



OBSTACLES & OPPORTUNITIES FOR ENTREPRENEURS IN EDUCATION

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MIT Enterprise Forum of the Northwest

Seattle-based MIT Enterprise Forum of the NW is one of 28 chapters of the MIT Enterprise Forum with headquarters in Cambridge, Mass. A global non-profit organization, it is dedicated to the advancement of technology entrepreneurs. Our mission is to inspire, connect, and educate our region's entrepreneurial and technology business community. For more information, please visit us online at www.mitwa.org.

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This document is based, in large part, on the published content of our panel moderator, Frank Catalano. It also results from background research and interviews conducted with teachers, entrepreneurs, and business and thought-leaders in the educational technology space in 2012, in preparation for an MIT Enterprise Forum held in Seattle, Washington on November 13th, 2012. It is not intended as a comprehensive or authoritative treatise on the subject. Any errors are ours and not the responsibility of our speakers or interviewees.

Introduction

It's interesting times in education.

There's a [supposed] Chinese curse, *May you live in interesting times*. Robert Kennedy famously described them as times of “danger and uncertainty,” but also times that are “more open to the creative energy of men than any other time in history.” It's an apt metaphor for the state of education in America.

K-12 education faces a host of converging trends set in a stark landscape of uncertainty, reduced school budgets and the widely held perception that American education institutions are in trouble. Reform efforts present conflicting messages. Schools face everything from digital literacy issues to print-to-digital transitions, new learning standards and the impact of technology initiatives on learning. Entrenched interests and, among some, an instinctual bias against the involvement of for-profit organizations in education tend to reinforce the status quo.

But it's also a time that is incredibly open to creative new approaches. There is the promise of tablet devices and laptops to deliver personalized digital content, anytime, anywhere. Common Core learning standards help to make student learning consistent from state to state. Multi-state and national initiatives make educational content easier to find online and, in one case, provide for a cloud-based data warehouse.

Increasingly, startups, technology ventures and even more traditional education companies are creating the technology tools and digital content that will deliver value in this environment. Students stand to benefit from the positive impact of education technology (a.k.a. edtech) on learning—and in the process, gain technology skills essential for success in higher education and the 21st century workplace.

Definitely interesting times.

Whether you're a parent or a teacher, an entrepreneur or an investor, you'll be affected—directly or indirectly—by these and other changes in American education.

This companion paper provides an overview of K-12 education in America, with an emphasis on the role of technology. It begins with a summary of converging trends and continues with a discussion of the opportunities for entrepreneurs and investors, as well as the potential threats and obstacles they face. And finally, because edtech continues to grow and evolve, it concludes with a brief discussion of the future of technology in education.

The Changing Landscape: Converging Trends in K–12 Education

There's a lot of energy around edtech these days. Take last year alone. A well-regarded e-newsletter focused on edtech entrepreneurship, [EdSurge](#), debuted in February. Silicon Valley incubator [Imagine K12](#) launched in March, with a focus on schools and direct-to-student solutions. The first Startup Weekend to focus solely on education [was held in San Francisco](#).

The reasons for all this attention? EdSurge co-founder Betsy Corcoran cites three:

- There is an “achingly great” need in education, including school budget shortfalls and “the anguish of teachers and parents.”
- Most young entrepreneurs grew up with technology. They like learning and so it seems “a natural fit.”
- The “tools for trying out ideas are just so darn good—and cheap.”

According to Corcoran, “A decade ago, it would have cost buckets of money to do what many entrepreneurs are doing with crowd-sourcing fundraising and elbow grease.”

The influence of high-profile, hard-driving foundations with names like Gates and Hewlett and Kauffman plays a role—as does the higher technology baseline. “Computer proliferation, tablets, mobile, social, broadband access and more are all reaching critical mass,” according to Teach Street founder Dave Schappell. “And they’re doing it at a time when the cost of education is far outpacing inflation and results (vs. other developed countries) are lagging. It’s a recipe for massive innovation, and an edu-revolution.”

In this environment, a number of converging trends are likely to influence the role of technological innovation in K-12 education.

Common Learning Standards

Consistent learning standards are generally intended to establish a set of clear goals resulting in a quality student learning experience that is the same from state to state.

According to advocates, the standards are simply guidelines designed to help teachers ensure that students develop the knowledge they need to succeed. They also provide an opportunity for teachers to share best practices. Proponents insist that such standards are not intended to place restrictions on local teachers and administrators, or to impose a national curriculum.

However standards initiatives are not without controversy. Critics respond that such standards are untested and may not actually have a positive effect on student learning. Some also consider them an unwarranted intrusion by states or the federal government into what they believe should be local decisions.

Nevertheless, learning standards are currently being developed or updated for mathematics, English, science, arts, languages and social studies.

Common Core State Standards Initiative

The Common Core State Standards Initiative, or CCSS, is an initiative—led by the Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center)—to establish national standards for mathematics and English-language arts.

According to the organization’s website, all of the states in the Pacific Northwest—and all Western states with the exception of Alaska—have voluntarily adopted the CCSS standards. Washington adopted them in July of 2011.

Next Generation Science Standards (NGSS)

Another state-based initiative, this time for the development of national Next Generation Science Standards, is being led by Achieve—in collaboration with the National Research Council, the National Science Teachers Association, and the American Association for the Advancement of Science.

The standards are based on a July 2011 framework developed by the National Academy of Science’s National Research Council.

