

The Challenge of Equitable Technology Adoption in Education

In 1728, the Boston Gazette ran an advertisement for "Caleb Philipps, Teacher of the new method of Short Hand", where Mr. Philipps offered through weekly mailed lessons- what we could call the first MOOC (Massive Open Online Course). By 1840, the introduction of uniform postage rates allowed Sir Isaac Pitman to teach a course where he would mail learning content on postcards and receive transcriptions from his students. We could call this the first online bootcamp.

For 250 years, technology-enabled and public policy breakthroughs to bring high-quality, accessible, and affordable education for the majority have been right around the corner. While significant progress has been made, particularly in literacy rates across the world, we still seemed far from a global leap forward. That all may have changed during the pandemic.

At the onset of Covid-19, the broad adoption of technology in education happened almost overnight. McKinsey found that between the start of the pandemic and late 2021, U.S. educators reported a 49% increase in learning technologies that enable collaboration and connectivity. The pandemic forced a rapid uptake in technology adoption across nearly every facet of the education function (from virtual classrooms, asynchronous learning, or blended models) and across every socio-economic demographic and age range (from K-12 to adult learning models, and within every income bracket).

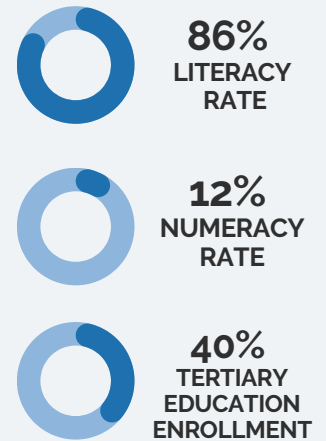
Today, we must reflect on what we learned during this period of time, and what technological approaches to education will ultimately have a sustained, positive impact for both learners and teachers.

Equity, Affordability, and Accessibility in Education

Perhaps the most pressing question in education throughout the years has been how to bring high quality and affordable education accessible to anyone, anytime, regardless of geography, wealth, and past merit. This may sound an impossible task, yet the world has achieved this outcome before.

Yet numeracy rates, measured as the percentage of adults skilled at problem-solving in math, arguably as important as literacy, stands at just 12%. Tertiary education enrollment (college, associate, and trade school degrees) stands at 40%, while tertiary education attainment, a better predictor of career success, is much lower.

Inequality—defined as a lack of opportunity for the majority—is the biggest problem of our time, and the strength of inequality rests almost exclusively on a lack of educational equity. Lack of high-quality, affordable, and accessible education is the largest barrier to accessing good jobs and financial independence, accessing adequate healthcare, participating in civic discourse, and even developing an ability to care for the environment. We believe that technology is the bridge by which we can improve education and quality of life for all.



Introducing **Spotlights**

The eLab team, in collaboration with the Siegel Family Endowment, have produced a series of Spotlights to highlight insights from the education technology (EdTech) startups, both for-profit and nonprofit, that aim to bridge the education gap from K to Gray (Kindergarten through life-long learning). These Spotlights and the founders we interview are a reflection of what the possibilities are, where we are standing today, and what barriers we need to break to reach the full potential of universal access to education.

eLab by Columbia University

eLab by Columbia University is a fellowship that brings together entrepreneurs (Fellows) who are leveraging technology to solve the biggest challenges in education—in K12, HigherEd, Workforce, Corporate Development, and Core Skills Development—with a collective mission to have a major impact in education and workforce development by solving for equity, affordability and universal access. Since its inception in 2020, to date, eLab has served 120 Edtech founders from 11 countries.

Siegel Family Endowment

Siegel Family Endowment is a foundation that aims to understand and shape the impact of technology on society through our lenses of learning, workforce, and infrastructure. Founded in 2011 by David M. Siegel, co-founder and co-chairman of the financial sciences company Two Sigma, we believe that philanthropy is society's risk capital – it can help drive innovation by investing in local leaders and community-born solutions, fostering prosperous and equitable futures for all. Our work is centered around funding organizations that address society's most critical challenges, while supporting innovative civic and community leaders, social entrepreneurs, researchers, and more that are driving this work forward.

