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TESTING TECHNOLOGY: DIGITAL MEDIATION
OF EDUCATION IN
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SUMMARY

In 1984, when American finance journal *Forbes* magazine staged an internal debate over its coverage of school computing, the magazine's technology editor, Stephen Kindel, wrote a cautionary memo. If computers let students do more and more of their work by themselves, he wrote, "what would happen to class discussion— and, more important, the sense of rubbing against other minds?" "I think that the best schools will eventually recognize [the] fact that ... education depends on the intimate contact between a good teacher ... and an inquiring student." Kindel concluded with an alarming comment. "In the end," he explained, "it is the poor who will be chained to the computer; the rich will get teachers." On the other side of the debate, *Forbes* senior editor Kathleen Wiegner, made the case that would become the mainstream ideology for digital technology in society. This machine, she suggested, "was merely taking its place in history's long line of world-changing machines." "The printing press, the steam engine, the car, the telephone," each has empowered the individual and dethroned centralized authority. "Why not in the schools as well?"¹

In the thirty years since, the dominant voices in American society have come down firmly on the side of Wiegner's techno-utopia. Educational technology is embraced as a tool for positive educational outcomes and personal empowerment across the ideological spectrum: from President Obama's ConnectEd initiative, to Bill Gates and Mark Zuckerberg's neoliberal educational philosophy, and, most recently, Trump Secretary of

¹ (Michaels, 1984), (also in (Oppenheimer, 2003), p. 397)

Education Betsy Devos' support of technology as part of a vision for "greater freedoms of choice" in public education.² But the promise of technology as a panacea for society's entrenched educational problems goes beyond the ideology of policy-makers and philanthropic industrialists. Techno-utopia is a fundamental component in the cultural values of the American imagination, reaching right to the heart of America's belief in the possibilities of scientific progress and universal opportunity. Faith in technology is an ideological formation that both enables, and is enabled by, American capitalism. Wiegner's claim that technology's long-term effects empower the individual and weaken central authority is a recurring theme that sounds throughout contemporary discussions of educational technology.

My dissertation is a study of the schooling of American children through a cross section of new technology, the public education system, and market forces. Insisting on an investigation that emphasizes the economic context of technological change, I argue that the drive toward digitization is embedded *within* the structural inequalities endemic to our public-school system, where it disrupts some aspects even as it entrenches others. I consider how new technology and data-driven approaches to educational reform call forth a reliance on *testing* as a source of technocratic data-gathering that works to monitor both students and teachers. This regime of test-based monitoring creates a contradictory social existence where greater possibilities for individual autonomy also serve to produce a greater surveillance and intervention in the act of teaching and learning. The dystopic prediction of the *Forbes* editor who warned that "it is the poor who will be chained to the computer; the rich will get

² <https://obamawhitehouse.archives.gov/issues/education/k-12/connected>; *Edweek*, June 20, 2017 accessed on 8/9/2017
<http://www.edweek.org/ew/articles/2017/06/21/gates-zuckerberg-teaming-up-on-personalized-learning.html>; Interview with Betsy Devos, *Philanthropy Roundtable*, accessed on 8/9/2017
http://www.philanthropyroundtable.org/topic/excellence_in_philanthropy/interview_with_betsy_devos

teachers” can be rewritten. It is the poor who are being tested with technology, while the rich are being taught to use them to hone their creativity and individual self-expression.

My study began with a broad question: how is the introduction of digital technologies and internet access changing public education in the United States? The question developed from my work as a documentary filmmaker teaching media literacy in New York City public schools. From my initial experience as a visiting artist in a downtown Manhattan high school during the aftermath of September 11, 2001, I returned to youth media literacy in 2012 only to realize that the intervening decade had seen a fundamental shift in the culture and structure of the classroom. I first noticed this difference in a classroom that was using social media platforms for students to announce and create an audience for their projects. I saw that the use of educational and mainstream social media platforms such as *Twitter*, *Facebook*, and *Google Plus* were, from the confines of the classroom, giving students the capacity to be in a constant dialogue with the world outside it. Not only did the school’s computers and internet access afford a means to connect with this external world (and disconnect from the internal one), but in many instances the students’ personal mobile devices played a significant role in separating students from educational activities planned for them. This is a striking difference from the traditional position of students in education: the classroom an impermeable space to be controlled by the teacher once the door has been closed.

As I began to document this shift, I realized that the interaction between inside and outside of the classroom is not one-sided, but reciprocal. Technology also affords the external world a greater intervention into the classroom. New technologies are bringing a host of curricula and teaching tools into classrooms that allow for the introduction of pedagogical values beyond the control or awareness of the individual teacher. In this way, the introduction of technology into the classroom is proving a contradictory process for

teachers as well as for students. Computers and digital resources require a technical knowledgebase that is considered a step towards improving pedagogy, allowing for a more targeted intervention into the learning process of individual students—even as it requires their instructors to be trained and professionalized in order to utilize this knowledge. At the same time, these digital tools signify an overall de-professionalization of teachers and an erosion of their autonomy. Preset curricula increasingly formed outside classrooms, delivered through technological means, and measured through standardized tests, all point to the teacher as a diminished actor in the schooling of children.

For students, on the other hand, technology offers a greater mental and intellectual autonomy from the confines of the classroom, but one that brings them into the dynamics of the market. It is becoming clear that new technology is entering schools in tandem with the incremental privatization of the public school system as part of the same process by which charter schools and private educational management organizations replace significant aspects of schooling.³ As private search engines replace library research, digitized textbooks arrive on Apple iPads, and Google Classroom becomes a basic tool of communication between students and teachers, the fundamental aspects of the educational process are coming to be controlled by largely private corporations.

This is a dynamic that, in the words of David Buckingham, sees schools as, “an increasingly important means for commercial companies to target young people—a market that is traditionally seen as volatile and difficult to reach.”⁴ New technologies are bringing market values into an institution whose original mission, formed during the earliest era of industrial capitalism, was to protect children from those very market interests until they would go on to enter the job market. The market-centered introduction of new technologies

³ (Field & Rachid, 2011), p.3

⁴ (Buckingham, 2007), p. 12

into schools promises the individual empowerment of the student to escape the confines of the industrial school, but this promise is compromised by the structural limitations of an increasingly stratified society. The result is a process that alters the subjectivity of the children as they learn to socialize in a world that accesses them as autonomous consumers.

The largest portion of the fieldwork that informs this conclusion was two-years of participation in the design chain of an educational technology software. I followed the development of this “edtech” from planning and production at the company to its implementation by teachers in classrooms and its use by students. In order to understand these contradictory processes, I also examined diverse supplementary sites that offered rich sources of data to contextualize the changing values and machinations of the institution of public education. I have continued my role as a teaching artist in New York City public schools, and I draw from that experience heavily in my discussion of the changing dynamics between students and teachers. This includes an ethnography of extra-curricular educational spaces such as youth media production and youth entrepreneurship programs, and my participation in various professional development forums for teachers, dealing with not only technology, but pedagogy, as well as teachers’ unions working to address those aspects of education reform that educators find most troubling. At the same time, I also participated in various educational technology seminars held by private and public institutions, and addressed to educators, administrators, and edtech entrepreneurs.

This ethnography inquiry forms the basic structure of this dissertation, broken up into three sections addressing each of the main stake holders in the educational technology design chain: education and technology experts, teachers, and students. In the introduction, *Technocracy without Technocrats*, I look at the history of American education as it has developed at the cross section of three processes: the *bureaucratic* systematization of public schools, the advancement and integrations of *technological* tools, and the ever-present tug of *economic* logic

on the public institution. This chapter is a history of the integration of digital technology into the school system, identifying the layers of contested political and pedagogical values as they struggled to define and control the processes and outcomes of the act of schooling. This suggests a situation where contemporary educational technology can be posited ideologically as an actualization of the promise of public education previously un-fulfilled by prior generations of technocrats and educators.

The dissertation then breaks the larger question into three smaller ones: in part one, I ask what the role of the educational expert is in a time of greater technological intrusion into the classroom. In part two, I explore how one teaches in a public school in the contemporary moment. Finally, part three examines what is it like being a student in this sort of public-school system. By concentrating on the contradictory currents faced by the three main actors in the design chain of an educational technology—the technologists, the teachers, and the students—my study offers a view of the incorporation of digital technologies into the education of children from the ground up. It examines how technology and the market are transforming not only the values of the institution of public education, but the subjectivities of the actors in the institution.

Part I, *Education as Quantity and Commodity*, considers the language of “personalization” in instruction in the technology (edtech) universe as the latest iteration of a particular confluence of pedagogy, capitalism, and technology. I argue that because the process of digitization in the school system is being carried out through private industry, the drive for profit-making frames the ‘person’ in market terms as consumer, commodity, and entrepreneur. Chapter 1 looks at how testing, in general, and formative assessment, in particular, are expanding in prominence specifically because they provide quantifiable data points for this techno-centric pedagogy. The introduction of these market forces to the public school system has also created a new figure in American society, one that I describe in

Chapter 2. This “educational entrepreneur” stands between simple cottage production and large-scale capitalist accumulation. The capabilities of the internet to provide a seemingly unlimited and unmediated scale of exchange empowers the figure of the entrepreneur with a powerful ideological position in contemporary capitalist society. This ideological formation enters at every stratum of the school system: the institution, the teachers, and the students.

Part II, *Teachers: Seeing and Being Seen*, investigates the changes that new technologies are enabling in the school system and the various ways in which teachers are reacting to them. In Chapter 3 I locate teachers’ resistance to contemporary regimes of quantification in century-long debates about the nature and values of pedagogy. I argue that the hegemonic “evidence-based” approach to instruction can, and is, being resisted through philosophical and phenomenological-based methods that question and resist core commonsense values for the relationship between technology and education in America, and I demonstrate how alternative practices in integrating educational technology can come from these methods. In Chapter 4, I locate education reform and teachers’ resistance within the political economy of contemporary American society, demonstrating that the struggle over teacher autonomy takes on both individual and collective responses. From this I suggest that a redefinition of “autonomy” itself, in the form of the *teacher-entrepreneur (edupreneur)*, is bringing about a dynamic where educators come to monetize other aspects of their labor and rework the collective nature of the profession.