National Standards for Arts Education

The National Standards for Arts Education were last released in 1994. Currently, the National Coalition for Core Arts Standards, a partnership of organizations and states, is developing revised grade-level standards for dance, media arts, music, theatre and visual arts.

National Standards for Foreign Language Learning

The American Council on the Teaching of Foreign Languages (ACTFL) led an 11-member task force to produce the first content standards for foreign language learning in 1996. The resulting document, *Edition Standards for Foreign Language Learning in the 21st Century*, now in its third edition.

Currently, ACTFL is currently working to explicitly link its language learning standards with the Common Core State Standards.

Multi-State and National Digital Learning Initiatives

You have to be pretty deep into wanting to know what makes digital learning work to face initiatives with names like the Learning Resource Metadata Initiative, Learning Registry and Shared Learning Infrastructure.

But education technology firms and entrepreneurs stand to be blindsided if they don’t pay some attention to these three major-but-little-understood multi-state or national digital edtech efforts. All three are foundation- or association-driven. The first two are about digital content—paid or free—and the last is about digital data plus that content.

- Learning Resource Metadata Initiative (LRMI) is spearheaded by the Association of Educational Publishers and Creative Commons. It provides a taxonomy to consistently tag digital learning content so it can be easily found in web search by teachers. LRMI's version 1.0 spec has been submitted to Schema.org, and when approved, means it will be used by Google, Bing and Yahoo in delivering search results. Digital content is already being tagged as proof-of-concept by McGraw-Hill, Pearson, CK12, Curriki and others.
- Learning Registry (LR) originated from the U.S. Departments of Education and Defense. It provides a structured index—not a repository—of digital educational content from various free and paid sources. It can present a visual map of available content directly in a browser or from within other tools. That makes things easier for teachers to find, in one place, related content and lesson plans by subject, grade level or other criteria. As an index, it can be replicated in real-time across the web in copies called “nodes.” One key point: the Learning Registry recognizes LRMI tags. It also applies other kinds of tags to content, reflecting how the content is used and how it might be rated by teachers.
- Shared Learning Infrastructure (SLI) was instigated by the Council of Chief State School Officers and is driven by the Gates Foundation and the Carnegie Corporation under the aegis of the Shared Learning Collaborative. The SLI provides a data warehouse in the cloud for all kinds of student data, and links that data through Common Core standards to digital educational content. Key fact to remember here: the SLI does not store digital learning content. It only stores data (assessment, behavior, attendance, standards mastered, etc.). The content part of SLI is actually a bunch of pointers to content from SLI's node of the Learning Registry and/or that may be identified with LRMI tags. And, importantly, the SLI has open APIs that let edtech products interact with the student data and content info, critical for layering on data analytics, personalization engines or other learning apps that interact with what SLI stores.

Connecting the bits of all the initiatives: LRMI tagging is used by the Learning Registry, and both LRMI and Learning Registry are referenced by the part of the Shared Learning Infrastructure that has to do with Common Core-aligned content. And SLI also stores student data.

So what's an entrepreneur or established edtech enterprise to do?

If you're a content company, you should pay attention to LRMI and, to a lesser extent, the Learning Registry—especially once Schema.org approves the LRMI spec and Google is using it. If you don't use LRMI tags, your digital content may not be as discoverable in the major search engines where many educators begin looking for classroom materials. Dave Gladney, who works on LRMI for AEP, says an automated tool is in development to make content tagging faster. Not taking part in LRMI may hurt your content's SEO.

Learning Registry's immediate importance is harder to determine. Richard Culatta of the Education Department's Office of Education Technology says someone with programming skills could publish a list of content to the Registry and its nodes in literally half a day, at the simplest level of participation. But the big if is whether teachers or districts will start using the Learning Registry, or tools that embed it, in significant numbers to find chunks of content. Still, with a promised low bar to entry—and the fact it gets an organization's digital learning content in the SLI—the question of participation may more likely be, “Why not?”

Finally, if you're an assessment or student information tools company, you must pay attention to SLI (lucky content companies get a mostly free ride by taking part in the Learning Registry and/or LRMI). SLI is the most complex of the three and, as a result, the most time-consuming for a company to even understand (Stephen Coller of the Gates Foundation figures it will take one to two people in engineering as much as two to three weeks, including implementation). It also could present a new barrier to entry.

Should a district or state adopt SLI as its data storage solution and require all educational apps to exchange data with it through SLI's open APIs, products or services that remain closed could be locked out—as at least one pilot district has already flatly stated. However, the Shared Learning Infrastructure faces its own hurdles due to its audacious vision and complexity, and its spread depends on the nine pilot states fully adopting it.

Love them or hate them, the education industry can't safely ignore the LRMI, Learning Registry and SLI efforts. And only time and educator adoption will determine their impact.

The Move to Digital Content

Digital course materials are, of course, nothing new. One of the highest-profile initiatives, MIT's OpenCourseWare, is a decade old. And digital textbooks, which have morphed from crude PDF representations of paper books to interactive eBooks, have also been available for years.

The trend to digital content, steady and apparently inexorable, is inspired by higher education, driven by financial pressures, propelled by foundations and the federal government, and enabled by technology.

