

Learning on the Block: **Could Smart Transactional Models Help Power Personalized Learning?**

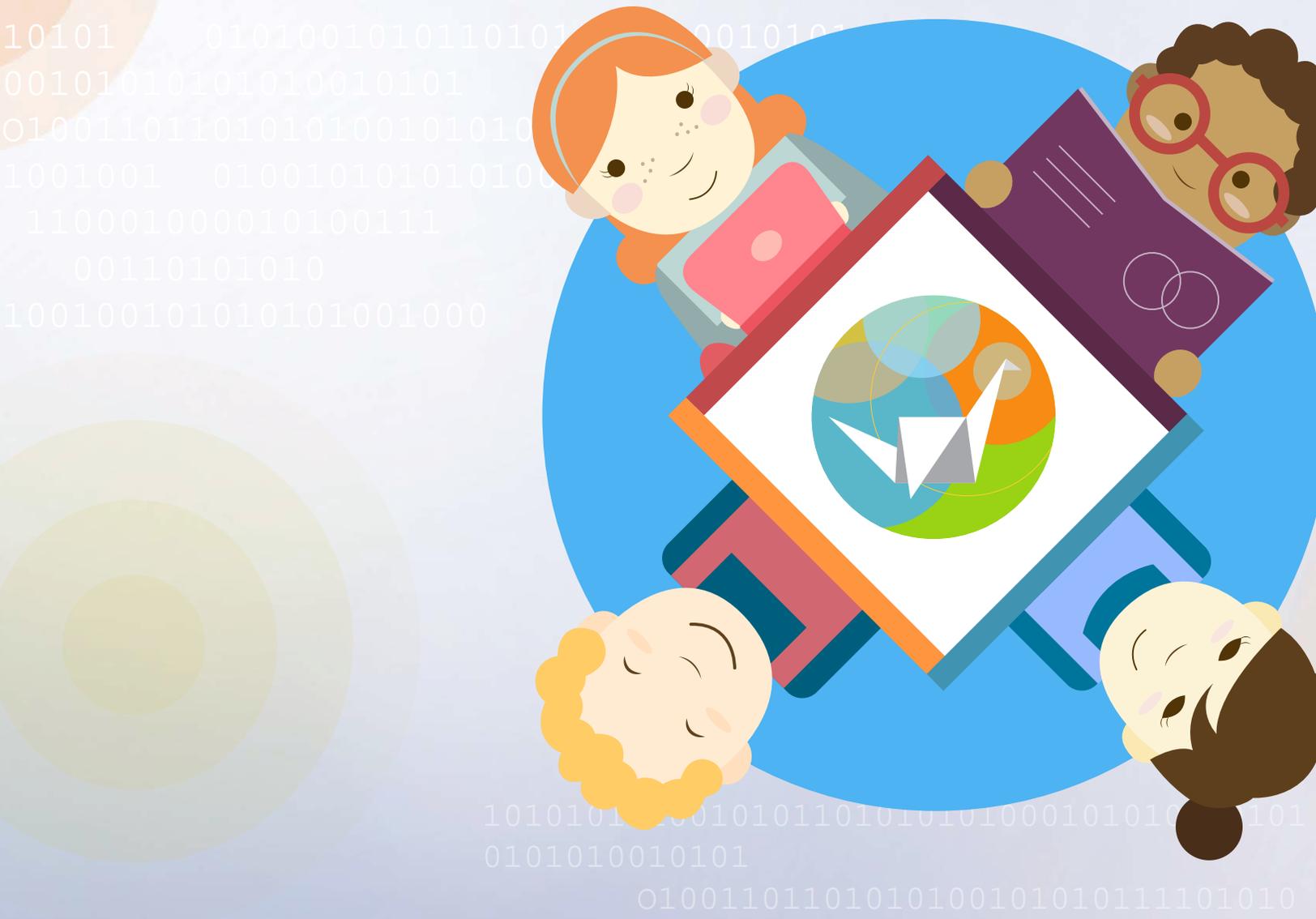


Table of Contents

A New Architecture for Education	3
Smart Transactional Models	3
The Cultural Shift	4
The Emerging Technologies	5
Possible Impacts on Education	7
How to Read and Use the Scenarios	8
Scenarios	9
Faster Horses	10
Terms and Conditions Apply	13
Parent Power	16
Systemic Synergy	19
Evaluating the Potential of Smart Transactional Models	22
Using Smart Transactional Models to Shape Learning	25
Technology Primer	26
Blockchain.....	26
Smart Contracts.....	27
The State of Play.....	28
About the Authors	29
Acknowledgments	29

