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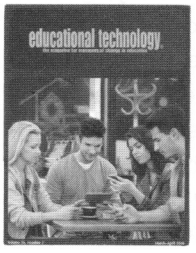

About This Issue

A general issue covering varied aspects of educational technology

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Financial Support and Challenges for Educational Technology Companies: Then, Now, and Looking Ahead

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The authors review past and current funding/support for U.S. K–12 educational technology companies. They review both who provided the funding for product development and the reasons why. They look back to the 1960s and 1970s, when federal government agencies helped produce computer-based materials, then how the schools' access to technology changed the market and funding as well as implementation in later years. They review the past and current challenges that companies have, and look ahead to what it will take for them to be successful in the K–12 market.

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Introduction

In the last few years, educational technology companies have received more investment dollars than ever before in history. In the first half of 2015, educational technology companies around the world received over $1.5 billion worth of investments, with about $1.1 billion going to U.S. companies.[1] Because the investors differ so greatly in how they define 'educational technology' companies, the numbers they reported varied from $0.5 to $2.5 billion during that time. Some investors counted only those companies that develop instructional products, while others counted companies as 'ed tech' if they built enterprise solutions for brick and mortar schools, or even photo-sharing apps for parent purchase.

The investments in 2015 showed that the total dollars invested rose every quarter. Interestingly, there are more deals with bigger dollars, showing a more mature market, at the same time that seed rounds are getting bigger. And the growth in non-curriculum products specifically designed for teachers, schools, and districts is also increasing. However, to put it all into perspective, the investments in educational technology companies is a very small percentage of all investments in other (non-education) sectors.

The growth of investment dollars is certainly indicative of the changes that have been occurring within the field of educational technology. This article looks at the changes in who is funding the companies and why they have provided the capital investments through these past 50 years. Finally, if those companies develop innovative products and services, will the schools be able to purchase them—and use them effectively to improve student learning?

The Difference Between Now and Then: Looking Back

In our 1987 report to the Office of Technology Assessment, "Support for Educational Technology R&D: The Federal Role," we (Charles Blaschke, Beverly Hunter, and Andrew Zucker) argued "The two wars—'Vietnam' and 'Poverty'—had mutually reinforcing as well as conflicting influences on technology support by various agencies." Many defense companies were facing cutbacks in 1966–1975 and looked upon the "War on Poverty" as an opportunity to apply the "systems approach," including technology components. Within domestic agencies, key technology "advocates" were able to scrape together funding to support instructional technologies which offered promise based on Programmed Instruction principles and preliminary and small-scale evaluation results. A number of defense

companies (Litton Industries, Raytheon, IBM, among others) contracted with the Job Corps, promoting the "systems approach" with technology components based on DoD experiences (e.g., Project 100,000 for certain enlistees operated by SRA/IBM) and other projects which were funded from DoD contract "Overhead" and other budget items. OEO (Office of Economic Opportunity) scraped together about $30 million annually in the mid–late 60s supporting, among others, some cost-effectiveness studies, including one which compared the results using the ERE "Talking Typewriter" developed by Dr. John Henry Martin and Dr. Omar K. Moore, to a configuration using a Smith Corona typewriter and Language Masters flipcharts operated by a teacher's aide. In addition to materials developed for the Job Corps, such as the Sullivan Series, which was used by many performance contracting firms, the ERE eventually evolved into the Writing to Read program marketed by IBM during the 1980s.

In the mid–late 60s, technology zealots in USOE funded costly experimental projects using crude network configurations, such as an effort operated by Westinghouse Learning Corporation, making headlines in the *New Republic* article in 1966 titled "16 Little Indians," by James Ridgeway. Entrepreneurial researchers, such as Dr. Patrick Suppes, piqued the interest of technology advocates within USOE (U.S. Office of Education), the OEO Community Action Program, the Defense Advanced Research Projects Agency (DARPA), and NSF, among others, to fund what later became CCC Corporation's Integrative Learning System. Aside from Secretary Robert McNamara's push to increase "spinoff" of DoD educational technology to the civilian side, which began in the 60s but took almost three decades to come to fruition (see C. Blaschke, "DoD: A Catalyst in Educational Technology," Phi Delta *Kappan*, January, 1967), DARPA and others funded a technology design prototype, which finally emerged as PLATO.

Within USOE, the relatively "independent" Bureau of Education for the Handicapped initiated important research and subsequent development of prototypes, one of which became commercially available as the Kurzweil "reading machine" initially developed for the blind and now in various forms still sold commercially in general education for multiple purposes.

During the same timeframe, the National Science Foundation had a mission, if not adequate funds, which contributed considerably to the theoretical constructs and learning knowledge underpinning CAI, especially for higher education. At the K–12 level, funding was provided to Dr. Suppes, for continuing his research; Wallace Feurzeig (with Seymour Papert) to develop Logo; and later Herbert Simon, Carnegie Mellon University, on cognitive processes, leading to Carnegie Learning. While intellectual knowledge was initially put into the "public domain," later, some developers/firms were allowed different types of Copyrights to market resulting products, which differs from recently announced Obama Administration policies (discussed below) on "open licenses."