K-12 Education

Spotlight: K-12 Education

A K-12 Education may be something that many families in the Global North take for granted, but on a worldwide scale, access to early education is far from guaranteed. Of the world's 787 million children of primary school age, 8% do not go to school—that's 58 million children.

In many countries, non-state and non-governmental actors fill the educational gap. According to UNESCO, in places where public schools were of low quality and in short supply, the percentage of private institutions increased by several percentage points over the past decade. Households in lower and middle income countries also spend roughly 10% more on education, accumulating significant costs for pre-primary and primary education.

In the United States, the pandemic upended K-12 education across the country, and families are still feeling the effects as students play catch-up academically and readjust to in-person learning. Now, 55% of Americans want schools to rethink how best to teach kids rather than just return to pre-pandemic learning modes, with a renewed emphasis on cultivating practical skills, emotional intelligence and 'character', as well as critical thinking abilities. The big question is: what is the best way to do this?

In this Spotlight, we'll identify a few key pain points in K-12 education today, and then outline some of the ways in which entrepreneurs are developing solutions and re-assessing these problems to tackle systemic challenges.





Shifting Learning Practices To Meet Student Needs

The market potential for upskilling technologies is substantial—LinkedIn reports that 46% of learning and development professionals say upskilling and reskilling is a top focus area in 2022. By some estimates, the global market size might be more than \$370 billion considering many employers spend an average of \$1,300 per employee annually on continuing education.

A core component of successful upskilling technologies is the increased access to real-time learning outcomes. When employers better understand the comprehensive skill sets of their workers in real-time they can make better decisions about not only who to train and on what topics but also what business strategies they can successfully endeavor today versus what skills they need to train or hire for in the future.

In the future, technology could enable a better learner experience with behavioral nudges and videos along the learning journey, artificial intelligence or virtual reality to improve one-on-one coaching, and natural language processing to track time spent talking versus listening in meetings. Today, however, systems and processes in the workplace are not always designed to bring the best out of people, but emerging technologies and ideas will allow us to improve upon these systems.



Supporting Teachers and Overcoming Staffing Issues

In the process of innovating the classroom, however, teachers cannot be overlooked. On both a local and national scale, there are widespread teacher shortages in schools, many of which can be attributed to the pandemic. Additionally, superintendent turnover jumped up to roughly 50% in the nation's largest districts. The fact is that students can't properly learn if there aren't enough teachers, or if those teachers do not feel supported in their school districts. Beyond improving salaries or benefits, some states are experimenting with teacher apprenticeships and customized teacher training programs to bolster the recruiting pipeline and diversify staff.

Providing Assistance Beyond the Classroom

In order to work against the declining public trust in the K-12 education system, improving the ways in which schools engage with families will be crucial. The dip in public trust was at a low during the pandemic, when debates surrounding virus mitigation and efforts to control classroom discussions on topics such as race and gender reached a peak.

Beyond family outreach, mental health support was, and continues to be, a primary concern for educators as students re-entered classrooms. With increased reporting around K-12 students suffering from depression and anxiety, many schools and school boards have placed a renewed focus on re-training staff to provide support and re-working curricula to meet students' social and emotional needs.





Meet the K-12 Entrepreneurs



In light of the challenges that many K-12 students face, we sat down with a group of eLab entrepreneurs who are actively working to improve the learning environment for these young students. Here's what they had to say about the K-12 education innovation landscape (interviews have been edited for clarity and brevity). This is who they are and why they do what they do:





Mo Arbaji



Mo is Founder and CEO of ChalkTalk, a platform for teachers & trainers to build, personalize, & run their real-time learning courses.

What is the biggest challenge you are trying to solve?

The first wave of personalized learning came and went by. This arrived in 2012 with MOOCs, and the basic idea was let's give everyone a test and based on that test, we'll give [students] personalized content and assessment. Teachers were teaching to the mythical 50th percentile, and as a result, a lot of students were getting left behind. [I think] no amount of gamification can replace the interactions between learners [and from] learner to teacher.

What role is technology playing today?