About KnowledgeWorks

KnowledgeWorks is a social enterprise focused on ensuring that every student experiences meaningful personalized learning that allows him or her to thrive in college, career and civic life. By offering a portfolio of innovative education approaches and advancing aligned policies, KnowledgeWorks seeks to activate and develop the capacity of communities and educators to build and sustain vibrant learning ecosystems that allow each student to thrive. Our on-the-ground work includes partnerships with schools through competency education and early college high schools, as well as with communities through StriveTogether. We also provide national thought leadership around the future of learning.

For more information on our strategic foresight work, see knowledgeworks.org/future-learning.



A New Architecture for Education

KnowledgeWorks believes that fostering meaningful personalized learning for all students is the best way to engage learners authentically and prepare them for a rapidly changing world.



Today, educators make their best efforts to meet the needs of students within a system that is often geared more toward the needs of adults. Ten years from now, we hope instead to see [vibrant learning ecosystems](#) that are learner-centered, equitable, modular and interoperable, and resilient. That level of transformation will require U.S. education stakeholders to [innovate boldly](#), even going so far as to reconfigure some of the underlying structures that support learning. In order to put students truly at the center of their learning experiences, education stakeholders need to consider a new architecture for education that enables the system to adapt to each child instead of each child having to adapt to school.

KnowledgeWorks' ongoing exploration of the future of learning shows that societal expectations of the education system are changing at the same time that emerging technologies are opening new possibilities for structuring and supporting education. This project highlights the potential for those shifts to change how people coordinate educational activities and evaluate student learning.

Smart Transactional Models

KnowledgeWorks' 2015 forecast, [The Future of Learning: Education in an Era of Partners in Code](#), identifies smart transactional models as one of five key drivers of change that have the potential to reconfigure key systems and institutions, including education. It says:



As part of a growing open culture movement, the authority to distribute assets, access permissions, and gain rights to resources is shifting from hierarchical institutions to communities. At the same time, innovations in encryption technologies are ushering in more transparent and distributed models for structuring transactions. Together, these developments promise to reconfigure institutions by enabling both the development of flexible value webs comprised of many organizations and individuals and the creation of distributed autonomous organizations that operate with minimal, if any, management. Smart contracts that automatically execute the terms of agreements once specific conditions are met promise to bypass layers of administration and expand possibilities for true local control of schools, school districts, and other institutions.

This driver of change reflects the potential for a [cultural shift](#), in combination with [emerging technologies](#), to create new possibilities for how people organize and manage institutions and many kinds of transactions underpinning daily life.

The Cultural Shift

Every day, people interact with rigid hierarchical systems and institutions, among them governments, corporations, and school districts. Those long-established institutions worked well to coordinate the activities for which they were designed and continue to provide a level of administrative convenience and social stability. However, the multi-layered, heavily mediated processes characteristic of these systems are often unnecessarily inefficient and opaque. They can be disempowering and often fail to reflect diverse perspectives. They can also be subject to mistakes and bias. Worse yet, traditionally, not everyone has had equitable access to the supports they offer or to quality experiences within them.

Now that newer forms of coordination and organizational structures are emerging, people are increasingly looking for alternative ways to work, learn, and interact, with or without traditional institutions. For example, people are:

- Using digital tools to bypass and push the boundaries of traditional institutions, sometimes to such an extent that whole industries are getting reconfigured.
- Advocating for more flexible workplace policies.
- Standing up for more inclusion of historically marginalized groups.
- Developing open source technologies.
- Creating open governance processes.
- Pursuing crowdfunding instead of going to banks.
- Starting businesses with flat organizational structures.
- Questioning traditional definitions of success.
- Looking to human-centered approaches, such as design thinking, to solve problems.
- Seeking customized approaches to education.