In the K-12 environment, however, there are “too few schools exploiting digital instructional content for all of its benefits,” according to a report by the State Educational Technology Directors Organization, or SETDA, and entitled *Out of Print: Reimagining the K-12 Textbook in a Digital Age*,

“The gap is widening between what technology allows us to do in our lives—how we communicate, work, learn, and play—and how we're educating our kids.” Nonetheless, the report continues, “it is not a question *if* the reimagining of the textbook will permeate all of education, but only a matter of how and how fast.”

The SETDA report outlines a number important student benefits stemming from quality digital content:

- Students gain anytime and anywhere access to educational materials.
- Materials can be updated without incurring printing and shipping costs, helping to ensure their relevance
- Multi-media capabilities—including high-definition graphics, video clips, animations, simulations, interactive lessons, virtual labs, and online assessments—are more engaging for students and provide for a richer experience.
- Lessons can be personalized to the individual learning needs of each student.
- Flexibility, particularly when the materials are Open Educational Resource (OER)-based and incorporate public-domain resources or resources that are licensed in perpetuity.

The movement to digital content is being led by the states, as they control funding and the policies and processes by which schools acquire educational materials. According to the SETDA report, “22 states have introduced either definitional or funding flexibility, launched a digital textbook initiative, and/or launched an OER initiative.” As one example, state-level education officials in Texas, Utah, South Carolina and West Virginia now define—and allow purchase of—“core instructional materials” in both print and digital forms.

SETDA concludes that such policy changes, while important, may not be sufficient to drive the move to digital content. Other important issues include intellectual property rights, the need for sustainable funding for devices and internet connectivity, teacher and administrator buy-in, and sustained professional learning for teachers.

Open Educational Resources

Schools have been moving away from content that is structured linearly and captured in all-inclusive books with predetermined progressions. Digital instructional content, too, is shifting away from approaches that simply break comprehensive digital textbooks into smaller parts. Newer forms of instructional content often begin with a scattered landscape of digital chunks that are then assembled to support full courses.

Encouraging the acceleration of such chunky digital content, in large part, is the Open Educational Resources (OER) movement.

Though definitions vary, OER is essentially digital instructional content that’s designed to be mixed, modified and shared. In other words, a teacher can pick and choose learning elements he or she needs for a lesson from a variety of sources, make changes, use those lessons in class, and theoretically distribute either the individual pieces or the completed combination to other educators for their use.

It’s like creating your own music playlist by choosing tracks from various artists and sequencing them any way you want.

Flipped Classrooms and Other Innovations

The move to OER and digital content has led to innovative approaches that build lessons and courseware from the ground up. And that has the potential to make the traditional definition of “textbook” somewhat quaint.

The not-for-profit Khan Academy, for example, has developed a catalog of over 3600 videos—representing more than 210,000,000 lessons delivered to date. They are provided free of charge to students, coaches and teachers. According to the Khan Academy website, “each video is a digestible chunk, approximately 10 minutes long, and especially purposed for viewing on the computer.”

The two-year-old Khan Academy advocates delivering their video lesson chunks using a flipped classroom approach, where students study the online lessons as homework, and focus classroom time on collaborative projects and other in-person and group initiatives that advance the material in the lessons.

Because the lessons are delivered online, the Khan Academy can also provide teachers and coaches with online access to student data—a type of big data application. Using the Academy’s toolkit teachers can view a “summary of class performance as a whole or dive into a particular student’s profile to figure out exactly which topics are problematic. The class profile lets coaches glance at their dashboard and quickly figure out how to best spend their time teaching.”

Factors Driving OER

Overall, four core factors have come together to fuel the rise of OER and digital content across the educational landscape.

1. Price

Ask any educator about the appeal of OER and you’ll likely hear, “It’s free content.”

That’s not totally true. The overused phrase, “free like a puppy, not free like a beer,” applies to any effort like OER that replaces publisher cost with the cost of teacher labor necessary to find, assemble and maintain content—even if, once assembled, the content is shared. And then, not all digital content is OER.

Finally, if the materials aren’t printed, every student has to have access to a hardware device that properly displays the content.

Nevertheless, perceptions do matter. And the perception that quality content is available for only the cost of labor has led many school districts and teachers to try OER during difficult budget times.

2. Availability

Spurred by entrepreneurs and fueled by funding from the likes of the Gates and Hewlett Foundations, there’s simply a lot more digital content on the web than there used to be. Examples include [Khan Academy](#) videos and materials from [NASA](#).

Significantly more has been developed by existing educational powerhouses, edtech start-ups and educators themselves. Anything digital, and granular enough, works.

3. Discoverability

It’s been a big challenge to simply find the online materials that exist on the web, beyond known repositories such as [Curriki](#). Two very prominent, and public, initiatives are tackling the problem.

- Last November, the U.S. Departments of Education and Defense launched the beta of the [Learning Registry](#), which is basically a directory of kindergarten-through-adult digital education resources from a wide variety of government, state, district and private sources.

What makes the Registry unique is that any provider can register content—the National Archives, Smithsonian and PBS were among the early participants—and any educator can quickly find lessons plans and content specific to his or her unique needs based on subject, grade level or other criteria. The Learning Registry doesn’t just reside at one address on the web; it’s more of an embeddable, distributed index that can be [browsed](#) from many websites.

- A second, related effort is the [Learning Resource Metadata Initiative](#). Steered by the Association of Educational Publishers and Creative Commons, LRMI is a fast-tracked project to make it easier to find educational resources via major search engines such as Google, Bing, and Yahoo. At its core, this is about consistently tagging digital educational content—no matter who creates it—with metadata that search engines understand.

