wanted me to know that Brazil had a small but passionate comics community. Interesting to me, and far from my own ken. She sent me a picture of her cat watching my lecture. A computer programmer in Dublin had never received an "A" on an essay before in his life. Bravo! A CEO in Lyons felt a spiritual pathway was open to him in fiction. I recognize that in myself. At the very beginning of the course, one student set up an interactive map so students could note their location. By the end of the course, the map displayed a global mosaic of early adaptors, each pin-point a life networked together in a learning community (image two[10]). I could not know these learners the way I know my seminar students, could not recognize them crossing the lawn on the University of Colorado Boulder's Norlin Quadrangle, but I could know them through their representative statements, as writers from the beyond, emergent patterns constituted in their upward leap from raw stimuli to symbolic meaning. In answering them, I closed a feedback loop, turning them from digital messages into people I cared about, into my students.

In this quality—this paradoxically networked alienation, this contradictory connection through isolation—the MOOC sums up our digital age. That we cannot know intention is one of the tragic elements of the human condition. That we cannot know anyone, indeed, are even surprised by our own selves, speaks to the limitations of our perception, so powerfully bound as it is by temporality. We live in a world of partial truths created by our own perspective and thus limited to it. In this world, we are faced with the hopelessness of isolation, of sad days and lonely nights, overcome by the ceaseless progression of time, of min-

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[10] "Map Yourself", a volunteer exercise at self-identification showing the global distribution of "Comic Books and Graphic Novels" MOOC participants. Screen shot, 11.1.2013. https://sites.google.com/colorado.edu/kuskinima-getwo/home

utes, of years that add up to a life. We are indeed like Major Tom, in his isolation. We are also networked. Recognizing this took me from experiencing the MOOC as alienating to realizing it as utterly transformative.

The nine essays that follow chart this transformative space, what Sherman Young identifies in the volume's first essay as a "new education ecosystem." Such an ecosystem seems uniquely suited to our historical moment. "The world needs more university-educated individuals, and governments don't have the resources, nor the available talent, to quickly scale brick-and-mortar universities to meet demand," writes Regent Steve Ludwig in the volume's last essay, continuing, "with the explosion of broadband and mobile data access, the solution also seems clear: scalable online education." As we survey this educational ecosystem, as we recognize the new hardware of teaching and deploy it toward the software of human needs, we face the weight of responsibility, for the application of technology, unlike education, is not in-and-of-itself an ethical imperative. Collectively, the volume suggests how we chart a course through this digital landscape— how we maintain a vibrant university culture that survives the flattening out created by the computer interface, how we formulate a responsible teaching practice that harnesses the power of the internet, and how we lead our institutions to some new form of educational success. In short, the volume continues the conversation begun at the eLearning Stakeholders and Researchers Summit by exploring how to utilize disruption in the service of global education.

I have organized the essays in three sections. The first, "Innovation and Disruption in the Digital Age," establishes the current landscape of scaled learning. The section begins with Young's essay, "From Disruption to Innovation: Thoughts on the Future of MOOCs." Recounting the utopian claims for MOOCs' disruptive energy, Young critiques the major MOOC platforms—Coursera, Udacity, edX, and FutureLearn— for offering only a disruption of business practices, not of educational strategies. The next two essays advance two different strategies for scaled online degree programs on the Coursera platform. Lawrence DeBrock's "The New Face-to-Face Education: Scalable Live-Engagement" narrates the genesis of Coursera's first for-credit degree, the iMBA launched by the Gies College of Business at the University of Illinois at Urbana-Champaign. Quentin McAndrew's "Innovation Leashed: How a MOOC-Based Master's Degree Brings Invention Home to the Institution" discusses the development of the University of Colorado Boulder's Master's Degree in Electrical Engineering, the MS-EE.