These actions and countless others signal an appetite for new ways of structuring and coordinating many kinds of daily activities and interactions. The new normal could become a widespread expectation of greater personal empowerment and inclusivity, less bureaucracy, more responsiveness, and more transparency than today's established systems and institutions typically provide.

The Emerging Technologies

Alongside that cultural shift, two emerging technologies – **blockchain** and **smart contracts** – have the potential to give people a completely new architecture for managing the transactions underpinning daily life. Early developers and forecasters of these technologies envision that people could use blockchain and smart contracts to help run businesses, buy homes, exchange goods and services, coordinate learning activities, collect and analyze data, and issue educational credentials.

What exactly are these technologies? In a nutshell:



Blockchain is a distributed, encrypted digital ledger technology that tracks and verifies basic transactions.



Smart contracts are self-executing contracts stored on the blockchain that can be programmed to carry out more complex transactions.

The most important thing about these technologies is that they allow people to work together directly, without the need for a central authority to [verify transactions](#) or keep [data safe](#).

A Word on Technology and Personalized Learning

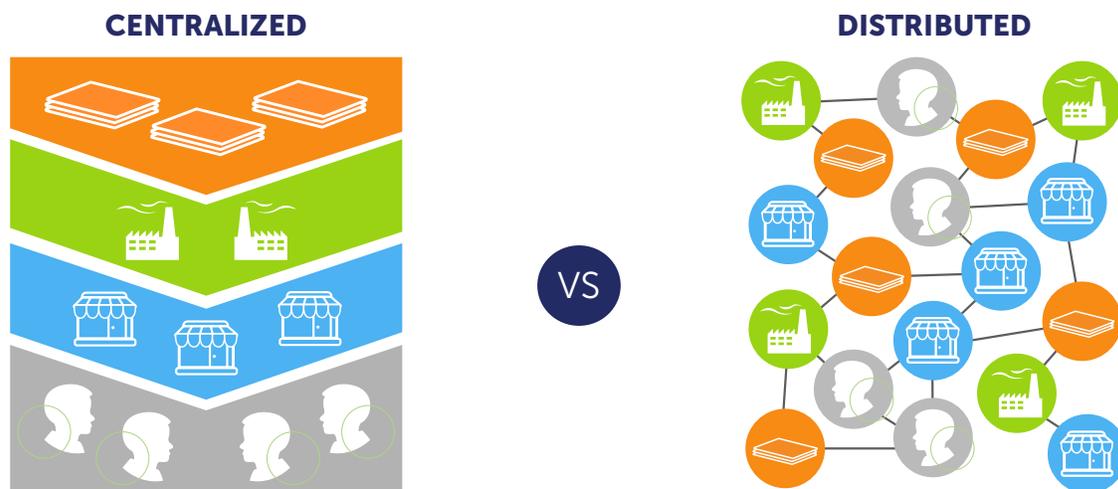
This project focuses heavily on two technologies and their potential role in personalized learning. This focus is neither because we believe that these or any other technologies are the most important elements of personalized learning nor because we believe that any technology will or should be the main driver of the future of learning. Any high-quality implementation of personalized learning will require not only technology but also caring educators, empowered communities, strong infrastructure, and sound policy, along with a collective belief in all children and the willingness to help them succeed. The scope of this project does not allow us to focus equally on all of those elements. Nonetheless, they are essential in efforts to create vibrant and equitable learning ecosystems.

See page 24 for a technology primer on blockchain and smart contracts, as well as these technologies' current state of play.



Distributed Verification

Today, for two or more parties to transfer funds or enter into a contract, an institution such as a bank, law firm, or government typically has to verify that everything is happening according to established rules. Blockchain and smart contracts can provide an alternative by enabling people to carry out those types of transactions without traditional intermediaries. Generally, only one institution has access to the necessary information and the authority to decide whether to verify a transaction. In this case, every computer in a large and distributed network can access the relevant records and the criteria for verifying the transaction. Once the transaction begins, each computer checks the records and the rules; as soon as a majority of the computers in the network agree that the transaction is legitimate, it is approved. This means that no single person, computer, or company has any more control over the records or processes than any other, potentially eliminating long wait times, costly brokering, and biased decision-making. Other technologies that may seem distributed, such as cloud storage, are still centrally controlled by one company. With blockchain and smart contracts, the only authority to approve transactions lies in the consensus of the network.