Everyone is building technology or content. We don't [necessarily] need more [platforms], but we need better engagement with teachers and students, as well as stronger implementation. With Chalktalk, the question we explored was: can we personalize learning for every student in the classroom but still keep it social and human? We can do this not by changing how teachers teach, but reinventing how [these] interactions work in the classroom.

What do you expect to see in the future?

What technology will do in the future is enable conversations between teachers and students in a decentralized way more effectively. [We'll see more] asynchronous learning coupled with real-time interactions, and tech will help scale this paradigm.



Kyla Bolden



Kyla is the CEO of Wiz Kid Learning, an e-learning platform offering live online programs for children aged 4-18.

Why are you passionate about K-12 education?

I think it's awesome to supplement traditional K-12 education and ensure that kids are prepared personally and professionally. I got a computer at a young age, and realized there

were no programs out there for me. I taught myself to code and and develop websites, but [I found that] there were no communities to join, unlike other sports and extracurriculars. Building WizKid, it's important to not just have the skills, but [develop] a community of like minded learners, a more holistic form of education.

What is the role of technology today in your business?

Technology plays a huge role at WizKid. When we first started programming, it was in person. Then we shifted to online to educate as many people as possible—we didn't want to make [someone's education] less achievable because of location. We're always thinking about how we can use technology to reach various kinds of backgrounds and learning styles. Right now, we're focused on small group classes. As we incorporate more tools, like AI, we see it as a way to teach kids in a more personalized way and reach more students. It's all about giving more access. When used correctly, [tech] levels the playing field. At the same time, one barrier is making the experience as social as possible because classes are online. We want to make sure the classroom feels as much of a community as possible, even though it's virtual.

What do you expect to see in the future?

I'm hoping that there will be more focus to develop core skills for kids that they're actually interested in. School tends to focus on one kind of learner. I'm hoping K-12 education can provide more ways to educate more types of learners. Specifically, [instilling] more of an educator's mindset. Being able to understand technology, and how to use it for good. I think people could benefit from having more of a tech-focused education.



Alma Losada **AEQUALAND**

Alma is the Founder & CEO at Aequaland, a value-driven edtech platform for kids 4-10 years that develop the life skills needed to become well-rounded global citizens.

Why are you passionate about K-12 education?

I'm passionate about educating the little ones. Brains reflect the lives they have lived. Our brains are continually changing by the education they receive, the hobbies we have, and the sports we play. We can no longer cast the debate of the difference as nature vs. nurture. We need to acknowledge that our brains are mouldable.

The problem is that capitalism, the patriarchal system, and traditional heritage are rooted unconsciously and guide our perceptions. To change the world, we must start from the root of the problem and plant the right seed [with our children]. I believe education can

change these perceptions, change the way we treat each other, [and] change the world for the better. At Aequaland, we want to empower every child to realize their inner superhero. I believe that access to a holistic education with digital play and physical activities can provide a creative pathway for kids' self-love, self-belief, and self-consciousness.

What role is technology playing today?

We use tech in two different ways: 1) For students, we use digital play and gamification to increase the appetite for learning, engagement and retention. It's scientifically proven that adding game elements increase the grey matter and dopamine in our brains, making us happier and smarter. 2) For educators, the class dashboard captures students progress to support their learning journey in a personalized way, and the resources offers teachers a 'pick-n-mix' of our themes and content.

The roadblocks [to achieve this] are: 1) The lack of technology or outdated tech in the schools and 2) the absence of familiarity and knowledge of using and integrating technology in the classroom. If we look at obstacles as opportunities to turn problems into progress, there is an opportunity for us to accompany, train and support schools on their digital transformation journey.

What do you expect to see in the future?

With AI and robotics, the workforce will be disrupted, jobs will disappear, and new ones will emerge. Education must speed up to match the new workforce. I see a growing need for social and emotional skills development. What differentiates humans from machines is that we are emotional beings. Technology enables us to allocate more time towards higher impact activities and to foster an inclusive and collaborative blended schooling space. With the help of data and AI, we can tailor and recommend learning according to each child, creating tech that supports greater human potential.