The initial claims around MOOCs were as naïve as they were broad. The three essays in section one offer new approaches for thinking about scaled learning within the university structure. For Young, MOOCs never developed into their initial disruptive potential, what he terms an "educational *superorganism* where individuals with different strengths come together to solve global problems and create innovative responses to the challenges we face." For DeBrock, scaled learn-

ing hybridizes the university classroom, making it more democratic and more global. For McAndrew, it affords an opportunity to rethink the structures of higher education that reaches from the classroom to the Registrar's and Bursar's offices. Though somewhat different in their approaches, each of the essays in section one accept that scaled-learning platforms have created a seismic shift in the online landscape. De-Brock and McAndrew, in particular, describe their scaled programs as interior to university practices. Their assessment repositions e-learning platforms such as Coursera and edX as complementary rather than oppositional to the traditions of higher education. Overall, by imagining scaled e-learning as organically connect to the university, Young, De-Brock, and McAndrew move beyond the stark binary juxtaposition of alienation and connection that I experienced teaching the first generation of MOOCs to describe a scaled educational community.

Section one describes what I would call the *post-MOOC turn in e-learning*, a turn from the utopian claims of open education to a more synthetic view of how universities can incorporate new educational technology. Section two, "Studies of e-Learning," presents four case studies of the e-learning classroom. Maria Janelli's essay, "E-learning in Theory, Practice, and Research," sets the terms for the section in her recognition that the literature on e-learning remains undeveloped and that scaled courses themselves, in her case a Coursera MOOC from the American Museum of Natural History in New York City, are educational research laboratories. Daria Kravchenko's essay, "Classical Test Theory and Item Response Theory in Measuring Validity of Peer-Grading in Massive Open Online Courses," explores the legitimacy of peer grading on MOOC platforms through two online courses, the National Research University Higher School of Economics' *Philosophy of Culture* and *Understanding Russians: contexts of Intercultural Communication*. Deborah Keyek-Franssen's "Practices for Student Success: From Face-to-Face to At-Scale and Back" brings three broad educational trends—longitudinal high-impact practices, high-impact learning design and teaching practices, and open-educational resources—to the testbed of the University of Colorado System MOOCs. Finally, Tatyana Bystrova, Viola Larionova, Eygeny Sinitsyn, and Alexander Tolmachev's essay, "Learning Analytics in Massive Open Online Courses as a Tool for Predicting Learner Performance" develops an evaluative algorithm to track student success in a number of Ural Federal University MOOCs on the National Open Education Platform.

Collectively, section two argues that MOOCs and scaled e-learning programs offer a powerful and recursive force for studies of teaching and learning. That is, e-learning, as it developed across the 1990s and 2000s, was almost entirely evaluated in comparison to the residential-campus seminar room and lecture hall. Regardless of the outcomes, by such a standard, e-learning could only approximate educational legitimacy, which was ultimately defined by the campus experience. In this tradition, MOOCs appear a minor sideline. The au-

thors of section two suggest a different approach: scaled e-learning is sufficiently different from the residential lecture hall to deserve sophisticated analytical tools for measuring student performance as well as a unified critical theory for explaining how learning occurs in the online environment. The essays, particularly Keyek-Franssen's, suggest the possibility of returning the lessons from the scaled classroom back to the campus. Yet there is also a dark shadow to these essays. Using both Classical Test Theory and Item Response Theory, Kravchenko's essay concludes that the peer judges she studied "tend to award higher scores than deserved." The work of perfecting the scaled environment has only begun, but it promises a transformation of how we understand student success. Born from the university into its own form, the scaled classroom can act as a laboratory for learning overall.

The final section, "Leadership and Change," suggests paths for institutional transformation. Rebecca Stein's essay, "Supporting Online Initiatives: from MOOCs to for-credit offerings," pulls together the previous two sections' themes by tracing the history of MOOCs from 2012 to the present day at the University of Pennsylvania. The last essay, "Higher Learning: Lessons from an Online Advocate," by Steve Ludwig, returns us to the social contract between the university and the public, to higher education's commitment to affordability, to access, and to quality.

Both Stein and Ludwig emphasize a set of tensions in online education and institutional practice, between the pace of university development and the rate of technological change, between the centralization and dispersion of authority, and between the pressures of a market economy based in prestige and the responsibility for educating the world. They also emphasize the roles of champions in online development, what Ludwig terms a "coalition the willing" to create change, and what Stein observes as a change in faculty attitudes: "Though there have been online classes at the Penn for over a decade, these were stand-alone courses mostly given over the summer months in our College of Liberal and Professional Studies that historically served nontraditional, older, students. Bringing MOOCs into Penn introduced faculty to the potential of a global reach and impact through online teaching." Ultimately, the section underscores that the leadership decisions we make now will have long-range implications for the fundamental mission of higher education—its commitment to access, to racial and cultural inclusivity, and to the individual dreams of self-improvement—across the twenty-first century.