Part III, *Students: The Production & Monetization of Inequality*, looks at the question of youth subjectivity as a contradictory process of increased testing and self-monitoring. In Chapter 5 I argue that the contemporary intervention of edtech, capital, and capitalist philanthropy in public education is intensifying the racial and class divisions already embedded in the public-school system. Contemporary educational reform, by entrenching testing-and-accountability, is, I suggest, deepening the socially normative values of

standardized tests and leading to new forms of social stratification. In Chapter 6 I argue that discussions around youth empowerment need to consider the way in which market-based neoliberal subjectivity constricts our notions of empowerment and autonomy. I argue that contemporary entrepreneurialism, as it enters the lives of young people, is encoding a self-compromising order of commodification.

Finally, in the *Conclusion* I examine a moment in my ethnographic observations that brings together the major themes of the dissertation. I argue that the uses of new technology in our educational environment—as they open new ways for our society to educate and socialize its youth—are both deepening traditional dynamics and opening up multiple possibilities for understanding them. As critical scholars of technology and of education, I argue, we need to dwell in the distance between these two poles.

PART I : TECHNOLOGY

EDUCATION AS QUANTITY AND COMMODITY

Part I describes how the introduction of digital technologies in the United States has formed the foundation for the incursion of market forces into the nation's public-school system. Chapter 1, *Quantification*, argues that a reliance on quantifiable metrics within educational research and curriculum development is the bedrock of the century-long technocratic approach to education. The chapter takes an ethnographic focus on both the non-profit and for-profit sectors of educational technology to show how data gathering is redefining the terrain and scale of pedagogic experimentation. This century-long tradition of quantitative experimentation in education, I argue, has offered up a rich soil for identifying granular skills and knowledge which can become parted out for profit.

Chapter 2, *Scaling Formative Assessment*, argues that the drive towards the marketization of the educational process is instituting a particular regime of quantification most visible in the increased deployment of testing and assessment of both students and teachers. Drawing on ethnographic fieldwork in the market-driven educational technology sector, the chapter shows how the language of entrepreneurialism and market competition is being instituted into discussions of education and educational reform. Documenting the history of the rise of the for-profit educational technology sector, the chapter then considers the literature of the sector's trade organizations, demonstrating the ways in which testing is viewed and instrumentalized by the industry as the primary tool for transitioning K12 education from print to digital platforms. To understand the complexity of the drive towards marketization, the chapter draws on an additional site of ethnographic fieldwork: the non-profit educational technology sector. The focus on the non-profit sector will allow us to see

how some of the values generalized by the dominant market system are being questioned by sectors that are partially protected from its capitalist logic. It also shows how the drive towards testing, even outside this logic, is fundamental to the digital turn in education as the notion of *formative assessment* becomes a dominant pedagogical practice within all sectors of American education. The chapter argues that *formative assessment* needs to be taken as the tool of data gathering and market-driven rationalization that is the basis of the contemporary language of “personalization” and “individualization.” These values, shared by market-minded education reformers and the traditional technocratic elite alike, find technology the solution to the financial and structural shortcomings of the public-school system. I conclude with a case study of the programming and marketing of an educational technology software being designed to address capitalist market forces and the institutional changes levied at the federal level through the Common Core State Standards. By mobilizing John Kenneth Galbraith and Fernand Braudel’s distinction between *capitalism* and *the market*, I argue that an ethnographic analysis of the educational technology phenomenon calls for a more precise definition of the *market* in the digital age.

CHAPTER 1
QUANTIFICATION

Thou shalt not do as the dean pleases,
Thou shalt not write thy doctor's thesis
 On education,
Thou shalt not worship projects nor
Shalt thou or thine bow down before
 Administration.

Thou shalt not answer questionnaires
 Or quizzes upon World-Affairs,
 Nor with compliance
Take any test. Thou shalt not sit
 With statisticians nor commit
 A social science.

Under Which Lyre
(A Reactionary Tract for the Times)

W.H. Auden
1946

Auden's poem speaks to a cultural moment that perhaps has passed, warning an imaginary college student in the post-war period to avoid the social sciences in all its forms. "Statistics," a "doctor's thesis on education," "tests," and "quizzes upon world affairs" are machinations of the zeitgeist, of a time when social science was the tool of social progress and the American liberal ideal. This is perhaps why the poem is subtitled "A Reactionary Tract for the Times," for, to avoid the social sciences, was a reactionary project—not one for the socially responsible college graduate. This lofty value system, a legacy of the

Progressive Era still dominant within the twentieth century, was, in many ways, becoming fundamentally altered by the mechanization of data gathering and the ensuing “technological solutions to social problems.”⁶⁶ The “personalization of learning through technology,” and the myriad of formulations endemic to contemporary edtech, are a reminder that the progressive ideal, at least within the public sphere, is lodged firmly within a technocratic value system. And whether or not this intensification of social science research through immense data gathering is still ‘progressive’ depends on how we might decide to define “progress.”

The Rise of Formative Assessment

Reflections on field notes
6-11-2014

The day went quite weirdly – weird in the way that there was a presentation of a multi-year, multi-million-dollar work that the Center’s own studies showed to have failed in its goals. The goal on the original project [“Possible World”] was to create a series of games for middle school students that would help in changing some misconceptions of basic scientific phenomenon. The games were not to be a curriculum per se but an exercise/play that would become part of a larger instructional process in the classroom. [After the production of the games, t]he researchers at the Center carried a study to see if the games that they had designed themselves would influence the students’ understanding of science regardless of the teachers’ abilities ... that the game would be basic enough to change the way that all who play it re-conceptualize some basic scientific concepts. The graph [in the field notes] showed that the science classes where this [game] was not used had a steady line of grades that was NOT commensurate with the teachers Cals-S ratings. However, the teachers that did use the games actually showed that the better the teachers did on the Class-S, the better their students did on their science ... which means that the games are DEPENDENT on the teacher whereas they were meant to give general improvements to all regardless of [this] factor.

⁶⁶ This particular formulation of the spirit of our times is by Evgeny Morozov in his *To Save Everything, Click Here: The Folly of Technological Solutionism*. There are numerous other formulations of the phenomenon.

So, the multi-million-dollar project that took over 6 years of their lives to design and produce was a failure, according to their own empirical studies of the students and teachers who used them [the games]

My bewilderment when Cathy presented her findings to the rest of her CCT colleagues seems, now, almost naïve and simple-minded. My concern was as a citizen [“our tax dollars being wasted”] and as an educational researcher immersed in qualitative ethnographic observations [“how can you rely on one set of evaluations to dismiss a complex system of teaching and learning?”]. It had been 25 years since the Center for Children and Technology’s public debate with Seymour Papert over the proper place for computer-aided instruction to the classroom. No longer affiliated with Bank Street College of Education, the Center is now part of a larger non-profit headquartered in Massachusetts that is called the “Educational Development Center.” Still, it continues to develop educational software and carry out research on the effects of software on learning. I am here studying development of *Zoom In*, an online 7-8 grade Common Core-aligned American history curriculum (www.edc.zoomin.org). I joined the design process a year earlier as a researcher and observer after meeting a few of the team members at a friend’s graphic design office; I went on to help produce some of the instructional videos that explain the site’s various functions to teachers. At the end of the design process, I decided to accompany the team as they studied the impact of the software on both the teachers’ ‘instructional practices’ and the students’ learning. After their study, I continued my own research in some of the classrooms where *Zoom In* was introduced.

In the weeks following the presentation I brought up my puzzlement with Cathy. I asked her how she felt about the results of the research study.

Cathy: I’m a researcher, I’m not looking to fool anyone in buying our products
KE: Is there any value in the project?

Cathy: Of course. We're designing and experimenting based on a set of ideas and expectations. So now we have a better understanding of some of those ideas and how they work.

KE: What are some of those ideas?

Cathy: Just go read the report

Perhaps the most consistent difficulty in my project has been in defining the relationship between my qualitative approach to the educational process and the highly quantitative nature of educational research. This distinction goes to the heart of this chapter and forms a fundamental aspect of the academic conceptualization of education, just as it does the problematic of modern social science research. Because education is a field fraught with not only contending values, but also a large number of diverse stake holders—teachers, education schools, government bureaucracies, philanthropic institutions—with often contradictory interests and objectives, educational research is a sea of disagreements with no anchors. In looking at the educational research literature, one is mesmerized by the sheer volume of research publications. For every study arguing for an educational method or value, countless others seem to contradict it with their own, alternative, methods and values. One truism repeated often in the field gives a good sense of the situation: “what decides the relevance of educational research is politics, not the quality of the research or the reliability of its findings.”

10-9-2014

I'm sitting in a meeting at the Center for Children and Technology a few months before the deadline for the design of *Zoom In* (ZI). The discussion I'm observing is between the four major organizations that make up the design process of the software, three non-profits: Center for Children & Technology (CCT), Bank Street College of Education (BCE),

the American Social History Project (ASHP), and the private digital design company, Blender Box (BB). CCT is the originating institution, having brought together and mediating most of the interactions between the other three organizations. Eileen from ASHP has been in charge of the actual historical documents that form the content for *Zoom In*'s lessons. Vicki, from Bank Street, is the pedagogy expert, dealing with ZI as a learning and teaching tool as well as outlining the educational values and processes that the software operates under. The discussion between these three will eventually include, via phone conference, Blender Box, the tech company that is doing the actual programming and coding of the software. Today's discussion is about the pedagogic uses of *Zoom In*: how is the teacher going to use the site and what are some of the site's affordances for teaching and learning. This is a check-in to see how the pedagogic values discussed up to this point have been incorporated into the design of the software.

We are looking at a prototype of the teacher "back end" interface for *Zoom In*. This is the teacher-only part of the software where the program can aggregate student answers in various ways.

Mark (CCT): *[showing the rating system and the way the teacher can respond to a student]* and the student gets a message that the teacher has sent you a note. The teacher can go rate the students for herself, and she can put a star next to the one that is exemplary and that kid will get the note that the teacher gave you a star

Vicki (BCE): that's great, I think the teachers would totally welcome that *[she says this over and over again]* it's very heartening, it will support the kind of discussion we want to have [in the classroom]

Mark: but we still need to put in the grading rubric

Vicki: This is very powerful - this is what is giving me a sense of the power of a digital tool.... This is what will get teachers to want to use this, we are in a data driven time and this is what teachers and principals want

Mark: Yes, this is what principals want and teachers understand that this is what they have to do to comply [with the teacher assessment programs]. And this is where the difference between the teachers show[s] itself. There is Liz and Jack [teachers who have used the beta version of *Zoom In*] who say that there is a data regime and I want to become a power user of this data to drive my instruction, whereas other people [say] that "yeah this is great for

my administrator, I can just hit REPORT and it'll print out documentation that I can include in my portfolio.