These beginnings clearly indicated that technology support among most federal agencies was less than "organized" and "programmed." Progress could be attributed largely to individual advocates and their ability to use non-traditional funding sources (DoD contract overheads, end-of-year leftover money, and flexible funding within newly-created organizations such as OEO) to support many of these efforts. In the late 60s, this educational technology support began to attract traditional educational publishers, which formed mergers, alliances, and other joint relationships, with many defense contractors (SRA and IBM, and General Learning/Silver Burdett, among others).

While many of the DoD and corporate officials differed in their specific perspectives, general themes are worth noting:

- most agreed there was a need to identify a "laboratory type" environment which could provide feedback to refine programs/software using existing equipment;
- "cautious urgency" was the "word" to not "oversell" and to minimize any marketing "black eyes"; and
- the market had yet to be created.

With some of the exceptions, there were many barriers to the creation of a market for computer-assisted instruction (CAI) during the 70s, due to a number of reasons:

- slower than anticipated school districts' adoption of a cost-effectiveness "mentality";
- in many cases, the lack of large-scale effectiveness evidence beyond some studies on CAI "remediation";
- a philosophy of "group-based, seat time" vs. individualized, self-paced instruction; and
- district costs in addition to procurement procedures which were not "performance-based" and therefore impaired the realization of the potential benefits of technology.

On the other hand, there are lessons learned from some of the successful efforts, which could be relevant today:

- placing priority support for R&D proof of concepts and/or prototypes that had a "solid theoretical or empirical foundation," offering promise for being effective;
- not only appropriate funding, but also continuity of support for innovators from multiple sources over a relatively long time frame; and
- flexible funding where federal agency advocates were able to take advantage of trends and opportunities.

Now and Looking Ahead

Many changes have occurred since the early educational technology products were developed in the 60s and 70s. Originally, they were focused on areas of need

(like special-education students), and the curriculum content in the products was mostly mathematics and reading and delivered by computer-assisted instruction, with most of the funding derived from different federal agencies.

Many of the products developed today are still focused on the larger market areas (mathematics and reading) and there are still large, sophisticated systems, but the majority of products on the market now are single apps built for mobile devices that students are using. SIIA's 2014 PreK–12 Market Survey results reported a U.S. institutional market for education software and digital content/resources at $8.3B.[ii] The largest market segment was Content ($3.3B), with Reading/Language Arts making up the largest Content category, followed by Mathematics/Arithmetic.

Interestingly, many of the very early products developed with federal or state funding evolved into products we see on the market today or into the companies who continue to innovate. CCC was acquired and the product became SuccessMaker, continually updated and now a product from Pearson. WICAT product development was a basis for the Waterford Institute, PLATO for Edmentum, and Logo computer language for products sold by Logo Computer Systems.

Many of the new products are now developed as Open Education Resources (OER), especially if they are funded by the U.S. Department of Education grants in the Obama Administration. Announced in November of 2015, a new Obama policy would require "open license" for any intellectual property, including software, developed with federal grants, which would discourage many for-profit firms from using federal funds to develop "high potential payoff" products—they would no longer be protected by Copyright. This would reverse a long-time federal policy, which funded private firms to develop and market software in "thin markets," such as special education; and it overturns the intent of the Small Business Innovation Research Grant Program, designed for small for-profit organizations, and violates the "unfair completion" policy tradition. If strictly interpreted and enforced, such a policy would likely reduce the amount of federal funding sought by for-profit software development firms.

The question arises—will the non-profit agencies who create products under this new license be sustainable down the road without continued funding to update and support their products.

Many of the companies developing the products are interested in building engagement by users more so than building a sustainable revenue stream. Given that the hardware has become less expensive, more ubiquitous, and used by all ages, in all subject areas, there are software solutions available for more than mathematics and reading. The focus has shifted from remediation for at-risk students to growing achievement by all students and engagement and improving teacher "ease of use." Administrators are focused on results and competency, partly from the testing and assessment requirements resulting from NCLB (No Child Left Behind) and CCSS (Common Core State Standards). Online courses have expanded in their definition—and in the number of students taking advantage of digital learning. The teaching and learning process, as a result, has become much more global. And the funding has shifted from the large government organizations to initial funding by friends and family, angel investors, seed investors, social investors, and philanthropic foundations.

What Does It Take to Succeed in This New Market?

Every day, new educational technology products are announced and companies are formed. How do we know if those new products and/or start-ups will be successful—and impactful? Since 2007, the Educational Technology Industry Network (ETIN) of the SIIA (Software & Information Industry Association) has implemented an Innovation Incubator Program, a virtual mentoring program for educational technology start-ups. Hundreds of small companies with promising technologies in the K–20 market have been reviewed by industry peers who have already gone through the growing pains of building their businesses. The number of applicants has grown in parallel to the growth of the industry start-ups—fueled by investor interest and increased purchases of hardware, especially tablets and other mobile devices.