Distributed Security

According to common beliefs about privacy, authority, and security, taking such a decentralized approach would seem to make processes run through blockchain and smart contracts less secure or equitable than if they were run through a tightly controlled, centralized system. But blockchain's distributed verification processes and record storage can actually increase security because no single actor can derail the verification process and the hacking of a single computer does not compromise the records. In addition, the transparency of the process – a record of each transaction is visible to anyone, though people's identities are protected through encryption – creates both accountability for equitable dealings and a historical record that cannot be altered. These safeguards enable people to manage exchanges and enter into contracts peer-to-peer, even if the parties do not know or trust each other. Thus, blockchain and smart contracts provide an alternative approach to security, again reducing the need to rely on established, regulated institutions.

For more on how these technologies work, check out our [technology primer](#). For more on their potential development and application, read more about the current [state of play](#). Or continue reading below for more on what smart transactional models could mean for education.

Possible Impacts on Education

In combining a powerful cultural shift with rapidly developing technologies, the smart transactional models driver of change has the potential to cause significant disruption to current ways of organizing and managing institutions. It could transform people’s relationships with traditional institutions, including schools; change how we approach educational management and administration; increase equity through more distributed authority and transparency; and enable new forms of coordination that do not depend on established systems and structures.

This project explores possible impacts of smart transactional models on education by asking two framing questions:

- In what ways might blockchain and smart contracts provide the technical foundation for a new architecture for education?
- How might emerging social conditions and cultural mindsets motivate the adoption of these technologies in K-12 education?

To surface future possibilities around these uncertainties, we created four “Learning on the Block” scenarios, a map illustrating how elements of those scenarios might manifest in the future, and an overview of strategic issues that education stakeholders should consider. The scenarios are the result of scanning for signals of change and primary research, and they assume that the technologies driving the emergence of smart transactional models have matured and have been adopted for educational use to varying degrees and in various ways. Each scenario is written from the perspective of a different stakeholder and dives into a unique combination of answers to the framing questions.

Learning on the Block | FOUR SCENARIOS



Faster Horses

A district increases efficiency and security without truly personalizing learning.



Parent Power

Unschoolers coordinate self-directed learning, with smart contracts securing access.



Terms and Conditions Apply

An ed tech product promises turnkey personalized learning – at a cost.



Systemic Synergy

A regional learning ecosystem enables and credentials customized learning pathways.

How to Read and Use the Scenarios

These scenarios project possible ways in which smart transactional models could impact education. They represent neither predictions nor preferred outcomes, nor are they mutually exclusive. Rather than offering an aspirational vision for future uses of smart transactional models in education, they aim to surface a range of perspectives so that readers can clarify their own points of view and consider strategic possibilities.

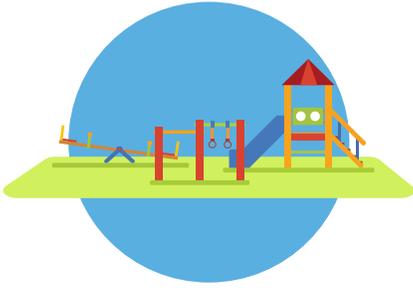
The scenarios will likely generate more questions than answers and may elicit a range of emotional responses. As you read them, we suggest that you consider several questions:

- What made you feel hopeful or curious to learn more?
- What alarmed you or sparked you to think, “Yes, but...”?
- How do the values and priorities of each scenario’s narrator reflect or differ from your own?
- Which outcomes might you hope to enable or prevent?
- What other implications do you see that the scenarios did not fully explore?

Blockchain and smart contracts are in the early stages of development, and no one knows all the details about how they might mature and operate in the future. Cultural mindsets are fluid and could shift in a different direction than they are moving now. Because of these uncertainties, it would be easy to leave the thinking about the potential impact of smart transactional models on education to technologists and corporations, but that would not be a wise move. Instead, educators need to be a part of the discussion, both to help shape the discovery of how smart transactional models might be used to support learning and to understand a set of major social and technological shifts that could affect the world in which learning occurs. These scenarios offer one entry point into that discussion and an opportunity for all stakeholders to engage with this topic.