What does the future look like? Major Tom can never fully report what he sees in the stars. We can, however, draw at least three conclusions from this volume's map of the new education ecosystem:

We stand at the cusp of a new moment. Perhaps every generation feels this way, but for higher education, the moment has a particular urgency. As Bystrova, Larionova, Sinitsyn, and Tolmachev remark, "the social need for studying the effectiveness of digital technology in edu-

cation has to do with the acute problem of organizing education in the information society with its high rates of technology turnover and life-long accumulation of statistics on this type of learning." We must not allow our nostalgia and sentimentality for the university system we grew up in to sway us from our responsibility to shepherd affordable education in the digital age. Ludwig concludes, "what a university is, whom it serves, what it offers, how it operates, how it creates new knowledge, how its reward systems are structured, and how it delivers information are not permanently fixed. It never was." Change is upon us. It is the responsibility of each reader of this journal to participate in navigating a way forward that sustains the principles of higher education for the coming generations.

Scaled e-learning presents an opportunity to rethink residential teaching. Many of the authors in this volume remark that the study of scaled online learning affords a new perspective on the traditional classroom. Stein writes, "innovation in the MOOC space helps faculty rethink face-to-face teaching by incorporating effective practices and supports innovations such as the flipped learning and enhanced use of peer and group projects." Yet, we must also be cautious: almost all of the essays in section two note that the way forward is undertheorized and, as Darya Kravchenko's essay particularly demonstrates, our current practices are not perfect. We must embrace the power of educational change, the excitement of disruption and the urgency of the moment and route the electronic currents of the internet back through the university sector, electrifying the classroom with ongoing research.

The university remains a powerful institution for innovation. The rhetoric surrounding the 2012 MOOC explosion suggested that the private sector would reform the university system from without. The past six years have demonstrated just the reverse: that the platforms for scaled learning such as Coursera, edX, Udacity, and FutureLearn, as well as Online Program Managers (OPMs) specializing in online program development, operate, at best, as partners with universities. Universities, in fact, have reformed how these companies do business. Reflecting on the process, McAndrew writes, "this lesson recalls us to a fundamental truth: while universities are conservators of academic tradition and systemic efficiency, they are also, most essentially, extraordinary engines of creation and innovative will. It is by tapping into this truth that we harness the potential for transformation." Although educational change is upon us, and although the changes in online teaching may well change our classroom practices, the university itself remains a disruptive and visionary social institution.

It remains for me to thank the many people who made this international statement possible. Foremost, I thank the Rector of the National Research University Higher School of Economics and the Editor-in-Chief of this journal, Yaroslav Kuzminov, for graciously allowing me to step in as guest editor. Cathryn Richter of Coursera and Ksenia Kidimova of the Higher School of Economics initiated the effort and

gave it the energy necessary to get off the ground. I thank Richard Bradley, the English translator and copyeditor, as well as the anonymous Russian and American readers of the essays. Mr. Bradley and the readers improved everything they touched. Quentin McAndrew, Deborah Keyek-Franssen, David Thomas, and Richelle Munkhoff generously read my drafts of this introduction and gave it direction and coherence. Ultimately, my highest praise goes to Julia Belavina, the Executive Editor of *Voprosy obrazovaniya / Educational Studies Moscow*, who made this project a reality. She kept me on task even though five-thousand, four hundred, sixty-seven miles stood between us. She organized the many details, deadlines, and people necessary to complete the volume. I thank her for her patience and for her precision.

Lastly, I would like to thank the readers of this journal. No reader of *Voprosy obrazovaniya / Educational Studies Moscow* is ignorant of the tensions that crosscut twenty-first century global politics. I believe that it is not naive to say that e-learning presents the possibility for global connection. Case in point: the essays collected here come from writers in Yekaterinburg and Moscow, from Sydney, and from New York City, Philadelphia, Urbana-Champaign, Denver, and Boulder. They look to the future with both the skepticism and the confidence of the trained academic eye. Not all of the authors were at the original Moscow eLearning Summit, but all of them responded to its brave spirit of investigation. Working with them has taught me a great deal about the educational ecosystem in which we find ourselves. It is my sincere hope that this volume extends our ability to collaborate across national divisions.

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