Taken together, the hope is that the Learning Registry and LRMI will go a long way toward solving the problem of highlighting appropriate educational chunks.

4. Flexibility

A large part of the appeal of digital chunked content is flexibility.

Pluto's planetary status in flux? No problem. Swap out chunks of the lesson without wiping out the entire lesson or course.

But the concept of flexibility goes beyond delivery via pixel. One previously mentioned approach advocated by the Khan Academy and others is a flipped classroom, where students study online lessons as homework.

The Utah Open Textbook high school science curriculum incorporates another approach. Created from OER content, the course textbooks are then printed and distributed. But the cost is \$5.35 per book, versus about \$80 for a traditional science textbook, prompting the project's David Wiley to note that these become books kids mark up and keep, rather than having to turn in at the end of the year.

In other cases, digital textbooks are created with a mix of copyrighted (paid) and open (free) content. The automated process leads to a custom electronic or paper book—essentially a digital course pack.

Ultimately, flexible, “free,” and findable may trump any downsides as digital curriculum adds more do-it-yourself options alongside its pre-built counterparts.

Consumerization and Rapid Adoption Cycles

Call it the consumerization of education technology. Schools have adopted iPads with lightning speed. More than 1.5 million have been distributed to students a mere two years after the original iPad launch.

But beyond Apple's influence in education, the high-profile tablet appears to be the poster child for a different trend. What this type of consumerization in the classroom masks is that the walls that used to slow new instructional technology's adoption in education are falling.

A decade ago, the standard education technology adoption cycle was pretty straightforward. Cool tech was traditionally seeded in the consumer market. If the technology could be useful enough for teaching, it might be adopted in higher education where older students and their parents were the consumers. Then, after being thoroughly vetted and validated, it might eventually work its way down into K-12 classrooms where schools and districts bought the technology.

It was a long process, one that itself might take a decade and for good reasons. Relative to today, technology was expensive. With few exceptions, mobile technologies were relatively unfamiliar. Internet infrastructure was also a challenge. If any Web connections were prevalent in schools, they were rarely wireless.

Yet the old evaluation cycle worked, if haltingly. It allowed for thoughtful analysis, planning and observations of technologies that worked and were not just passing fads. On the other hand, it let educational institutions get horribly out of sync with the rest of students' lives.

A good chunk of the reason for the change is rational. Technology is increasingly cheap. That \$3,000 laptop is now about \$500-700—plus it's far more powerful, and could be a netbook or a tablet with an optional keyboard.

As a result, upfront-purchase instructional software is being supplemented or replaced entirely by individual apps, digital subscriptions or Open Educational Resources. And the required infrastructure has moved from wired and plugged to wireless, cloud-based and battery-operated.

But an equally large part of the reason for the acceleration may be both biological and psychological: Technology's presence is familiar, almost expected, to accomplish a task. It's not just students who are "digital natives" these days. No one under the age of 30 knew adolescence without a Web browser, let alone a personal computer. That means a lot of teachers, administrators and even education policy makers carry the same tech expectations as their students.

Project Tomorrow, in last year's [Speak Up National Research Project](#) report, summed up another key facet of the change: "Today's students are functioning as a Digital Advance Team for the rest of us, scouting out these new technologies, adopting them for use in their personal lives and then effectively adapting them for education purpose...."

Except now, those digital scouts could be anyone who brings an outside device or app into a school or college.

The result? Something different, fluid, with less domain separation and more immediate influence. Altogether, it likely represents an unprecedented convergence of K-12, higher education and consumer technology.

1:1 Computing Programs

1:1 computing, or one-to-one computing, refers to initiatives that provide every student with a laptop, tablet or other personal computing device—and thus constant access to technology and educational materials. It's been described as potentially "transformative" and "a game-changer" for education, while critics charge that claims of improved learning and teaching are not supported by facts.

Until fairly recently, there's been little data to evaluate the potential of 1:1 computing in K-12.

Then, in 2010, the peer-reviewed [Journal of Technology Learning and Assessment](#) published a special issue focused on “the educational impacts and outcomes of 1:1 computing initiatives and technology-rich K–12 environments.” In the [introduction to the issue](#), Damian Bebell and Laura O'Dwyer synthesize the results of four separate studies on 1:1 computing, while noting that the term itself refers only to “the level at which access to technology is available to students and teachers; by definition, it says nothing about actual educational practices.”

Among their findings are the following:

- “Across the four empirical studies, it is evident that teachers play an essential role in the effective implementation of 1:1 initiatives and that the onus of responsibility for implementation often falls to the teacher.” One of the studies concluded that it is ‘impossible to overstate the power of individual teachers in the success or failure of 1:1 computing.’ ”
- “Despite variations between and across 1:1 settings, participation in the 1:1 programs described was associated with increased student and teacher technology use, increased student engagement and interest level, and modest increases in student achievement.”
- “In addition to these common results emerging across the 1:1 studies, nearly all of the [study] authors made note of the massive potential for 1:1 computing models for transforming education.”

Bebell and O'Dwyer also identify additional success factors, including teacher professional development, stakeholder buy-in, planning, and leadership at the school or district level.

They conclude that, “regardless of the reported effect sizes and individual study outcomes, it seems highly likely that some form of 1:1 computing will be the norm for the majority of American classrooms at some point in the future.”