Miriam Altman-Reyes

Miriam was Co-founder and CEO of KinInvolved, an industry leader in efficacy-tested technology to elevate student attendance, through its acquisition in 2022 by PowerSchool, where she is VP, Go-to-Market Strategy and Partnerships for it's innovation group.

What is the biggest challenge you are trying to solve?

As a high school educator, one issue I encountered was kids missing or being late to class, so I tested different interventions. When I did my MPA, we developed a software platform

that generated a two way communication to prevent absenteeism and provide access to data that can help school/district leaders to see trends in real-time and over time. We then built automated interventions based on the attendance data. Over time, the challenge of absenteeism has not gone away, but due to the pandemic, there is now much more public awareness of the problem.

What role is technology playing today?

Technology cannot replace human interaction, it is about creating capacity and systems that are reliable. An example is our digital attendance postcard, which automates attendance-data-driven interventions, but [still requires] teachers to have conversations with parents around root causes. Attendance [is a] foundational issue; this is a pretty green market, and most [school] districts [don't have] a solution to solve for this holistically.

What do you expect to see in the future?

I am hopeful for the future. The pandemic placed emphasis on gaps [in the education system], and there is a huge opportunity to think differently about how we educate kids. We will see transformations that will have positive intergenerational effects.



Juan Manuel Restrepo



Juan is the Director of Cosmo Schools, a movement that wants to transform the education system in Latin America through a network of high quality and accessible schools.

Why are you passionate about K-12 education?

I'm really interested in how tech can transform society. We live in a world where we have huge gaps in equality, gaps between public and private education. Education [is] for me the pathway towards transforming society. No matter your family or economic reality, if you are [given a] pathway to education, you can become what you want to become.

In starting Cosmo, we wanted to explore what the future of education could be. We traveled the world, learned about 100 educational models, talked with teachers and students. [We wanted to] move from transferring knowledge to building pathways of inspiration and facilitating the learning process.

What is the role of technology today in your business?

We cannot see tech as the end or the purpose of education. It's a powerful tool that helps us engage towards a new way of learning—it helps us reduce the gaps and also increase

access. Tech will disrupt more of the traditional [aspects] of learning, but we cannot forget about human interaction. If you leave the human aspect out, we lose a sense of who we are. Technology makes knowledge more accessible, but we need to also develop human social and emotional skills at the same time. In K-12, there is not a lot of disruption happening. It's a very traditional model. We have not had a scalable, disruptive change in a long time. [To do this], we need to change the minds of leaders, and help them see how tech can be a powerful tool.

What do you expect to see in the future?

We're going to have more personalized education through AI. But the big challenge is how we won't lose the human aspect. We're going to have AI disrupting many jobs, changing general perspectives of how we work, live, and spend our time. The gap between rich and poor countries could increase. [Therefore] access to technology is going to be critical to reduce this gap.



Maria Vélez

CRACK
THE
CODE.

Maria is the Founder and CEO of Crack The Code, a computer science school for kids and teenagers.

Why are you passionate about K-12 education?

I am passionate about K-12 education because day-in-day-out we are changing lives. Our work is having a direct impact on the futures of the kids that we are working with. There is nothing more gratifying than knowing that your hard work is benefitting society.

What role is technology playing today?

Technology is what enables us to reach students all across Latin America. [Because of technology], we are able to scale faster and work with kids that otherwise wouldn't be able to have this type of education. We are also teaching kids how to use and create technology, so our work is tied to technology in different ways. One of the biggest roadblocks we have is that schools in very small and remote parts of Latin America don't have devices or internet, so we can't work with them.

What do you expect to see in the future?

I expect to see that technology will transform how we learn, what we are learning and how we should teach. Education leaders, teachers and mentors should be open to accept change in how we teach, how students learn—because a new generation of learning is here.



Kellie Lauth

Kellie leads the MindSpark team by designing and launching community-based solutions with innovative professional learning, as well as creating transformational shifts across schools through industry-school partnerships. At Couragion, Kellie is redefining what it means to collaborate across sectors to ensure ample opportunities for communities we all care about.

Why are you passionate about K-12 education?