Vicki is an education expert from a well-known teacher education school in New York City. She has been an integral part of the design process of the software, but she has consistently kept a distance from discussions of its technical aspects. Vicki's concern, speaking as a specialist on the needs and responsibilities of teachers, has been the *pedagogic* values of the finished product. Today, as the software is rolled out and the infrastructure of the back-end of the software becomes clear, she understands “the power of [the] digital tool” to provide a granular view of the progress of each student in an immediate and efficient way. “We are at a data-driven time” she continues, moving from the perspective of the teacher as the educator in the classroom to (“this is what teachers and principals want”) to the perspective of the teacher as the “professional” who needs to demonstrate the products of her practice within the confines of bureaucracy and society. Mark, the head of the design team, continues these thoughts, reiterating that this backend is where teachers will be able to improve their practice (by agreeing to learn how to use the data). Even those who do not engage with the data directly will still be able to use it indirectly—to show documentation that they have fulfilled a curricular requirement of the school system for teachers. This pressure for teachers to provide documents and data on their practice is a central feature of the changes in the teaching profession I will describe in the next chapter.

The CCT staff soon unveil their next innovation to the pedagogues in the room. This is an interface where the teacher can get a quick look at how many of the lesson questions each student has answered:

The graphic shows the beta version of the tool as it was tested and used by a teacher in his 7th grade American history classroom during the Spring semester. The teacher-monitor page shows all the documents that the students have had to view and answer questions about. But Vicki and Eileen, the two members of the team who deal with the pedagogic content of *Zoom In*, are taken aback:

- Eileen (ASHP): This privileges context slides with the document note slides, and it shouldn't do that
- Mark (CCT): That is correct. The numbers in the fields means how many notes overall the kid has taken, it doesn't distinguish between the kind of notes. The colors are a kind of algorithm that helps the teacher tell quickly how many notes they have answered
- Eileen: But if a kid takes ten notes on the first document, and doesn't go through the rest [of the documents], this doesn't show it ...there is no way to know if the student went through the whole lesson or just answered one with a bunch of sentences
- Vicki (BCE): This needs to show how much of the lesson each student has gone through the lesson
- Mark: This is Blenderbox's algorithms. They have other software that they use this algorithm with and this is how it works. They don't have an algorithm for such a thing [that you are asking for] ... the [total] number of notes is the only gage we can have at this point
- Vicki: This seems like such an obvious part of the design; how can they not have it?
- Mark: These aren't variables in their system and I don't think it's easy to have, it would require a substantial re-engineering to have it
- Vicki: I'm not sure if this is useful. If the teacher goes to see how many of the important documents have been read by each student and all they get is a [total] number like this, then this [page] is not what it claims to be.... I think it's better to not have it at all.

Vicki's last comment is a bucket of cold water for the rest of the people in the meeting. The algorithms that form the basic blueprint of the back-end tool for teachers to follow student progress are not only inadequate, they are misleading. The teachers need more precise data than what the algorithms offers if they are to monitor each student's engagement with each portion of the lesson. For Mark, the project leader of *Zoom In*,

developing the teacher check-in points has taken up a large number of hours. Getting rid of them would mean a huge waste of effort and time. Changing the algorithm, on the other hand, means a re-design of the site and it is not clear if Blender Box would do this without going over the allotted budget. Mark calls Quill at Blender Box:

Mark (CCT): We are here with the content development team and we want to discuss the overall progress-monitoring view. There's a clear consensus that it's not working as a snapshot of the progress in the classroom. It is basically a huge distraction to have all these notes on the same level

Quill (BB): Yes, that's because all these documents are equal as far as the software is concerned

Mark: Yes, but these docs are equal from the point of engineering, not in terms of the lesson

Quill: The idea is to provide info on how many notes they are taking as a form of formative assessment

Vicki (BCE): Yes, formative assessment is what we are talking about, but what the teachers want to know is how far along the students are in each question. So what we need, if you could do that, is to give us data that gives us more information on each question type

Mark: It would help the teachers to get an at-a-glance read on the students' progress

Quill: I have to talk to Mitch [the engineer] about that. It's a big change....

Mark: Basically for any question that requires student input, we want a metric that shows progress, so [for example, we need a special mark] for each document there are like three questions and they have done 2 out of three questions

The tension is between priorities of content and the capabilities of engineering. For the digital design team, these algorithms do not distinguish between the various documents in the lesson: each document is equal to another so that any interaction by a student with any of the documents will be marked equally. If a teacher wants to get a glance at how many of the questions from a specific document a student has answered, the platform will not provide her with that data. The platform will tell her how many of the total questions the student has answered but it will not provide more specific data. This, for Vicki, is a missed opportunity in the software's ability to provide teachers with granular data on how each

student is doing on a specific question or skill, or how a specific skill is being carried out by the class as a whole. The discussion demonstrates a difference in the notion of “formative assessment,” and it is this concept that explains what is at stake in the conversation.

Formative assessment has become an important concept in American educational practice over the past few years. The concept, along with its counterpart, *summative assessment*, was introduced by the American philosopher of evaluation Michael Scriven, in his much quoted 1966 treatise “The Methodology of Evaluation.” Theorizing the different ways for evaluating school curricula and teaching tools, Scriven used the term *formative* to describe evaluations that modify a project while it is still in development. He used *summative* when an evaluation is to be used for making final or conclusive claims on the effectiveness of a design or program. A few years later, educational researchers Bloom, Hastings, and Madaus extended the uses of the terms by using *formative* to refer to the educative evaluations *inside* classrooms, such as quizzes and tests that are used informally to modify instruction and check in on student learning. They contrasted these activities with *summative* assessment—high stakes tests such as final exams or the SAT—which determine a student’s final grade and rank in relationship to preset rubrics and standards.⁶⁷ In a technological approach to education, *formative assessment* is the pedagogic name given to the collection of minute data on the user in the educative context.

The discussion at CCT between tech designers and education expert is over the *precision* of the information provided by formative assessment tools in the educational software. The tech company’s previous algorithms, now applied to an educational technology, proved inadequate at providing the kind of formative information that the teacher needs to properly assess the progress of each student. In the few weeks after this

⁶⁷ (Bloom, Hastings, & Madaus, 1971)

conversation, the need of the educational expert won out and the software's codes were updated to match the requirements Vicki and Eileen had asked for. While a more in-depth discussion of the *educational* significance of formative assessment will follow in chapter 3, what we need from this discussion is the *technological* significance of formative assessment.

As this conversation demonstrated, in the process of designing *Zoom In* the designers are carrying out what Manovich termed *transcoding* (“to translate something to another format”⁶⁸). As Vicki’s remark at the beginning of the conversation indicated, the digital tool is able to transcode a function that had, until now, been an informal and, at times, instinctive part of the teaching and learning dynamic, into a visualizable data-point. Digitization of the educational process allows the teacher check-in to become a material artifact and a quantifiable *thing*. The thingness of the assessment is providing the teacher—and whoever else has access to the software’s back end—with information that had been otherwise unquantified. It is this information that is the basis the data that many think can be used to intervene more directly into a student’s intellectual development.

Testing for Personalization

Assessment is the central mechanism of creating personalized education in the technological imagination. The overriding dynamic of contemporary intellectual measurement, in the words of Randy Bennett of the Educational Testing Service (the largest standardized testing organization in the world, and the one that develops the GRE and TOEFL), is the confluence of advances in technology, cognitive science, and measurement.⁶⁹ For Bennett, discussions around contemporary testing are part of a larger discourse on the

⁶⁸ (Manovich, 2002), p. 64

⁶⁹ (Bennett, 2004), p.117

future of testing that anticipates a “universal assessment via the internet ... in our schools.”⁷⁰ For Howard Everson of the College Board (the developer of the SAT), contemporary testing is also a confluence of new technologies and cognitive science. But for Everson, who is less interested in the possibility of internet-based national assessment in schools, today’s discussion anticipates the development of *intelligent tutoring systems*. He argues that discussions around cognitive science and the adaptive nature of digital technology can conceptualize automated pedagogic systems that instruct and assess the learner concomitantly to constantly provide targeted and effective content knowledge.⁷¹ This promise of individualized instruction through technology is being marketed through private companies such as Knewton, “The World’s Leading Adaptive Learning Company.” As CEO Jose Ferreira, explained at the White House South Court Auditorium for the 2012 *Education Datapalooza*:

Education is the world’s most data-mine-able industry by far... and Knewton gets 5-10 million actionable data per student per day... because we get people to tag all their content, down to the atomic level [and] because of our relationship with (the testing company) Pearson where they tag all their content.... [so] we think in a few years we will be able to predict grade performances [for each student] and be able to tell you what paths to take [for better learning]. The power of data when you unlock the millions of data points per day [means] you can accomplish things that people aren’t even conceiving right now....⁷²

As Ferreira went on to argue, the contemporary intensification of this individualized learning is based on the idea that, in education, “every single concept is related to every other concept using psychometrics.” So while the increase in the number of traditional forms of schoolhouse tests are yielding results that better rate the intellectual ability of students and performance of teachers, the continuous testing of students through digital platforms—whether it is called ‘formative assessment’ or some other name—can yield massive data for