The EdTech Ecosystem in Seattle

Edtech companies have had an oddly low profile in Seattle.

After all, as TeachStreet founder and Startup Weekend Seattle EDU organizer Dave Schappell notes, Startup Weekend has its roots in Seattle. Beyond that, the area has “a massive concentration of edu-innovators,” including Vittana, LiveMocha, GlobalScholar, DreamBox Learning, Apex Learning and Giant Campus, Bettr.at and All Star Directories. There’s also Qwizdom, Headsprout, Metria and digital operations of larger companies, such as McGraw-Hill’s Center for Digital Innovation.

So why does the Seattle edtech industry have this unexpectedly low profile?

In a city where the Bill & Melinda Gates Foundation makes headlines every time it talks about education reform, the local companies actually providing cutting-edge tools and digital technologies are virtually invisible. Not just to the general public, but to the tech community as well. With school education reform increasingly on the national, as well as the Gates Foundation, agenda, it might be nice knowing who around here is trying to digitize it.

Unfortunately, there's not much educational technology or digital learning industry infrastructure to support edtech companies in Seattle.

The Washington Technology Industry Association, Northwest Entrepreneur Network and others have great general, horizontal efforts. But there are no ongoing groups or initiatives that target education technology, unlike the occasional local focused efforts for clean and green tech energy and health care technology.

While there are national trade associations for education technology companies—such as the Software and Information Industry Association's Education Division—local technology trade groups never seem to take much sustained interest in edtech.

On the other hand, one critical startup ingredient is well-represented here—money. The Bill & Melinda Gates Foundation is a prominent source. Maveron and Madrona Venture Group have also put their cash behind new edtech ventures.

Opportunities for Innovation

The edtech landscape as previously described threatens to, at the very least, upset the status quo in education in a number of ways. And in doing so, either create a more level playing field for new entrants, or a tech-enabled series of “platforms” upon which entrepreneurs can build.

Opportunities exist to leverage existing and new trends and to combine them in evolutionary and even revolutionary ways.

Mobile Devices, Apps, Collaborative Environments, the Cloud and Beyond

New and evolving technologies have the potential to profoundly change the way education content is developed and delivered—and the increasingly collaborative manner in which it is used.

The [NMC Horizon Report](#) report—representing the combined efforts of the New Media Consortium, the Consortium of School Networking (CoSN), and the International Society for Technology in Education (ISTE)—examines the emerging technologies that will impact K-12 education over the next five years. In addition to providing time horizons for the adoption of each technology, the report includes descriptions, discussions of the relevance to education and learning, practical applications, and additional resources and reading materials.

According to this year’s report, mobile devices, mobile apps, and tablet computing will become mainstream in education within the next year, as will the use of collaborative environments (online spaces for group work) and cloud computing.

Within two or three years, personal learning environments, learning analytics, digital identity management and game-based learning will join them in the mainstream.

Natural user interfaces, augmented reality, synaptic applications and various assessment tools are likely four or five years away from broad-based use.

While the Horizon Report defines “mainstream” as being largely in use in only 20 percent or more of institutions, its observations do provide an early warning system to both educators and the industry as to trends and potential opportunities.

Granular Digital Content

Chunked digital content, even OER, isn’t a panacea for education in a digital age.

Too often, creating digital content is developed by simply breaking down a textbook or entire digital text into smaller pieces. Aside from the fact that this approach generally requires teachers to find, assemble and maintain such content, the result doesn’t necessarily provide a richer or more engaging experience for students. It may be better than its pre-built counterparts, but only marginally so.

There is an opportunity for entrepreneurs to reimagine digital content. To take a different approach by creating something totally new, far less linear and definitely more appealing and absorbing for students. And to make use of the animations, simulations, audio, video, virtual labs, collaboration tools and other elements that are unique to a digital approach. The Khan Academy, for example, is a leader in providing video content chunks.

Finally, in addition to creating new content, entrepreneurs may choose to make sense of the digital chunks that exist, free or paid, to vet them for quality, and then assemble them for teachers to use. Companies such as Learning.com and Pearson Education are successfully vetting digital chunks and making it easy for teachers to assemble them.

Market Forces

The walls that used to slow new instructional technology's adoption in education are falling. Three outside forces contribute to the trend, enhancing entrepreneurial interest in the sector.

Venture capitalists see K-12's Common Core State Standards as leveling the playing field by potentially lessening the cost for entrants to be "standards aligned," and able to sell into one nearly 50-state market rather than up to 50 individual state-standard specific markets.

Foundations consider tech a lever for education reform.

And don't forget there are the non-edu technologists who see an unmet need and are being propelled into ed-tech through competitions such as [Startup Weekend EDU](#), SXSWedu's [LAUNCHedu](#), and at three years old, the comparative granddaddy of such events, the Software and Information Industry Association's [Innovation Incubator](#).

What all these external efforts also have in common is that they don't necessarily respect the traditional separations between types of education markets. So what results is often a Dr. Doolittle pushmi-pullyu-esque mashup of ideas that could play in one or more of K-12, higher education, continuing/professional education, lifelong education and direct-to-parent. All of which will cause the walls to crumble even more.

Threats and Potential Obstacles

The education market, with its labyrinthine approval processes, murky budget buckets and dominant major players can make the most intelligent outsider eventually sound like HAL at the close of 2001: A Space Odyssey.