Over the past few years, "Innovation Incubators" and/or "Education Design Studios" have popped up in major cities, particularly near universities, such as LearnLaunchX in Boston, Socratic Labs in New York, or GSV Labs in Redwood City, CA. This funding typically provides early development support and some growth opportunities, allowing most companies to emerge with an interesting product they consider to be ready for the market. But what does "ready" really mean—not just for the product but also for the company?

While all of these programs can support entrepreneurs in the development and launch of innovative learning technologies, the existing companies and educators still have the key roles in any successful and impactful implementation. Just what does it take to 'make it' in the school market these days, and even more importantly, to be impactful to students and teachers?

Here are some attributes that companies developing products for the school market need to have, wherever they get their funding and whatever the purpose of their products:

- passionate leaders who understand the education market and the needs of administrators, teachers, and students;
- customer and user/influencer knowledge to

understand how K–12 decision-makers will buy the product and how the product will be used;
- support for a growing number of users with products installed on different devices (e.g., legacy desktop computers or using the different operating systems on mobile devices);
- enough money to build a strong distribution mechanism, do product revisions, and withstand the long decision-making and buying cycles of schools;
- entrepreneurial skills and contacts to develop business partnerships that will allow growth in areas where going it alone is too risky; and
- a product that actually addresses a real need and in a way to make it impactful.

The products and companies now entering the school market can be successful—and even impactful. For further information on how innovation can move the needle in education, see a publication by Michael Barber, Michael Fullan, and Katelyn Donnelly, *Alive in the Swamp: Assessing Digital Innovations in Education,* published by the New Schools Venture Fund; *www.newschools.org/blog/alive-in-the-swamp* .

Today's companies, whether the start-ups or the established companies who develop educational technology products, will never stop innovating. They love creating more useful tools and applications for their customers—and building new products to reach new customers. But, if their customers are students, educators, and administrators, how innovative can their products be and still be purchased and implemented successfully?

School funding has long been an issue—and certainly before instructional materials or computer technologies were invented. But K–12 districts do acquire new, innovative products, even with economic downtowns, given that the technology products have decreased in price, but also because they shift dollars around within their budgets. Online access is acquired using money previously available for face-to-face workshops, or mathematics software is purchased using textbook adoption funds.

What is required for a successful implementation in the education market? Professional development is a case in point. What support is given to schools and education leaders now who want to be innovative in their curriculum and in the teaching and learning process? Fifty years ago, more attention was given to professional development, but now, many administrators assume that the teachers know how and when to use new products. It's one thing to acquire new tablets and learning apps, but quite another to drive real change in education and produce significant and lasting results.

When the leaders from school districts, academia, and educational technology companies work together and share information about their needs and what works, everyone gains. Newspapers and magazines have covered stories about the challenges and failures of technology implementation, and it's typically a problem with the planning process—at both the school district and the company.

Technology can improve teaching and learning, but just having technology doesn't automatically translate to better instructional outcomes. Whether a given school experiences the potential benefits of technology depends on the software it chooses, what students actually do with the software applications and computer hardware, how educators structure and support technology-based learning, and whether there is sufficient 'time-on-task' with the technology-based materials. This has been true from the initial, large-scale applications (both instructional and administrative software) in the 60s and 70s as it is today with the innovative apps.

The schools will continue to increase access to technology when they see it working. The companies will spend more time focused on what might work in the classroom, if they know there's a market and can use the resulting revenue to support their products and services and build their companies.

Is There a Bubble Coming?

This educational technology investment boom will not burst as the "dot-com" bubble did over a decade ago. The reasons vary—from increased hardware access and connectivity and the touch tablet's ease of use for education institutions, to the lower development costs, apps market dynamics, and expanded distribution channels for the developers. In recent years, investors started to require business plans with sustainable revenue growth, simply because they need the companies to grow on their own and provide investors their money back and hopefully some financial gains. Students will continue to push for more technology products. They expect to use technology to personalize their learning to stay more engaged and challenged—a far different situation than 50 years ago, when students left classrooms to work in a computer lab to use remediation products.

Not every new product and company will succeed, given the numerous products relative to the number of users needed for product success. Whether investment is flowing to the right solutions and the best entrepreneurs is still an open question, but the key issues are the ability of the start-ups to get the solutions to a sufficient number of learners—and the ability of education leaders to implement the new learning tools in impactful ways. When that happens, everyone wins, including the investors—whether they are the venture capitalists, the government, or philanthropic foundations. □

Notes

[i] *https://www.edsurge.com/news/2015-07-29-education-technology-deals-reach-1-6-billion-in-first-half-of-2015*

[ii] Richards, J., & Stebbins, L. (2014). *2014 U.S. Education Technology Industry Market: PreK 12.* Washington, DC: Software & Information Industry Association.