⁷⁰ (Bennett, 2004), p.117

⁷¹ (Everson, 2004), p. 185

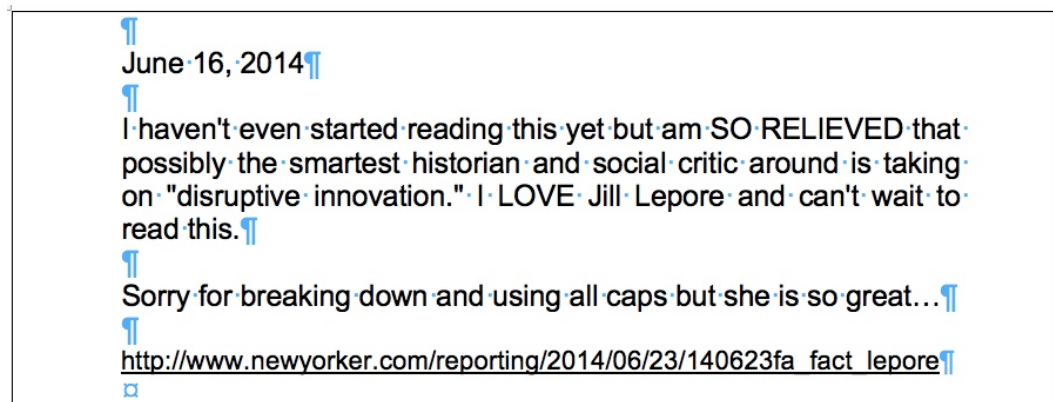
⁷² <https://www.ed.gov/blog/2013/01/education-datapalooza-unleashing-the-power-of-open-data-to-help-students-parents-and-teachers/>

companies like Knewton to provide “brain maps” of an individual and a personalized path for his or her intellectual development. Through Knewton’s “predictive analytics machine,” Ferreira promises a system that “provides detailed reports and metrics used by students, teachers, and parents.” These reports will allow them to “predict the rate and likelihood of goal achievement, expected scores, proficiency, and more.” (Knewton.com)

This regime of quantification may be the result of an increasing reliance on technology-centered instruction and pedagogy, but it would be a mistake to suggest that the quantification of cognition and learning is solely due to the voracious need for data of our contemporary techno-centered society. As the following section will show, the debate around the role of numbers in educational research is tied to the way that technology has been being mobilized by the market to enter the educational system.

Scaling Formative Assessment

The message came over CCT email a full week before *The New Yorker* print copy was issued:



The link came from Cathy, who took it upon herself to provide a continuous commentary on the place of the Center within the world of education and education

research. As a non-profit educational research organization, there is a subdued pride in the Center amongst the staff: a comfort that comes from a belief that the organization is carrying out an important mission of “social good.” One piece of the company swag, a thermal coffee holder, for example, announced that in 2009 parent Educational Development Center was ranked by the *Boston Globe* as one of the Globe100’s “Top Places to Work.” The CCT staff comes from a largely academic background. Most have masters and doctorates in educational research. A number have experience as teachers. Others come from a media production background. Women form over half of the organization, and a vast majority are white. The atmosphere of the office is professional in its quietude without being stuffy and intimidating. The staff is down-to-earth but professional. The kitchen area encapsulates the vibe: the company refrigerator is always packed with food staff bring to the office, but there are warnings and sticky notes to ensure individual accountability and a fresh smell permeate the office, rather than the horror of endemic to most institutional refrigerators. The round table in the kitchen corner often holds a cake, a box of cookies, or a treat from a recent trip of one staff member or another, usually with a note identifying the benefactor and describing the treat and its dietary and allergic considerations. During lunch hours, the two microwaves and the one large toaster are held in constant use, with the banter of the kitchen offering a notable break from the habitual hum of the office. The lunch time atmosphere at CCT felt a little like that shared by NYC public school teachers—minus the constant barrage of the students distracting from middle-class adult sociality. I asked about the kitchen culture whenever I would run into someone in the area, and I got a few responses that summarized the Center’s character: lunchtime is a good time to socialize and “see what others in the organization are up to,” bringing your food “is healthier than eating out,” and it is cheaper to bring your own lunch [“we aren’t paid corporate wages here”].

Cathy’s email set off a series of informal comments and discussions in the office over the following few days. Jill Lepore’s opinion piece “What the Gospel of Innovation Gets Wrong” came out in the June 2014 issue of *The New Yorker*.⁷³ The article took on what the author framed as the history and values of new tech business as they applied to the rest of society.

Innovation and disruption are ideas that originated in the arena of business but which have since been applied to arenas whose values and goals are remote from the values and goals of business. People aren’t disk drives. Public schools, colleges and universities, churches, museums, and many hospitals, all of which have been subjected to disruptive innovation, have revenues and expenses and infrastructures, but they aren’t industries in the same way that manufacturers of hard-disk drives or truck engines or drygoods are industries.⁷⁴

Lepore, went on to argue that, as opposed to industries that produce material goods, professions that produce non-material goods and services—journalists, doctors, teachers, pastors, curators—all have obligations to other people in the form of information, knowledge, spiritual or medical interventions, etc. For Lepore, these obligations lie outside the realm of earnings, and they are fundamentally different from the obligations that a business executive has to employees, partners, and investors.

Lepore’s argument resonated in various ways. The fact that CCT is a non-profit organization sets it apart from the most aggressive portion of the for-profit educational technology sectors. Their measured attitude toward profit-making, at this period of expansion of the edtech market, places the Center somewhat behind the times. Josh has been at CCT for over a decade working on the technical side of the center’s projects. He helps with conceptualizing technological possibilities and oversees the video production, when necessary. He is less involved with pedagogical questions, and more connected with the industry in terms of marketing and distribution. When I asked him about the Lepore

⁷³ (Lepore, 2014)

⁷⁴ (Lepore, 2014)

article, he put it this way: “CCT is conservative in the way that it is not necessarily disruptive, it is sustaining in its innovations, we are not going out like the venture capitalists. We are more thought-out.”

The literature on non-profit organizations figure them as one of three basic types of formal organizations in every society: private, public, and voluntary. In his 2012 study, *Nonprofit Organizations and the Intellectual Commons*, Jyh-An Lee describes private (proprietary) firms as “more flexible and more efficient in meeting consumer demands because they have to maximize the profits that they distribute to owners and managers.”⁷⁵ These private firms, however, are less likely to respond to public interest issues (such as education) since “the profit-motivated firms usually prioritize activities that improve their revenue.” The second sector, government or public institutions, “can encourage public goods provisions through subsidies, or can discourage unwanted private activities through tax levies.” The limitation is that “government decisions are easily influenced by industries and pressure groups, with “the policy-making process usually ignor[ing] the interests of weakly organized groups.”⁷⁶

Non-profit, or voluntary, organizations fall in between these two sectors. They are organizations that “are more responsive than proprietary firms to public-interest issues.” At the same time, “they are less subject to the transaction costs stemming from the political process.”⁷⁷ One of the first systematic study of nonprofits is credited to Burton Weisbord, in his groundbreaking 1972 study of the non-profit sector:

The existence of certain constraints on governments will be seen to create what might be termed government market failure, analogous to the conditions causing private market failures. Development of a voluntary sector will then be posited as an adjustment to the restricted capabilities of these other two sectors.⁷⁸

⁷⁵ Lee, p. 27

⁷⁶ *ibid*, p. 28

⁷⁷ *ibid*, p. 28

⁷⁸ Weisbord, 1972, p. 2

The nonprofit sector has been fundamental to the process of education in twentieth century American society. From private universities to smaller research centers, these institutions operate under the ideal that the profit motive should be minimized within discussions and debates about the schooling of children into adulthood. But, as I will discuss, changes in the economic and social structures of our society brought about by digital technologies have had a particular influence on the nature of profit-making, one which is effecting the relationship between the nonprofit and for-profit sectors.

As my time at the Center continued, I came to realize that the conservatism of the organization and their unwillingness to “disrupt” the education system was directly related to the way they regard the role of teachers. The culture of the organization is built around the idea that they are producing pedagogical tools in order to *help* (rather than replace or circumvent) teachers in their role as the central actors in the transmission of education. Suggesting that the source of problems in education might be *with* teachers was something that, within the professional discourse of the center, was frowned upon. Cathy, the person who sent the Lepore article put it succinctly: “Education is an ecosystem. We want to be a part of that ecosystem instead of take over it.” But, as I will argue, becoming part of an ecosystem that is increasingly being defined through “Shark Tanks” and “armies of entrepreneurs” leaves little room for organizations like CCT to remain shielded from the motives of profit.

CHAPTER 2

COMMODIFICATION

The ‘digital ocean’ ... is coming. Just as ‘big data’ is transforming other industries such as insurance, finance, retail, and professional sport, in time, it will transform education. And when it does, it will resolve some long-standing dilemmas for educators and enable that long-term aspiration for evidence-informed policy at every level, from the classroom to the whole system, to be realised.

Impacts of the Digital Ocean on Education
Pearson Corporation Series, 2014

Selling Personalization

NYU’s Skirball Performing Arts Center is lodged in the middle of the University’s urban Washington Square campus. It is 8:30 in the morning on December 20, and the area is empty of the usual bustle of students. They have given the streets back to the City as they leave for the holidays. It is, however, the opening plenary of NYEdtech Week™, which, according to their email announcement, is “a global education innovation festival, focusing on how entrepreneurship and edtech can drive advancements in education and learning.” The conference joins industry representatives and policy-oriented members invested in the marriage of new technologies and schooling, brought together in the American temple of the unregulated, “free,” market.

The stairs going down to the auditorium reach a landing where two long rows of tables with polyester white tablecloths hold the standard New York City catered breakfast platters. The air is abuzz with the banter of an early morning conference crowd that has stumbled on an unannounced fortune of free food and unlimited coffee. Attendees are preparing for the rest of the day’s intellectual menu by loading up on gratuitous carbohydrates and milk fat littered, for a healthier intake, with strawberries that, by 2016,

have been engineered to roughly the size and texture of standard crabapples. I remember a comment from similar event: “Oh-oh! You know whenever they give away free food at a conference, they want you to buy something.” She had said either “buy” or “buy into.” In this case, either would fit.

There are numerous educational technology conferences in the country, from the official Obama-White-House-sponsored “Datapalooza” to informal DIY-spaces-turned-meet-up “Maker Fairs.” This conference distinguishes itself by expressing *private industry’s* interests in educational technology, to the point where the name of the conference is, itself, trademarked as a brand. The bottom of the conference’s webpage (www.nyedtechweek.com^{*}) lays out the public-private relationship of the conference as: *Copyright ©2017 StartEd Companies Inc, a public benefit corporation.* Alongside StartEd Co. Inc., other official sponsors of the conference include McGraw Hill, BMO Capital Markets, Wiley, and WNET, Boston’s PBS station.