Scenarios



Faster Horses

Scandal, data security concerns, and systemic inefficiencies have led a large urban public school district to adopt a [private blockchain](#)-powered administration platform. The new solution allows the district to keep student data secure, increase trust in the reliability of its accountability reports, and streamline administrative processes. Written in the form of an open letter to parents and taxpayers from the district's superintendent, this scenario explores the ways in which adopting the platform has created the illusion of change by increasing efficiency without changing approaches to learning or addressing existing inequities in a meaningful way.



Terms and Conditions Apply

A Silicon Valley entrepreneur, fresh off the massive success of his blockchain-enabled financial technology product, creates EDBlock. This proprietary turnkey product is meant to help schools offer more learning opportunities, stay relevant in a competitive marketplace, and remain financially solvent. Written from the entrepreneur's perspective, this scenario explores the appeal of an easy-to-implement ed-tech solution, the hidden consequences of its apparent convenience, and the potential conflicts that can emerge as new benefactors embed their values in the solutions they offer.



Parent Power

Parents in an unschooling network found themselves needing a way to coordinate learning activities. To address that need, they created an open-source, [consortium-style](#) blockchain-powered network management tool. Written from the perspective of an unschooling parent who maintains a blog, this scenario explores how that tool helps learners discover and access learning experiences across the community, along with the challenges of maintaining such a system and persuading independent learners and diverse learning providers to participate.



Systemic Synergy

Public demand for greater control over and decentralization of education has led a regional learning ecosystem to diversify. Larger numbers of learners now access education in new ways, both inside and outside of school buildings, with a blockchain-based ecosystem management tool being used to store, analyze, and verify learning-related data. Written from the perspective of a learner who sits on the region's learning ecosystem stewardship council, this scenario explores the opportunities and limits to using blockchain and smart contracts to coordinate the activities of an expanded learning ecosystem.



Faster Horses

Scandal, data security concerns, and systemic inefficiencies have led a large urban public school district to adopt a [private blockchain](#)-powered administration platform. The new solution allows the district to keep student data secure, increase trust in the reliability of its accountability reports, and streamline administrative processes. Written in the form of an open letter to parents and taxpayers from the district's superintendent, this scenario explores the ways in which adopting the platform has created the illusion of change by increasing efficiency without changing approaches to learning or addressing existing inequities in a meaningful way.

An Open Letter to Parents and Taxpayers: Our District's Advances and Public Chain of Trust

8/25/2026



Dear Parents and Taxpayers,

You might be aware that six years ago, this school district retooled our administrative staffing and infrastructure to enable significant investment in the blockchain-powered administration platform, Public Chain of Trust. This platform helps us put learners front and center on our journey toward being a top-rated district that supports all young people in developing to their fullest potential.

More specifically, Public Chain of Trust is helping the district do three things and do them well: 1) ensure the security of student data, 2) reliably demonstrate student outcomes, and 3) maximize operational processes. It is thereby supporting our constant efforts to deliver the best possible education to all students entrusted in our care and steward responsibly our community's investment in education and its future.

Ensure the Security of Student Data

First and foremost, Public Chain of Trust protects student data. As a distributed storage system operating on a highly encrypted technology called the blockchain, it is far more secure than the centralized databases we used to maintain.

In 2020, as the district began using blended learning in more extensive and creative ways,

continued...

bring-your-own devices became more sophisticated and more wearable, and districts around the country experienced repeated data leaks. We knew we had to take preventative action to meet our legal – and more importantly, our ethical – obligations to your children. While our district had experienced only a few small data leaks and had been able to identify most of the compromised data, we realized that the technical complexity involved in keeping larger and larger amounts of student data secure was exceeding our grasp, even with our strong technology team.

Public Chain of Trust eliminates those risks through state-of-the-art data encryption and security protocols that make student data safe and immutable. Nobody can alter student data without the blockchain network confirming the accuracy of the change. Therefore, we can assert with confidence that there will be no more data breaches for which this district is responsible.

You do not have to worry about keeping track of every piece of your child’s data; we have that covered for you.