Startups targeting K-12 are especially challenged due to unique school funding sources, long sales cycles and frequent institutional aversion to anything *truly* new. But knowing the current rules before taking the playing field can help entrepreneurs and investors avoid costly mistakes and missteps.

Complexity

It is not easy to understand the edtech, or even education, market. Connecting companies and products with K-12 school customers is a complicated and frequently convoluted mess. It combines the worst of government and B2B sales with the worst of consumer sales—differing state and federal regulations, long sales cycles and finicky individual customers, be they educators or students.

The terminology and products aren't particularly familiar or mainstream either: adaptive web instruction, interactive white boards, and classroom response devices. Trying to understand how it all works can be maddeningly complex.

And this complexity affects investors as well as entrepreneurs.

Relatively few venture capitalists actually understand how the K-12 education business models work, even fewer than those who understand higher education business models.

Still, some do, and a few high profile edtech acquisitions of late—Wireless Generation by Rupert Murdoch's News Corp., GlobalScholar by Scantron—seem to be increasing interest... and valuations.

A Potential Tech Bubble

Anyone who lived through the last tech bubble in the 90s can recognize at least a few of the core indicators: Overheated attention and expectations. Increasing investment, with smart money followed by not-so-much. Frantic startup activity with a loss of focus on the problems that need solving. And the opportunistic co-mingling with agendas that use the technology as a lever to push issues that appear superficially related.

That may—just may—be starting to happen with technology in education.

Digital learning may be getting too popular among some entrepreneurs and investors—because this popularity may be increasing for the wrong reasons and have little to do with actually improving education. There are early warning signs that the hype could be outpacing the reality.

Investment

K-12 and other education segments are now being chased by a mob of investment capitalists.

At the October 2012 [EdNET](#) education industry conference, Managing Director Susan Wolford of BMO Capital Markets said the potential for technology to customize learning for students “makes enormous sense” to investors interested in education. But she added it’s important for entrepreneurs to create “smart products” rather than jury rig something to take advantage of whatever the current funding or fads support, cautioning that too much money is chasing ideas “that should have been left to die.”

Digital instructional content company Boundless summed up the last decade of venture investment in edtech by concluding that “record numbers of companies are receiving venture funding,” with VC investments in education this year on pace to be five times higher than in 2002. The news site [EdSurge](#) added, “In 2011, we [sur]passed the last peak of edtech investment, which occurred during the memorable bubble of 1999.”

However Betsy Corcoran of EdSurge also points out that, even though the numbers do seem to indicate an edtech bubble is forming, the characteristics are different from those of the dot-com era. There is more demand as education technology has gone mainstream in schools. The balance of entrepreneurs also seems to tilt, for now, toward those who are mission driven than gold rush-driven.

Attention

Mainstream tech blogs like Mashable and TechCrunch upped their frequent coverage of edtech—and almost every week a new site surfaces specializing in covering tech in schools, colleges or for consumer and adult education. More recent entrants include [WiredAcademic](#), [Technapex](#) and [Edudemic](#) joining print-spawned old-timers like [THE Journal](#) and [Education Week](#) and more established blogs such as [EdSurge](#), [Hack Education](#) and [MindShift](#).

Even the Consumer Electronics Association (CEA) has piled on, recently naming technology in education one of five “prominent technology trends expected to influence the consumer electronics (CE) industry in the years ahead.”

Startup Activity

[Startup Weekend EDU](#), a Startup Weekend vertical, is both a thoughtful driver and a reflection of edtech’s growing popularity and potential influence among entrepreneurs. Since an early EDU event was organized in Seattle a year ago, an estimated 17 EDU Weekends have occurred and more are on tap.

But Startup Weekend EDU is not the only entrepreneurial launch pad: SXSW has an education conference, [SXSWedu](#), with a [LAUNCHedu](#) component. The Software and Information Industry Association has its long-standing [Innovation Incubator](#) at its twice-annual education conferences. And there are longer-term, investor-backed incubator projects on both coasts.

Politics

Perhaps unique to education, its adoption of technology is being promoted by those with a political agenda—or perceived to have one.

Former Florida Governor Jeb Bush's Foundation for Excellence in Education has digital learning as a core part of its reform agenda, and edtech frequently is mentioned in the same breath as education reform, as though one can't occur without the other. True or not, adding politics to the mix can mask, or make divisive, technology's application and effectiveness in classrooms.

Individually, none of these developments is worrisome. They're actually pretty cool after years of digital education being viewed as an ugly stepchild to sexier consumer and business tech. Even combined, these moves may be no more than a potential cautionary tale of a balance that never will tip from good to bad. After all, a lot of excitement generates a lot of activity.

No. It's more a concern that while there is a burning unmet need and opportunity to apply technology intelligently to teaching and learning, too much overhyped edtech developed for reasons having little to do with enhancing education can collapse into a black hole of failure. It's a black hole of potential failure that could consume not just bad products, greedy investors and clueless entrepreneurs, but also the good of each group—with teachers and students dragged into the maelstrom.

Digital Literacy

The edtech landscape is full of surprises. Who could have anticipated that many of today's kids are lacking in digital skills?

At this year's EdNET conference in Baltimore, Gloria Keaton of Annapolis Road Academy stated that she believes "anyone can learn online." But that doesn't mean all students know how to start, despite the pervasive bath of tech in which current kids are immersed.