I remain deeply passionate about the expansion of workforce literacy opportunities in partnership with K-12 and industry, especially in rural and highly impacted communities. Providing students with viable industry recognized credentials and mentors is an investment with strong economic and social returns. We can diversify traditional career pathways and offer more options to all students, creating more access and opportunity on-ramps. We have seen firsthand in the communities we work with, the power of intersecting industry and education together to galvanize relevant and viable solutions.

What role is technology playing today?

Technology plays a key role in our organization. We not only utilize multiple platforms, apps, and tools to communicate and run our organization, but we upskill educators in drone technology, responsible AI models, AR/VR, and robotics. With the acquisition of Couragion, we have leveled up our ability to build responsive and agile courses, intersect partners, and utilize gaming to support robust early career exploration and development.

What do you expect to see in the future?

In the future, I would expect and hope to see an expansion of community-based problem-solving approaches that uplift education as foundational. There is limitless potential in education. We believe the health of communities and our economy is directly tied to the health of our education systems. My hope is that cross-pollinated, transdisciplinary partnerships that provide fluid, dynamic, fierce, unassuming, and simple solutions become the norm across the education landscape.



Sonny Thadani

Sonny is CEO and Co-founder of Robin, a supportive community that connects students with inspiring coaches to empower emotional growth.

Why are you passionate about K-12 Education?

I wanted to get involved with [education] work after seeing the [effects] of mental health issues within my family, getting involved in Sandy Hook Promise, and as a Dad, realizing the impact of gun violence on children. The world of education is rewarding and unique and it houses everything that my values and beliefs stand for.

What is the biggest challenge you are trying to solve?

[Specifically], I wanted to dig deeper on mental health. We want to support our students, but if we don't support the educator as well, [then they] won't be able to bring their best selves to work. We've learned that teachers don't have enough [personal] support—they have professional development and training, but who is supporting them? They don't have access to therapists and coaches or mentors, and [this] is a critical problem to solve.

What role is technology playing today / in the future?

We all know how powerful technology is, but we need to use it effectively. For us [at Robin], it is the ability to provide access to students who may not have had the opportunity to access coaches, and when a new skill set is learned, the technology will help us build that into a habit. [But], technology cannot replace on ground support, shared safe spaces and replace personal relationships.

What do you expect to see in the future?

A [major] barrier to innovation is [having an] understanding of what's happening — innovation has to come from people who understand education deeply. [We need to] have more stakeholders become decision makers: we need teachers, students, parents to have a voice and seat at the table to drive change. We also need to pay educators more money, and change incentive structures.



Phil Weinberg



Phil is a Senior Advisor and MD of the Writing Pathway Innovation Lab at the non-profit Teaching Lab (TeachingLab.org), a multi-year research project providing teachers with a clear, open-source roadmap for implementing the highest-quality writing instruction. He was formerly a Senior Partner at Quill.org and Deputy Chancellor for Teaching and Learning of the New York City Department of Education.

Why are you passionate about K-12 Education?

Educating our young people is an essential aspect of working toward a more equitable society and maintaining a functioning democracy. At present, my attention is on writing because it is something that does not receive enough focus in teacher training or in the classroom. Writing is an important element in the learning process, and is a key skill ensuring young people develop voice and agency in the world. If students are not taught how to express themselves effectively, we are leaving [these students] without access to one of the most important skills they will need for the rest of their lives.

What is the biggest challenge you are trying to solve?

When we started our project, we [realized] there was no coherent and research based approach to teaching writing to support teachers. That support exists in math and in reading. Educators deserve help constructing a progression of skills to enable students to grow as writers. Individual teachers should not have to create that pathway themselves.

What role is technology playing today / in the future?

ChatGPT notwithstanding, I don't think technology exists right now that effectively supports teachers to teach writing well. However, I believe technology will play a huge role over the [next] 20 years—it will help educators become more efficient at providing thoughtful feedback to their students, and it will allow teachers to better track the thinking and learning of students as it evolves in their writing. Additionally, I think technology can support instructional approaches that become more student-centered and differentiated to meet students where they are and help propel them forward. [That said], we also need to understand that tech is a luxury in some places, and that creates huge inequities across the world. Once all students have [better] access to technology, then some of these inequities will begin to dissipate.