Reliably Demonstrate Student Outcomes

Secondly, Public Chain of Trust ensures that all student outcome data is impervious to tampering by district employees and that we can be confident in our performance reports. While every district wants such assurances, they are especially essential for us given the incidents of willful misconduct that a few district employees committed in the early 2010’s.

This district came under well-deserved fire for misrepresenting the achievement data of students with special needs and scrubbing attendance records to steer clear of accountability sanctions and protect much-needed funding. We broke your trust through such actions. The organization Watch Our Schools was right to have their eyes on us. Parents were right to insist on having more information about what was happening in classrooms and at the central office. I came into this position determined to clean up operations and rebuild trust, and I remain dedicated to doing so.

Today, data from standardized tests goes onto Public Chain of Trust automatically. Teachers are, thankfully, still human, but that does mean they can make errors when entering day-to-day assessment data in the platform’s gradebook app. But the platform’s verification algorithms constantly scour the data for discrepancies and alert us when data needs confirmation. If we decide any records need to be changed, three independent reviewers must confirm that the change is valid. Any data that gets flagged for us also gets flagged for the State Department of Education, which can see how we resolve each inquiry.

Our operations are transparent for students and their families, who have anytime access to individual learning profiles. Similarly, district taxpayers can see extensive and timely data about academic performance and resource allocation. That data is not student-specific but holds the district accountable to our community.

We should all be proud of what the data show. Ten years ago, a few of the district’s best schools had begun to nudge out schools in traditionally high-performing suburban districts in our state’s school rankings. Today, 80% of all children are reading at grade level and have core mathematical skills, as evidenced by our consistently high standardized test results. Our concerted pursuit of educational improvement has worked. We have nothing to be ashamed of, and we reveal it all for your scrutiny, without giving any personal student information away.

continued...

Maximize Operational Processes

Lastly, we are reporting more but are spending less time – and fewer taxpayer dollars – doing it. Public Chain of Trust has made many core operations such as attendance reporting and financial reconciliation more accurate and simpler to manage, reducing our administrative overhead and ensuring that funds and transfers to other entities are accounted for correctly.

Those improvements mean that we can focus more resources on what counts most: the teachers who are educating your children. Teachers have access to frequent data about how the students in their classrooms are performing, and instructional coaches help teachers tailor their delivery to draw forth the best from every student.

We are also beginning to hone our school assignment processes to align more closely with students' needs. For instance, our secure and robust data sets allow us to predict success in various school settings based on performance patterns. Combined with transportation algorithms that keep students as close to home as possible, the assignment process allows us to identify the ideal learning environment for each child. While criticism has been leveled that basing such judgments on standardized test results presents a limited view of performance or reflects cultural biases, we must work with what data we have and administer district resources fairly.

However, we do take those and other concerns about equity seriously. We have received complaints about racial bias in some recent disciplinary decisions and heard concern that the permanence and transparency of discipline records kept on the Public Chain of Trust could lead to discrimination. We are currently examining the data and logging such complaints, but I do not see sufficient evidence that our discipline policies or documentation processes require revision at this time. We will, however, continue to monitor all district processes for equity.

Looking Ahead

Parents, taxpayers, and other key stakeholders can see – and therefore feel confident in – what students are learning and how the district uses public funds. Student data is secure and reliable, assessment data is encouragingly high, and district operations are running more efficiently and effectively than ever.

Please join me in celebrating the tremendous progress in efficiency and coordination that this district has made through our deployment of Public Chain of Trust. I promise you that I will continue to inspire our educators to make this a top-rated district and that we will continue to support your children in developing to their fullest potential and preparing for the future.

Sincerely,

A handwritten signature in cursive script that reads "Sidney Niles". The signature is written in a dark grey or black ink on a light beige background.

Sidney M. Niles, Ed.D.
Superintendent of Schools



Terms and Conditions Apply

A Silicon Valley entrepreneur, fresh off the massive success of his blockchain-enabled financial technology product, creates EDBlock. This proprietary turnkey product is meant to help schools offer more learning opportunities, stay relevant in a competitive marketplace, and remain financially solvent. Written from the entrepreneur's perspective, this scenario explores the appeal of an easy-to-implement ed-tech solution, the hidden consequences of its apparent convenience, and the potential conflicts that can emerge as new benefactors embed their values in the solutions they offer.