The email from a few days earlier had proudly announced that the conference was sold out, and this seems to be true. The 850-seat auditorium has filled up quickly as the day’s events began to unfold. As we entered the amphitheater seating of Skirball, we can see the stage littered with a number of hide-covered wooden drums, and with three white and one Asian performer playing them. Behind the drum circle, an excessively large screen projects a loop of 30 or so photographs emitting images of African children and first-world adults of multiple races smiling at the camera, all set in various locations and demonstrating various poses.

* Website visited 5/25/2017



The images on the loop tell us to “Dance Your Rhythm” and that they are photographs from NYU Steinhardt School of Culture, Education, and Human Development’s University’s Dance Education program in Uganda. It’s all smiles as white, Asian, and African-American students join faculty from NYU to pose with African children wearing I ♥ NY and NYU swag. It seems to be a 21st century rendition of the familiar confluence of photography and global inequality that dates all the way back to the dawn of the medium in the 19th century. The performance of domination and appropriation reaches its most absurd end with a screenshot featuring the logo from Apple Inc.’s commercial search engine-*Safari*-that informs the audience “You are not connected to the internet.” The African safari, it seems continues as a source of “authentic” naturalistic experience for Westerners in need of an escape from their hyper-technologized lives.



The contrast between technology and development that plays out in this scene is perhaps only a slightly more stark example of the contradictory dynamics and values that have been at stake in educational spaces over the past century. The promise of educational practice, honed by science and technology to better reach those without access to knowledge and the material benefits that come along with it, is as much the history of America's public education system's dealings with the country's *internal* inequality, as it is with the civilizing mission that the US inherited from its European colonial predecessors. EdTech is only the most recent iteration of this history. Whether or not the unique nature of our digital and network technologies is creating a categorically altered ("revolutionary") dynamic within our educational practices is the question at the center of this dissertation.

After another 15-minute performance, where the NYU dance-education majors drumming, dancing, and singing African rhythms provides a semantically rich moment with their rendition of Alicia Key's "Empire State of Mind" for an audience of educational technology developers and marketers, the conference is underway. Out comes Jonathan Harber, co-founder of *StartEd Companies, Inc.*, and one of the organizers of the event. As

Harber takes over a corner of the stage, the stagehands remove the African drums from the darkened platform and push in plush white leather seats. Harber's business credentials are in full display as he starts off by welcoming the audience and informing them that *StartEd* is “working with NYU Steinhardt to attract an army of edtech entrepreneurs to solve the world's largest education problems.”

This image of a militarized corps of independent technologists marketing their inventions in a global battle against poverty and ignorance is a remarkably lucid enunciation of the contemporary ideologies of edtech. Education, in the American public imagination, has been tied to national security and the safeguarding of America's global stature at least as far back as the end of World War II. The Cold War was a technological competition, one that sparked the American imagination with the 1957 Soviet launch of *Sputnik*, the first human-made satellite. The national outcry and outrage at the US's seeming disadvantage in this competition brought with it the 1958 National Defense Education Act that saw an influx of public funds for the education system.⁷⁹ But the language of education as a form of national defense would see its greatest rhetorical utility 25 years later, at another moment at the height of the Cold War, when President Ronald Reagan's Commission of Education released its infamous report, *A Nation at Risk*, with the ominous claim:

If an unfriendly power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves....We have, in effect, been committing an act of unthinking, unilateral educational disarmament.⁸⁰

Nation at Risk put in motion in 1983 the reform in public education that has been described as a *neoliberal* turn in American society, where national policy became centered around enabling, and encouraging, market forces to operate within the institution of public

⁷⁹ Chubb & Moe, p. 7

⁸⁰ *A Nation At Risk: The Imperative For Educational Reform: A Report To The Nation And The Secretary Of Education*, United States Department Of Education, p. 1

education. Over the past 30 years, we can see a move from Reagan era rhetoric that framed education reform as an ‘act of war’ and ‘unilateral disarmament,’ to President Obama who

articulated a bold vision for the United States to lead the world in the proportion of college graduates by 2020 ... thereby regaining our leadership and ensuring America's ability to compete in a global economy. To achieve this aggressive goal, we need to leverage the innovation and ingenuity this nation is known for to create programs and projects that every school can implement to succeed.... Technology-based learning and assessment systems will be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels.⁸¹

By the time Harber has taken the stage of the 2016 NYEdtech Week™, the Cold War *cum* neoliberal Frankenstein “army of entrepreneurs” made complete cultural sense.

By now, a jazz trio has moved to the other side of the stage with a bass, keyboard, and jazz drums playing interludes as Harber draws out the picture more completely, guiding the audience to think of NYEdtech Week™ conference as “NYC Fashion Week for edtech.” The event now has the entertainment value of a cross between TED talks and late-night comedy TV. Harber’s language is fully conscious of itself as the marketization of everything it touches. He informs the audience

globally we spend 6 billion dollars annually to teach people from early childhood to workforce development.... And although we have made huge advancement in the learning sciences, we still have huge discrepancies in quality, affordability, and access to education. Most of the 6 billion is still spent on physical classrooms, live instructors and printed material but like other industries that have been transformed over the last 20 years since the internet boom, the learning industry has begun to transform too, choosing digital learning, distant instruction, and learning management tools.

Harber’s use of the term “learning industry” brings together the contemporary amalgam of education, technology, and the market. Harber, according to his S&P Global Market Intelligence profile

⁸¹ “Transforming American Education: Learning Powered by Technology,” National Education Technology Plan, US Department of Education Office of Educational Technology, 2010

advises private equity funds and large education companies on mergers and acquisitions.... Until January 2014, Mr. Harber served as Chief Executive Officer of *Pearson K12 Technology* following its acquisition of *Schoolnet*... He earned an M.S. from MIT and completed a joint Master's thesis on education technology between the MIT Media Lab and the MIT Sloan School in 1990 and received a Bachelor of Arts with Honors in Cognitive Science from Wesleyan University in 1986.⁸²

Harber's tenure at Pearson K12 Technology is perhaps the most significant and high-profile moment of his career in edtech. Pearson is the most visible global manifestation of private industry's incursion into the core of the public good we call "education," laying bare the central role that new technologies are playing in the increased privatization of public school systems across the world. According to the company's website, "Pearson's origins were in the construction business during the Industrial Revolution... [when] Pearson became one of the world's largest building contractors at a time when the industry-controlled development of the transportation, trade and communication links that fueled world economies."⁸³ This corporate sense of itself is a clear example of the core ideology of capitalist modernity: the unity between private industry and the wheels of "progress." The timeline recounting the company's history goes on to tell us that Weetman Pearson, the son of the founder and the man who moved the company's headquarters to London in 1891:

built railroads that criss-crossed Spain, Colombia, China and Mexico; harbours in Dover, England, Vera Cruz, Mexico and Valparaiso in Chile. He even built the Sennar dam in Egypt. Other contracts covered reservoirs, tunnels and factories. By the end of his career, he had ventured into the oil business and energy, illuminating Mexico and Chile with energy generated by the countries' first hydroelectric plants.

The company shifted its source of profit to the media and publishing industry in the 1920's (with the *Financial Times* and *Penguin* its most famous holdings), and it went on to become one of the largest textbook publishers in the world. By the beginning of the twenty-first century, Pearson was a leader in the education market, but it wasn't until January 4, 2016

⁸²<http://www.bloomberg.com/research/stocks/people/person.asp?personId=11340911&privcapId=134992>, website visited 5/29/2017

⁸³ <http://timeline.pearson.com/> website visited 6/8/2017

that the firm sold off all of its other assets (including the now financially unstable *Financial Times*) to rebrand as *Pearson Education Limited*, the “world’s learning company.”⁸⁴ In the process of concentrating the company’s profit-making on education, Pearson has acquired numerous edtech companies, become the world’s largest testing company (with 60% of the US’s testing market), and is working to set the world standard in not only English proficiency, but in learning standards more generally.⁸⁵ Pearson, in the twenty-first century, has positioned itself to commodify “learning” in much the same way as it had once commodified industrial development.

The 170-year-old construction company that is vying to be the world leader in education as commodity has become a dominating force in global education. The company entered the education market in 1988 when it became the world’s largest education publisher, taking control of the textbook printing industry through the \$4.6 billion acquisition of Simon & Schuster’s education division. But, as digital technology and the internet spread, it was not the digitization of textbooks or curricula that brought dominance for Pearson in the educational technology market. Pearson positioned itself to capitalize on the *data-driven* approach to education through its interests in high-stakes testing. In 2000, Pearson acquired NCS, the largest American testing company, for \$2.5 billion, and began developing educational products beyond the textbook. “Content has been king,” CEO Scardino was quoted as saying to *The Wall Street Journal*, “but now we’ll have the ability to put content and applications together, and that will really allow us to be king.”⁸⁶

⁸⁴ “Pearson Rebrand to Focus 100% on Education,” <http://www.thebookseller.com/news/pearson-rebrands-reflect-100-focus-education-319864> accessed 6/8/2017 “? Meets ! in new Pearson Logo,” <https://www.designweek.co.uk/meets-in-new-pearson-logo/> accessed 6/8/2017

⁸⁵ “Everybody Hates Pearson,” <http://fortune.com/2015/01/21/everybody-hates-pearson/> accessed 6/9/2017

⁸⁶ “Pearson Sets \$2.5 Billion Deal for National Computer Systems,” <https://www.wsj.com/articles/SB965027307754298481>, accessed 6/16/2017

Pearson is part of a larger network of for-profit educational technology companies operating in both the US and global markets. The Software & Information Industry Association (SIIA) is the largest professional organization representing the business interest of the computer and digital content industries. According to Immanuel Ness' comprehensive *Encyclopedia of Interest Groups and Lobbyists in the United States*, SIIA was formed in 1999 through the merger of the Information Industry Association (founded in 1968) and the Software Publishers Association (founded in 1984). Both of these groups were the main lobbying organizations for their respective industries in Washington, advocating for deregulation on behalf of "the creators and packagers of information content" in the case of IAA and for the software industry in the case of SPA. It was a natural by-product of the digital economy for these two lobbying groups to merge and "seek formal and informal access to policy makers through campaign contributions and their ability to supply information."⁸⁷ Alongside Pearson, Microsoft, Apple, Dell, IBM, over 1500 companies are members of the trade group.⁸⁸ The trade group offers its members, for a sliding scale between \$800-\$131,000, a host of policy papers, webinars, and conferences.⁸⁹ SIIA's Educational Technology Industry Network (ETIN) specifically represents the interests of the private edtech universe. The trade group is best known for its annual conference and their CODiE Awards which, according to the ETIN website's call for nominations:

remain the only peer-recognized program in the business and education technology industries so each CODiE Award win serves as incredible market validation for a product's innovation, vision, and overall industry impact. CODiE Award finalists and winners experience increased product recognition; increased press, customer and prospect visibility; product validation for your team; and the simple enjoyment of standing out as the best amongst the competition.⁹⁰