"Facebook and texting does not count" as a student being tech-ready for learning, Keaton discovered, and her program wound up teaching students how to use email and other skills needed to navigate a digital learning environment.

Similarly, Dr. Kathleen Toms, executive director of Research Works, said at EdNET she was surprised to learn from a survey issued to evaluate a learning repository that students "didn't know computers could be used for learning." A whopping 96% were unaware of how to use computers for research. The disconnect, she implied, was personal tech is often seen by teens as being for entertainment and communications. Being surrounded doesn't equate with being knowledgeable.

Teachers may also lack full digital media literacy, since few (if any) traditional teacher education programs actually provide instruction in how to use technology in support of pedagogy. Continuing education for educators—called professional development—frequently is spotty and doesn't always cover how to integrate technology in support of instruction.

Closing Thoughts: Looking to the Future

There's enormous good that can come from an increased emphasis on technology to support, and perhaps even transform, learning. But the stakes are much higher than for another me-too e-commerce startup going under. It's how the kids of entrepreneurs and everyone else will be educated for decades to come.

In the past, education technology has been described as a "get rich slow" business—an appellation somewhat lacking in appeal to investors and entrepreneurs. That appears to be changing. But there remain significant hurdles in leveraging the edtech opportunity in K-12 education. And few students and teachers will benefit if it all bursts, sweeping away the cool with the crap.

Education startups have one advantage in that the entrepreneurs often have a deep and personal passion for their solution, notes TeachStreet founder Dave Schappell. "If you get a parent who's trying to create a product to improve their child's education experience, or a lifelong learner who wants to help others share their passion for learning, you intrinsically get some extremely special products."

Nevertheless, passion may not be enough—at least not without a deep appreciation for the complexity of the undertaking.

It's vitally important that entrepreneurs and investors in the edtech space do their homework. They must educate themselves on the market and the various submarkets, of which K-12 is only one. There are significant differences in customer sets and buying behavior across K-12, higher education, continuing education and lifelong learning.

Successful entrepreneurs will also involve teachers and administrators in the process—to provide practical insights and essential feedback as their products unfold. As edtech journalist [Audrey Watters](#) reminds us, entrepreneurial passion comes from teachers, too. After all, many newer teachers grew up with digital technology and may see its potential to actually change teaching practice, rather than just automate existing approaches.

Perhaps venture capital luminary Vinod Khosla said it best. If you want to change education, leverage the teachers who are really passionate.

Appendices

Appendix 1: Glossary

Appendix 2: MIT Enterprise Forum Moderator and Panelists

Appendix 3: Interviewees

Appendix 4: Resources

Appendix 5: Acknowledgements

Glossary

Thank you to the edtech news site EdSurge, for providing the majority of the terms and definitions included in this glossary.

Adaptive Learning	When software adapts content to the knowledge level of the learner. This is a frequently used buzzword used by many products, but programs “adapt” in different ways.
Blended Learning	Any program where a student learns partly at a supervised physical location away from home (such as school) and partly through content delivered online, with some student control over the time, place, path, and/or pace.
Differentiated Learning	Programs and tools for tailoring instruction and presenting content in different ways (from lectures, to quizzes and games, to inquiry-based projects, to you-name-it), corresponding to how the student best learns.
Flipped Classroom	A model that promotes using class time for tutoring, and home time for lectures via video. Popularized by Khan Academy.
Gamification	Use of game design techniques and mechanics to promote motivation and engagement.
Individualized Learning	When students encounter the same buckets of content but move through the material at their own pace.
Informal Learning	Learning that happens outside of a formal instruction environment (such as a school).
Learning Registry	Structured index—not a repository—of digital educational content from various free and paid source, designed to facilitate the exchange of data about how resources and tools are used.
Learning Resource Metadata Initiative (LRMI)	Taxonomy to consistently tag digital learning content so it can be easily found by teachers in web search results delivered by Google, Bing and Yahoo, among others.
Lifelong Learning	Learning that takes place informally or outside of traditional academic institutions, often for personal enrichment and typically after people have completed formal education.
Mobile Learning	Access to educational content on the go—whether via tablets, smartphones, or older cell phones.
OpenCourseWare	A project of MIT, begun in 2001 and representing an important early initiative in the OER movement to make course materials freely available online.

Open Education Resources (OER)	Digital educational materials distributed—frequently at no cost—under a license that conveys some or all of the following rights: reuse, revise, remix redistribute
Personalized Learning	When instruction is truly geared to the student. Precisely what content is presented, the pace that content is presented and the way the content is presented may all vary depending on the learner.
Shared Learning Collaborative (SLC)	An alliance that aims to accelerate personalized learning in public schools, through common core standards and shared technology infrastructure.
Shared Learning Infrastructure (SLI)	Project of the Shared Learning Collaborative, originally started by the Council of Chief State School Officers. The SLI provides a data warehouse in the cloud for all kinds of student data and links that data, through Common Core standards, to digital educational content.
Startup Weekend	Startup Weekend is an international initiative, based in Seattle, that brings together entrepreneurs, designers, developers and other specialists to create startups and even launch products over the course of 54 hours.

MIT Enterprise Forum Moderator and Panelists

Our panel represents a broad range of expertise in the educational technology and digital learning industry.

Moderator



Frank Catalano, Principal, Intrinsic Strategy

Frank is an industry consultant, GeekWire columnist, author and veteran analyst of digital education and consumer technologies.