Enter the Tech Titan: Jarrod Ross's Plan to Reshape Education

Ed Tech Trends, May 5, 2026

The famed startup competition TechCrunch Disrupt held its first-ever virtual reality event, TechCrunch Virtual, last night. The event featured a keynote by financial tech innovator Jarrod Ross, whose talk focused on his newest venture, EDBlock, and its potential to disrupt the education system. Below is a transcript of Ross's keynote, which highlighted EDBlock's ability to personalize learning, create seamless student interventions and supports, coordinate professional development, and unlock student data as a revenue stream for schools. Many in the audience were quick to praise EDBlock's promise of a seamless education system. Others in the audience were alarmed, noting that, while EDBlock clearly reflects Ross' belief in technology as the solution to society's ills, they believe it is not a true step towards equitable, personalized learning. The full transcript of Ross' speech is below.

"For those of you who might not know me, my name is Jarrod Ross. I am the founder and former CEO of Hyper Wallet, the massively disruptive blockchain-based financial technology that now powers the world's transactions. I am here today to talk to you about my plan to transform education. Just as we've solved some of the finance industry's most pressing issues by ensuring secure transactions and by cutting out the middle man to optimize value flows, blockchain experts like me can solve the most pressing issues that education is grappling with.

We have the power and responsibility to significantly improve education, disrupting the current system and transforming it into something that works well for everyone: more choice, deep partnerships with industry, personalized professional development for educators, and increased resources for schools. In so doing, we can unlock the hidden value that has long been trapped in highly centralized, complex, and expensive IT systems. Just as we did with the financial industry, we can unleash the power of blockchain on education and take learning to levels of personalization and efficiency that are simply unattainable with its current architecture.

Allow me to introduce you to EDBlock. EDBlock is based on the same proprietary

continued...

technology that powers Hyper Wallet. At its core is an education-centered blockchain that will replace the outmoded IT systems and mismatched databases that school districts use today. EDBlock will capture all of a learner's experiences in the very same way that Hyper Wallet records and verifies all of your financial transactions. For example, EDBlock will log every assignment given and submitted, every afterschool experience, and every test taken, among the countless other learning transactions that occur every day.

EDBlock utilizes the Hyper Wallet closed-loop distributed model where learning transactions are verified and stored across our network of computers, meaning that you get all of the safety of a distributed model and none of the worry about people outside of the system having access. Besides increased peace of mind that a learner's data is secure, one of the most exciting features of EDBlock is that it gives schools the ability to expand their educational offerings without adding any additional work for teachers or administrators.

We know that schools want to offer a wide range of great opportunities to their students. We also know that it can be extremely time and resource consuming to create partnerships with outside organizations or to add new programs in-house. That's why the EDBlock system comes with its own list of pre-approved partners who offer afterschool services, clubs, targeted services for students with special needs, and supplemental learning opportunities. This list of partners also includes a diverse range of companies looking to build a mutually beneficial relationship with your school and your students. Many are ready to offer internships, educational project-based work for students, and sponsorship in exchange for access to students' attention to their products and offerings.

We at EDBlock recognize that true personalized learning doesn't only mean offering students more options; it also means giving students the unique supports they need. Using our smart contract templates, schools can create automatic interventions for students that execute seamlessly whenever an academic problem surfaces. That might mean that EDBlock's algorithm updates a student's profile to mandate extra time for assignments, hires a tutor, revises an IEP, or contracts out for supplemental services.

The product helps maximize schools' human capital investments by coordinating professional development.

For schools that already contract with outside organizations or service providers, those partners can apply to EDBlock to be listed as approved providers. Once approved, EDBlock manages schools' relationships with their partners and automatically issues payment when the services are complete. This level of efficiency will help schools save money by reducing the amount of time spent on such tasks or, in some cases, eliminating redundant positions. Schools can then pass along their savings to the student, effectively increasing per pupil funding.

This sounds good, right? It gets better: EDBlock goes beyond basic process efficiency to help teachers be the very best they can be. The product helps maximize schools' human capital investments by coordinating professional development. Going far

continued...

beyond current skill tracking systems, EDBlock combines its unparalleled ability to track both formal and informal learning with proprietary smart contract technology that looks for and awards credentials and certifications based on the competencies identified in professional development plans. This streamlined certification power proves the value of your staff, which translates to higher-rated schools.