⁸⁷ (Ness, 2000) under *Software and Information Industry Association*

⁸⁸ <http://www.siiia.net/About/SIIA-Member-Companies> accesses 9/11/2017

⁸⁹ <https://www.siiia.net/Membership/Join> accesses 9/11/2017

⁹⁰ <http://www.siiia.net/codie/Nominate> accesses 9/11/2017

But they also offer member companies resources such as the “Expert’s Guide to the K12 School Market” and “SIIA Trends Report for Education Technology.” Nearly all of the industry’s white papers are behind a paywall, with prices ranging from \$300 to a few thousand dollars. Neither direct calls to the group’s offices in DC nor institutional access through the NYU Library system could give me access to most of this content. I was, however, able to get a copy of the executive summary of the ETIN 2014 “Behind the Data: Testing and Assessment—A PreK-12 U.S. Education Technology Market Report.” According to this report, based on extensive interviews with 20 companies demonstrating extensive sales in the testing arena, the industry had grown 57% over the previous three years, with an annual income of \$2,500,000,000 in 2013. However, the most interesting part of the trade group’s market report is in its key findings:⁹¹

Behind the Data: Testing and Assessment—A PreK-12 U.S. Education Technology Market Report 2014

Key Findings

Participants almost universally identified four key factors affecting the recent growth of the digital testing and assessment market segment:

1. The Common Core State Standards are Changing Curricula
2. The Rollout of Common Core Assessments are Galvanizing Activity
3. There is Widespread Demand for More and Better Formative Assessments
4. Testing and Assessment is Leading the Transition from Print to Digital

In addition, there were four contributing factors identified by smaller groups of participants:

1. School Districts are Requiring Interoperability
2. Big Data and Analytics are Driving Infrastructure
3. Real-Time Digital Assessments are Actionable
4. Linking Assessments to Content holds the Promise of Personalization

While the survey reported on total revenues in testing and assessment, these interviews identified subcategories in the following order of size:

1. Summative (including benchmark/interim) composed the bulk of revenues,
2. Formative was in second place, and

Representing significantly less revenues are:

3. Psychological testing, and
4. Test preparation products.

Finally, despite the excitement over the expanding testing and assessment market segment, participants raised a couple of cautions:

- There is a broad question about how best to preserve the privacy and security of student data, and
- The pattern of dynamic growth in statewide summative assessments has slowed, and little growth is expected in the coming years.

⁹¹ (Richards & Stebbins, 2014)

According to these findings, testing and assessment are leading the transition in education from print to digital. Furthermore, the industry has identified formative assessment as a key demand in the education field. Feeding this market for assessment is the national Common Core State Standards.

To understand this macroscopic perspective on the intersection of digital technology, education, and testing, we need to look further into how the logic of testing is becoming a *regime of testing* in the school system. In what follows, I will look into the penetration of digital technology into the educational environment to show how the market demand for actionable data, as well as the technocratic nature of our notion of education, are contributing to the regime of testing and assessment that is becoming the dominant logic of the educational system.

The Entrepreneurial Army of EdTech

The announcement for the Pre-Conference Reception invited us to:

Kick off NY Edtech Week by tipping a glass with industry innovators, investors, and influencers!

By the time I arrived, an hour into the event, the venue was over-capacity, a line of people waited for attendees to leave before we could get into the elevator that opened into the loft. The loft was a converted industrial space. Like most large buildings in this part of Manhattan, it is owned by NYU. Hundreds of people were crammed into a space that couldn't seem to hold any more, flanked by caterers walking with small trays of *amuse bouche* exasperated at having to navigate the crowd. On the stage in the middle of the space, someone was beginning welcoming remarks. The mauve and sapphire-color lights placed on

the floor next to the columns and walls shot up to the ceiling, an attempt to give the space a dramatic-yet-cool effect. As anyone who has done any interior lighting or design in old NYC spaces knows, this is the worst kind of lighting. The effect highlights the one-hundred-year layers of paint chips and bubbles on the columns and moldings, and they end up giving the space a creepy, drab feeling—no matter how cheerful the color of the light.

The crowd is diverse in race, gender, and age, though the majority are middle-aged white men. There are a lot of conversations, but quite a few people who, like me, don't know what to do with themselves. I have no entry point to talk to anyone, and I naturally gravitate towards the food table, where tubs of bar-mitzvah-sized sushi platters disappear more quickly than expected. A few minutes after I fill my plate and move to the side, I notice a middle-age white woman who is also awkwardly standing with her plate. We seem to share a desperate need to talk to at least one person before the networking opportunity ends. It turns out that she is at the conference with one of the start-ups who have been chosen to incubate in the 2016 NYU EdTech Accelerator lab. The lab, co-sponsored and staffed by NYEdtech Week™, presented itself as working with

innovative startups focused on technology solutions to improve education and learning -- across all stages from birth through lifelong learning. Each of the ten companies selected for the program will receive up to \$170,000 in funding.... The intensive three-month mentor-led Accelerator is housed at the NYU Edtech Incubator, a co-working space dedicated to education entrepreneurship on NYU's campus in New York City.... It provides mentorship, coaching, legal services, development expertise, sales consulting, and business development, among other resources. It is designed to help entrepreneurs secure their next round of financing, culminating in the innovation festival NY Edtech Week where companies will present to an unparalleled network of angel and venture capital education investors.⁹²

⁹² <https://www.f6s.com/nyuedtechacceleratorbystarted2016>

started

NYU Edtech Accelerator by StartEd 2016

Join the army of edtech entrepreneurs solving big problems in education.

Team
Ashantha & Doug + 1

Overview

Oct 5-Dec 21 '16 (11 weeks)

35 W 4th Street, New York, NY 10012

New York City, US

FUNDS UP TO
\$170K
per team

TAKES
6-11%
equity

FUNDS
10 startups
per year

MARKETS
Education • Finance • Training & Coaching • Women • Adult Education • 9 more

INVESTS IN
Europe • North America • South America • Asia • Africa • 4 more

The StartEd Accelerator works with innovative startups focused on technology solutions to improve education and learning -- across all stages from birth through lifelong learning. Each of the ten companies selected for the program will receive up to \$170,000 in funding. Final decisions for the Fall 2016 are complete.

The intensive three-month mentor-led Accelerator is housed at the NYU Edtech Incubator, a co-working space dedicated to education entrepreneurship on NYU's campus in New York City. The Accelerator will run from October 5 to December 21, 2016. It provides mentorship, coaching, legal services, development expertise, sales consulting, and business development, among other resources. It is designed to help entrepreneurs secure their next round of financing, culminating in the innovation festival NY Edtech Week where companies will present to an unparalleled network of angel and venture capital education investors.

Read our FAQ: bit.ly/startedfaq

Staff

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Admin

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Admin

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Admin

STAFF

The woman with whom I am awkwardly eating sushi is in the accelerator with the company she started with her husband, looking to find venture money to develop resources for high school students to improve their applications to college. The problem is that there are other competitive online resources just like their company. What makes them different is that it doesn't end up costing the kids a lot of money. The two founders are native New Yorkers. They lived in Brooklyn, and they have been working on this project for a few years. This, she suggests, is an opportunity for them to take a giant step forward in turning their website into a successful product. They are on their way to join Harber's *army of entrepreneurs* and solve the problems in education.

Discussions around the relationship of entrepreneurship and capitalism has taken a new turn with the rise of digital economy. In his study of twentieth century American

capitalism, *The New Industrial State*, the mid-century American economist John Kenneth Galbraith made a distinction within what he called “the parts of the economy.” For Galbraith, there was a fundamental difference between:

the world of the technically dynamic, massively capitalized and highly organized corporations on the one hand and of the hundreds of thousands of small and traditional proprietors on the other.... [This] is not a difference of degree but a difference which invades every aspect of economic organization and behavior, including the motivation to effort itself.⁹³

The distinction between small producer and large capitalist was systematically studied by the French historian Fernand Braudel in his three-volume history of capitalism, *Capitalism and Material Life*, where he traced the development of our economic system between the 15th and 18th century in Europe. The narrative of Braudel’s history stems primarily from his conclusion that *capitalism*, as a specific form of profiteering and reinvesting, is the economic system that came to dominate Europe and eventually the rest of the world, but that it did so without ever completely destroying the ordinary *marketplace*. Braudel’s revisionism was primarily a debate between European Marxist and Anglo liberal historiography that had conflated the *market* with *capitalism*. Indeed, Braudel calls *capitalism* the zone of “anti-market” where financial, political, and technological manipulations work *against* the natural process of production and consumption.⁹⁴ The *market*, on the other hand, as the expression of the production and circulation of goods to take care of social needs, is basic to all societies. For Braudel, what is exceptional about contemporary *capitalism* (as it instrumentalizes the everyday circulation of society for gross monopolization) is its dominance over the *market*. In a move that would be echoed by Galbraith’s and even Jill Lepore’s critique of today’s dominant economic ideology, Braudel criticizes the mid-century

⁹³(Galbraith, 1978) p. 10

⁹⁴ (Braudel, 1977), *passim*

Austrian economist Joseph Schumpeter, who sought to elide this distinction in his discussion of the *entrepreneur*.