Focusing on marketing and brand strategy as a consultant, he is a former senior vice president at Pearson Education and serves on the Education Division board of the Software and Information Industry Association.

Frank is also a columnist for the tech news site GeekWire, and a regular contributor to both the NPR/KQED education site MindShift and the edtech news site EdSurge.

He tweets @FrankCatalano.

Panelists



Lindsey Own, Teacher, The Evergreen School, Shoreline, WA

Lindsey Own is in her 9th year as a middle school science and health teacher, in a career that has been interspersed with research-based curriculum development and state-level science education reform administration.

Her love is in the classroom, supporting her students in understanding themselves, their growth, and the great impact they can have on the world. She has pushed forward technology use since commandeering her first school's decrepit, unloved MacBook cart.

Lindsey now sends her students backpacking with digital data collection probes, Skyping with university students as consultants on undergraduate science documentary projects, and creating animated computer games to demonstrate their understanding of the many pathways throughout the human body



Randy Reina, Sr. Vice President of Digital Product Development, McGraw-Hill Education's Center for Digital Innovation

Randy heads digital product development at the Center for Digital Innovation which has built web-based instructional and assessment applications since 2002, supporting over five million users.

Prior to McGraw-Hill, Randy worked in a variety of teaching and administrator roles at both public and private institutions, in notable positions such as Director of Technology and Supervisor of Curriculum & Instruction.

Randy holds a BA in Economics from the University of Pennsylvania, a PhD in Education from the University of Pennsylvania and an MBA from the Tuck

School of Business at Dartmouth College



Jessie Woolley-Wilson, Chair, President and CEO, DreamBox Learning

Jessie leads DreamBox Learning, developer of the Intelligent Adaptive Learning platform heralded as a "game changer" in the eLearning sector.

She brings nearly two decades of experience in K-12 eLearning and education technology to DreamBox Learning. Throughout her career in the education industry, Jessie held leadership roles in general management, sales and marketing, operations and business development.

Jessie received her MBA from Harvard Business School and her BA in English from the University of Virginia. She is a 2007 Henry Crown Fellow of the

Aspen Institute

Interviewees

Name	Affiliation	Website
Pete Findley	Vice President, Career Education Giant Campus	www.giantcampus.com/
Katie Mangan	National Correspondent The Chronicle of Higher Education	http://chronicle.com/section/Home/5
Scott Oki	Founding Partner Social Venture Partners Also, The Oki Foundation	www.svpseattle.org/
Lindsey Own	Teacher, The Evergreen School Volunteer Team Chair Startup Weekend EDU	http://seattleedu.startupweekend.org/
Randy Reina	Senior VP, Digital Product Development McGraw-Hill School Education Group	www.mheonline.com/
Jason Stoffer	Partner Maveron	www.maveron.com
Tom Vander Ark	CEO Open Education Solutions Also, Partner, Learn Capital	http://openedsolutions.com/
Jessie Woolley-Wilson	CEO, President and Chair DreamBox Learning	www.dreambox.com

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Resources

This companion paper includes excerpts from a number of articles authored by Frank Catalano and initially published by [GeekWire](#), [MindShift](#) and [EdSurge](#).

Additional background information was derived from the resources and websites of companies working in the edtech space.

We thank them all.

American Council on the Teaching of Foreign Languages	www.actfl.org/
Center for Digital Education	www.centerdigitaled.com
CASTLE UCEA Center for the Advanced Study of Technology Leadership in Education	http://schooltechleadership.org/
EdSurge	www.edsurge.com <i>Potent Alphabet Soup: How SLI, LR and LRMI will Shape Education Technology Content</i> by Frank Catalano. <i>Is education technology turning into a gold rush?</i> by Betsy Corcoran
EduTech: A World Bank Blog on ICT Use in Education	http://blogs.worldbank.org/edutech/
GeekWire	www.geekwire.com <i>Here comes another tech bubble — in education</i> by Frank Catalano <i>Irresistible Startups, Immovable Education</i> by Frank Catalano
Hack Education	http://hackeducation.com/index.php
Intrinsic Strategy	http://intrinsicstrategy.com./blog/ Frank Catalano's blog with tech and edtech insights
Journal of Technology Learning and Assessment	http://ejournals.bc.edu/ojs/index.php/jtla/index <i>Special Edition: Educational Outcomes & Research from 1:1 Computing Settings</i>
Khan Academy	www.khanacademy.org

MindShift	http://blogs.kqed.org/mindshift/ <i>Which Device Will Win the Tablet Battle?</i> by Frank Catalano <i>How Open Education is Changing the Texture of Content</i> by Frank Catalano <i>When Technologies Collide: Consumer, K12 and Higher Ed</i> by Frank Catalano
National Center for Educational Statistics	http://nces.ed.gov/nationsreportcard/s
New Media Consortium (NMC)	www.nmc.org/publications/2012-horizon-report-k12 <i>NMC Horizon Report, 2012, K-12</i>
State Educational Technology Directors Association (SETDA)	www.setda.org <i>Out of Print: Reimagining the K-12 Textbook in a Digital Age</i> <i>National Educational Technology Trends: 2012</i>
TechFlash	www.techflash.com
The Journal of Technology, Learning and Assessment	http://ejournals.bc.edu/ojs/index.php/jtla/