As Galbraith argued: “The entrepreneur—individualistic, restless, with vision, guile and courage—has been the economist’s only hero.”⁹⁵ Today, the image of the entrepreneur has become the basic unit of our techno-utopia: Steve Jobs, Bill Gates, Kevin Kelley, Stewart Brand, and Mark Zuckerberg are all role models that prove how the right idea, at the right time, can not only change the world—it can make a lot of money. But the will to fulfill Schumpeter’s call for an organic unity between the individual entrepreneur and the capitalist is also realized primetime on ABC in the form of the show *Shark Tank*. This is where the antagonism that Galbraith and Braudel presume is edited and smoothed over as small-town-American entrepreneurs come on the public stage to supplicate to venture capitalists for investments to “scale” their ideas. The concept of the *shark tank* was vague to me until the NYEdtech™ plenary. After the morning “Think Tank” of the “thought leaders,” EdTech week moved into its own “Shark Tank” segment. The participants were 9 entrepreneurs who had been “incubating” in the NYU EdTech Accelerator with a grant from (“powered by”) StartED, one of whom was the woman I had met over sushi at the welcoming party.⁹⁶

The relationship between these “sharks” and a non-profit like CCT is worth considering. As Cathy, one of the head researchers at CCT, put it in a staff meeting, much of the research and development that goes into contemporary edtech occurs in the non-profit sector. It is knowledge gathered within places like CCT that forms the basis for private companies to profit. The incentive for corporations to provide funding to these non-profits is two-fold: it is a tax-write-off and a way to test new ideas and new technological solutions with no risk of failure. Relying on non-profits for research and development is a way to

⁹⁵ (Galbraith, 1978) p. 62

⁹⁶ <http://2016.nyedtechweek.com/schedule/> accessed 7/14/2017

mitigate the risk of scaling products in the competitive capitalist order. This process happens organically as non-profit researchers leave the sector to start for-profit companies. In the case of CCT, as Cathy and others pointed out in various conversations and contexts, it was Wireless Generation, at one point the largest and best known for-profit edtech company in New York, which was started by former CCT staffers. Wireless Generation went on to be bought by Rupert Murdoch's News Corporation, run by Joe Klein—the City's former education chancellor. Mark, the senior members of the organization leading the design of the software I studied, was more stoic about the symbiosis between his labor and the rest of the industry:

we are a non-profit but we have to constantly deal with all the for-profit organizations out there who will use our research; and who will easily create material that can compete with ours by using their resources to offer it for cheaper until they get a hold of the market. It is really not an option for us to compete with for-profits. We are here to carry out research to see what works. What happens after that, can't be something for us to try to control.

Back at NYEdtech Week™, where the desire for the take-down of the public school system is a given, the discussion is not *whether* it needs such a direct assault, it is *how* to disrupt the system. The final line up of the morning plenary “Think Tank” included members of policy circles. The discussion featured the first two African-American speakers of the day, both of whom were there to talk about how venture capitalists should deal with the federal government. It is a clear example of the way in which the technocratic approach to educational reform stands in dialogue with the market-based approach.

The first of these speakers was Gerard Robinson from the American Enterprise Institute, followed by Jim Shelton, former Deputy Secretary of Education for the Obama administration. Robinson had, a month and a half after the 2016 elections, been introduced

as a member of President Trump’s transition team for educational policy. Robinson is also a contributing columnist for USNews & World Report. The same day as the conference, he had published an op-ed on usnews.com with a title taken from the R.E.M. song “It’s End of the World As We Know It (And I Feel Fine).” The subtitle went on to say that “Many Worry that Trump’s election is a sign of the apocalypse, but education is one domain where the upheaval is welcome.”⁹⁷

American education is one domain where I welcome an end of the world as we know it. Trump's selection of Betsy DeVos as secretary of education signals Trump's desire to "shake up" a bureaucratic approach of delivering teaching and learning in pre-K-20 public and private education, while encouraging blended and alternative models along the way. School choice is part of the equation, though the traditional public-school sector is a big area for innovation, too.

In his talk at the conference, Robinson encapsulated the contradictions at the heart of the politics of public education in the US. At the core of his talk is the idea of “alternative education” in the United States, reminding the audience that the idea of alternative education “is as old as the nation” and that it means a “mix of public and private sources.” “Long before we had traditional public schools,” he explains, “like those that began after the Civil War in the South when the newly freed Africans helped to create what we know today as a system of universal public education... there was always a push for alternative public education simply meaning public *and* private and otherwise.” Robinson ends with an upbeat note to the audience: “the period to come will be the best time to be involved in educational technology. President Trump believes in the power of technology and the market to solve some of the deepest problems in our educational system. It will be a good time for you all.”

Robinson’s counterpart, Jim Shelton, speaks next. Shelton, the former Obama under-secretary of education is introduced as the new head of the *Chan-Zuckerberg Initiative’s*

⁹⁷ <https://www.usnews.com/opinion/knowledge-bank/articles/2016-12-21/donald-trumps-cabinet-pick-betsy-devos-signals-plan-to-shake-up-education>

education division. His talk is centered around the familiar “Bloom’s Two Sigma Problem.” This 1984 study by educational researcher Benjamin Bloom is a staple of edtech intellectual heritage. It found that any student who was tutored one-on-one by a personal tutor—regardless of their intellectual or academic standing—performed better by two standard deviations within the 98 percentile of the rest of her peers studying in a traditional classroom. Shelton points out that this experiment has been repeated numerous times with the same results. “What does that mean? It means what everyone in this room knows: it’s never the kid. It has never been about the kid. It’s about: can we provide them the kind of learning experiences that would produce those kinds of results?” In Bloom’s argument the question of educational equity for those who need extra attention and intervention is a question of our social priorities. “The problem to be solved: can we provide every child that kind of learning experience at a cost we are willing to pay?” The solution, Shelton concludes, is that “the only way we have a shot at achieving those outcomes for every student at costs we are willing to pay is if technology plays a significant role.”⁹⁸

Shelton was the Chief Technology officer in the Department of Education when President Obama announced the launch of ARPA-ED, a research and development office modeled after the military’s DARPA research and development office during the Cold War. ARPA-Ed’s core mission was the development of “personalized instruction” at a national scale.⁹⁹ While ARPA-Ed never took off, Shelton has now joined the private sector with the same mandate. He is carrying Robinson’s caricature of the “bureaucratic approach” of delivering education to its technocratic conclusion. Technology has changed much of our contemporary schooling, Shelton explains, but “perhaps the most important is that for the

⁹⁸ Chapter 3 will discuss at length the politics and pedagogy of *personalized learning* and the specific role that Shelton and the *Chan-Zuckerberg Initiative* are playing in its propagation

⁹⁹ (Enyedy, 2014), p.

first time [technology] makes the process of learning transparent: you can watch it happen, you can connect every 0 and 1 associated with it, and what that ought to enable is to allow us to know much more about learning than we ever had before.” Since the realization of Bloom’s “discovery” (that children learn best and most equitably when given personal instruction) is impossible within the current political economy of our educational institutions, we can save money by replicating the process of teaching to an individual child’s learning needs through technology. This is the debate within contemporary edtech which I will consider: the “technocratic approach” that empowers the institution of public education to employ technology in order to arrive at its goals (“to educate and elevate”) versus the “market-based approach” that sees competition in the marketplace as the most desirable way to arrive at a somewhat similar goal. But first, we must understand the technology itself, and the way it is imagined in the larger ecosystem of education.

Enclosing the Digital

December 2014. The design of the lessons that make up *Zoom In* is near completion. Eighteen lessons are under wraps, needing only minor tweaks, and the team is left to make some tough decisions about the remaining four lessons that will have to be abandoned if the project is to stay within budget and time. This project meeting is an attempt to answer these questions: how are we going to finish the design of *Zoom In* (find more funding) and get it out in the world within the next 6 months (find distribution networks)?

The problem of funding and distribution is a particular question for CCT. As a non-profit organization, its funds are tied to fragmentary grants instead of a predictable revenue stream. Its distribution networks are determined by the form and content of each individual product rather than a cultivated share of a specific corner of the market. The advent of

digital technology and the internet has added a new dimension to this question as the patterns, if not the very nature, of distribution networks has changed. This problem comes up in the discussion today as the design team debates the best way to approach the main funder of the project, the Gates Foundation, for more money to finish the final lessons for *Zoom In*. But the discussion soon turns towards a more fundamental question. Mark, the project coordinator, starts the meeting:

We are at an interpretative moment. Of all the things which *Zoom In* does well, which aspects are we going to invest in, in terms of partnerships and to reach audiences that want what we have? ... The mission is bringing these materials into the world where people can find it and can find it useful and [that] we can continue growing. (12/1/2014)

This moment of financial crisis in the face of a deadline marks a shift in the conversations that have previously surrounded *Zoom In*. It is the Janus-face moment of the project, as the past and the future get interpreted according to the exigencies of the present. The moment ends the team's conception of the software as a series of design choices in the cross-section of pedagogical and technological values and begins the transition to a conception of *Zoom In* as an educational tool whose value is defined in social use and exchange. "The question is, what are its marketable affordances?" asks Tim, the project's originator. This moment exposes the contradictions in the presumptions and objectives that the different members of the team have about this project, even as it shows how the project has morphed in the three years since it was conceived. For Mark, the project leader, *Zoom In* needs to be presented primarily as a tool that offers an instructional arc for teachers to better teach students necessary content and skill sets in the American history classroom. Having recently come back from a conference of the *National Council for Social Studies*, he tells the design team:

That's what we presented at the NCSS and that's what people flocked to us for: for teachers, [it's] an arc; and for students, [it's] the careful thinking about the skills [of

historical thinking] We showed them that this thing is about getting adolescents to argue, [and] that's what people were flocking to [our] session for.

Tim is the second most prominent member of the design team in terms of an overall vision for the project. He was the one who wrote some of the original grant applications to get the funding for the project and was given credit for some of the early ideas that eventually became *Zoom In*. Tim comes from an ed-school background. He is a firm believer in “using technology to realize educational goals.” For Tim, the feature that should be highlighted in the launch of the software is the site’s capacity to help teachers carry out *formative assessment* of students. *Zoom In* provides numerous check-in points where students answer short questions about various parts of the lesson, which the site aggregates for the teacher in order to be able to see how each grasps the key facts and skills that the lesson highlights. Tim argues that:

For the teacher, Zoom In is about formative assessment. [It is] something that documents the changes that the students are going through and [it] allows for strategic moments that we provide the teachers: here’s where your students are bumping up against, and this is what you can do with it.

Both Mark and Tim are trying to place *Zoom In* within a particular language and value system, competing in the complex and multi-dimensional contemporary American educational ecosystem. For Mark, the power of *Zoom In* rests in its use as a digital tool for teachers to engage their students in “a deep dive into historical thinking”: to highlight the value of history in understanding our society, to be able to think like a historian, and to form arguments based on historical documents. The original descriptions of *Zoom In*, as it was conceived and funded, expressed the centrality of “historical thinking” as “shorthand for a complex set of habits of mind – grounded in an understanding of core disciplinary concepts [of history]—that contribute to rigorous interpretations of past events given specific places,

times, and people.”¹⁰⁰ For Mark’s, *Zoom In* is designed to teach “the historian’s craft” to middle-school students as part of a larger movement nationally to “emphasize the inclusion of discipline-based literacy across K12 content areas.”¹⁰¹ This national emphasis on teaching children how to think like historians is one of the ripples of the Common Core State Standards (CCSS) that have both marginalized and accentuated the study of social studies and history in the school system. The Common Core has been framed as a set of rubrics and assessments for the instruction of core disciplines like English and mathematics. As such, non-core disciplines such as social studies, the sciences, and the arts have taken a back seat to CC’s focus on bringing American children on par with the rest of the world in basic language skills and math literacy. However, within the “key shifts” of the English language arts (ELA), the Common Core leaves room for the teaching of skills that are the basis of academic disciplines other than ELA: “Reading, writing, and speaking grounded in evidence from texts, both literary and informational” and “building knowledge through content-rich nonfiction.”¹⁰² The original grant pitched the project exactly in this way, presenting the study of history and social studies as central to English Language Arts instruction:

The widespread adoption of the Common Core State Standards, which emphasize inclusion of discipline-based literacy teaching across K–12 content areas, has created an opportunity to renew a national conversation about the purposes of history and social studies instruction in formal education and to study ways in which well-designed materials might help teachers integrate a focus on literacy skills. Implementing these new standards generates simultaneous needs for curricula that encompass content and content-area literacy skills.¹⁰³

¹⁰⁰ Center for Children and Technology, *Learning to teach historical thinking through practice: Integrating the Educative Curriculum and Accountable Talk frameworks to support teacher practice* (unpublished), p. 6

¹⁰¹ Center for Children and Technology, *Learning to teach historical thinking through practice: Integrating the Educative Curriculum and Accountable Talk frameworks to support teacher practice* (unpublished), p. 2

¹⁰² <http://www.corestandards.org/other-resources/key-shifts-in-english-language-arts/>, accessed 7/8/2017

¹⁰³ *Learning to teach historical thinking through practice*, p. 1

The resentment at having to justify teaching history and social studies in relation to English language arts was a constant theme in my field notes, expressed by everyone on the design team at some point. But at the same time, the Common Core’s spotlight on the teaching of academic disciplinary skills at every level of K12 education is a pedagogic expectation that everyone here finds valuable. For Mark, this is *Zoom In*’s central selling point because it will interest not only teachers, but school administrators and district leaders whose focus is on fulfilling the Federal Government’s Common Core requirements.

Mark’s resistance to Tim’s argument rests on the tension between the solid pedagogic grounds of *Zoom In*’s disciplinary instruction in a central national educational policy and the site’s formative assessment tools, which are secondary in their pedagogic value—their importance transitory and faddish. “Maybe in 5 years, the traction with formative assessment will pan out, but who knows?” says Mark.

Since this discussion, the Common Core state exams have been dropped by a third of the states, and the 2016 presidential elections have brought to power forces that oppose federal government initiatives for a national education policy.¹⁰⁴ This is even as the explosion of discussions, seminars, webinars, and white papers on *formative assessment* has proven unassailable as digital technology continues to grow as the central tool for private industry’s incursion into public education.

By March 2015, when *Zoom In* was to be launched publicly, the design team decided to bring in an outside consultant to help with marketing. Ned Bronsky is a veteran digital

¹⁰⁴ As of September 2017, 12 states have opted out of the Common Core State Standards, on top of the 6 that had never adopted them. Many other states, including New York, are implementing laws that replace the national standards with state standards.

marketer who has been specializing in educational software for the past 6 years. His primary point, when I sit down to talk to him, is that the big venture capitalist funders such as the Gates Foundation, are moving away from the traditional forms of supporting educational material. They are “no longer supportive of endeavors that cannot generate their own revenue stream,” he says, and “they are tired of non-profits like CCT going back to them every few years for more money in order to upkeep their previous projects.” I have no way of verifying this. The foundation made it clear that it was not interested in being part of any study that they were not, themselves, conducting, and the representative liaising with *ZI* designers wouldn’t even talk to me. But, Ned’s claim did end up being accurate—*ZI* did not end up receiving any more money from the Gates Foundation and, this was the reason that the research team had sought out Ned. They needed someone to help them find ways to enter the market of online EdTech in order to find users, and a revenue stream, that would help support the software’s upkeep.

Ned’s 3 proposals for monetization of Zoom In:

Pricing / Revenue Model

We envision a freemium pricing model for Zoom In to maximize trial and adoption. We are considering three freemium pricing models.

Initial (1-2) modules to be offered at no cost; access to the remaining modules would require a paid subscription.

Stripped down version of modules to be offered for free; fully featured version would require a paid subscription.

Fully featured modules to be offered for free as a means to sell associated PD [professional development] services.

We envision pricing the premium version of Zoom In at approximately \$2 per student per year, with discounts for low income schools and district wide adoption. The \$2 per student annual price is based on the following:

\$45 per student per year for digital core curriculum	<i>divided by equals multiplied by yields:</i>
180 instruction days per year	
25 cents per student per instruction day	
8 days average usage of Zoom In per year	
<u>\$2 per student/year for Zoom In</u>	

Monetizing *ZI* would allow it to become packaged alongside other EdTech to be mass marketed. It would show the Gates Foundation and other interested parties that the pedagogic benefits of *Zoom In* were matched by market demand. But in order to prove this viability, monetization requires the creation of paywalls around specific aspects of the software. In option (A), the paywall would exist between two lessons that would be available on the internet commons, and 16 others that would be accessible only after payment. In option (B), the paywalls would be around specific features of the lessons. All lessons would be available, but only with minimal access to tools for discussion, assessment and grading. In option (C) lessons would be available for teachers to use with classrooms,

but the Teacher Professional Development tools that explained the various pedagogic capabilities, historical contexts, and so on, would, themselves, be behind a paywall.

I had been quiet in the meeting before this. I have been taking notes and having been away from the office for a few weeks means that it is taking me a few extra minutes to re-acclurate to the space. I ask, “I thought Zoom In was supposed to be a free tool on the internet for anyone to use. Are we going to be selling it, now?”

There is a pause in the room and a quick glance between all the other members of the design team. They have already resolved this question and have moved on. But the pause is as much a frustration with having to deal with an already-answered question as it is an embarrassment with the answer. Mark *[stuttering]*

Well ... Yes ... We’ve talked about this ... This is basically an opportunity for us to have one of our products actually used. We can distribute this beyond anything we have ever done before. Up to now, we have been so research driven that who actually uses the results of our research has never really been a consideration.

Josh, the technological officer of the organization who has voiced his frustration with the slowness and the quietude of the Center in relation to the private edtech world is least apologetic (emphasis added):

No EDC product has ever gotten to more than .01% of schools and classrooms. We are a mission-driven organization; our research question is the main target. But *things have changed, you have to find your solution in the marketplace*

Mark finishes the conversation:

EDC is now having to think of itself as comparing its value in relation to its neighbors’ market value

It is a paradox that at precisely the moment when the organization has the greatest opportunity to share its product with the largest number of users, it is forced to create paywalls and monetize its product. This is one of the most important aspects of the process of commodification in the digital age. Creating digital paywalls in order to monetize a software has been likened to the “enclosure” movement at the beginning of capitalist social

relations in 15th century Britain. Law Professor James Boyle defines this as the “conversion into private property of something that had formerly been common property or, perhaps, had been outside of the property system altogether.”¹⁰⁵ He goes on to argue that we are witnessing the “second enclosure” of the internet as communally-consumable material is being made into private property through paywalls, protected legally through intellectual property and copyright laws.

The paradox that the designers of *Zoom In* are facing is not related to the question of copyright or intellectual property. As a research-focused non-profit, their products are meant as an exercise and experiment in applying new ideas to the educational process. They have generally not monetized their products, nor raised a law suit against anyone for stealing their ideas. In the new technological universe, the primary impetus for considering the enclosure of *Zoom In* is for the possibility of *scale*: the ability to become part of a marketplace whose reach is beyond anything that the organization had access to. The digital platform, if it becomes bundled with other curricula in a larger company, could reach a broader cross-section of an educational ecosystem that is global in scale. This is not a question of copyright or ownership, rather, it is the need for the vast marketplace of the internet to scale the use of *Zoom In* beyond the dozen classrooms where it is being tested and the limited number of teachers who know about it. The nature of the scale has changed.

In part 1 of this chapter, I argued that the circulation of data promoted by the technocratic approach to educational institutions permeates the logic of the educational ecosystem. The section documents how the promise of greater circulation within the

¹⁰⁵ (Boyle, 2003), p. 34

internet-enabled marketplace is solidifying the urge to quantify educational outcomes. In part 2 of this chapter, I have argued that the for-profit edtech market has imposed its own logic onto the educational system, mobilizing the capabilities of new technologies for data gathering to promote testing as the essential function of schooling. The latter portion of this section looked at a particular moment in the history of edtech to show how a particular statistical logic came to dominate the world of educational research.

I conclude by arguing that the imaginary of the free market, as the site to counteract and reform the stultified structures of public education, has been part and parcel of the history of edtech. However, there is a qualitative change in the world of educational technologies as computers and the internet provide a new mode of communication and contact for the scaling of curricula and educational philosophies. This shift in scale has a direct effect on the ontology of teaching in the public-school system. In the chapter that follows, I will show that there is a heightened tension for teachers torn between either accepting the dominant pedagogic values that are increasingly quantified, commodified, standardized, and piped into the classroom, and rejecting them in favor of a phenomenological Pragmatism for which John Dewey remains its most eloquent interlocutor. As such, the teachers' stance toward the contemporary regime of test-based accountability remains tethered to the modernist values of the individual self and the scientific measure of that self in relation to the rest of society. As the educational environment deepens the practice of quantifying the individual psyche, teachers are left with a discourse that seeks to temper this process by merely problematizing the *purpose* of education in a democratic polity; there are few spaces where alternatives to the whole *premise* of this regime of quantification can be imagined or be put into pedagogic practice. I look at this contention over the praxis of teaching in chapter 3.

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