Last but not least, I would like to share EDBlock's most exciting feature: its unmatched ability to create new revenue streams that benefit learners, their families, and their schools. Like other blockchain systems, EDBlock is pseudonymous. Even though all of a learner's data is stored in our system, it is associated with a random number in place of a name or social security number. This layer of security keeps student data safe and secure. Combined with EDBlock's unique ability to catalog experiences and behavior, it also allows EDBlock to unlock the value of student data by auctioning it on the open market to companies around the world interested in developing insights into the preferences and behaviors of young people while protecting each learner's identity. A portion of the resulting funds will go to the student's district, charter operator, or private school. So the more educational experiences a learner has, the more money his or her data might earn. This monetization of the latent power of student data creates an entirely new incentive for schools to personalize learning.

To put it simply, we have done the hard work for you. All schools have to do is complete a hassle-free application and pay a nominal annual fee. If you want your school to offer exciting new choices for students and stand out from the rest, our network will provide an easy, secure system with a multitude of options.

The world is changing, and education must change with it. EDBlock has the power to transform our education system, making it more efficient and more personalized. The time is ripe for disruption, and who better to lead the way than a tech entrepreneur with a proven track record of innovation and value creation? We're going to break open our outdated education system and power this important public investment with the best of today's technology.

EDBlock will be released in beta over the summer, with a full release scheduled for June 22, 2027. For those of you who want to join us in disrupting education, we will begin taking preorders tomorrow.

Thank you. Here's to the future."



Parent Power

Parents in an unschooling network found themselves needing a way to coordinate learning activities. To address that need, they created an open-source, [consortium-style](#) blockchain-powered network management tool. Written from the perspective of an unschooling parent who maintains a blog, this scenario explores how that tool helps learners discover and access learning experiences across the community, along with the challenges of maintaining such a system and persuading independent learners and diverse learning providers to participate.

PARENT POWER

A place for homeschooling, unschooling, and hackschooling parents to build a community that empowers their children's exploration and learning.

PARENTING

RESOURCES

EVENTS

ABOUT

Spoke: Our Key to Self-Directed Learning

October 15, 2026

Here's the post you've all been waiting for! The most popular question I've received in the last year from unschooling parents all over the world is: "How does Spoke work, and how do we do what you've done?" I finally feel as if we have enough experience with it and as if I have enough understanding of it to explain it to other non-technical people like me.

What is Spoke?

New to my blog? Here's the short version: Spoke is our blockchain-powered network management system. Parents and kids within our unschooling network built it using open-source code. People network-wide now use it to find out about new learning opportunities, coordinate daily learning activities, and store and analyze learning data.

Why did we build Spoke?

Our network had very specific needs. Each family was scouring the community for new learning opportunities and figuring out the logistics of coordinating them. Many of us felt overwhelmed. We were all trying to solve the same problems without really working together. We looked into out-of-the-box learning management systems, but they either assumed that all kids were following a similar learning pathway, or the companies had overly invasive data policies.

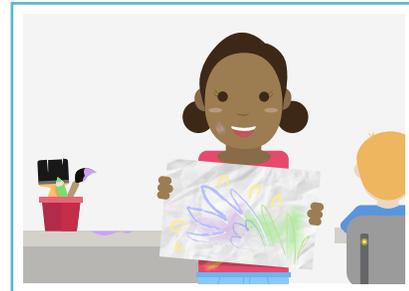
One of our parents, Anat, had recently left a tech company and suggested we build our own

continued...

network management system using blockchain and smart contracts as the backbone. It seemed complicated, but Anat said that open-source blockchain and smart contracts were invented to do exactly what we needed: provide efficient coordination and unhackable data monitoring and storage without reliance on big tech companies. The network voted, and we decided to go for it. She and some students built the system from scratch to meet our needs.

How does Spoke work?

My daughter is interested in art, so she takes art classes at the local museum, watches videos online, submits her work to local galleries, and connects with other artists. She inputs each of those activities and experiences into Spoke with a rating, and her device logs her mental focus and engagement levels. Spoke securely stores that data so that its built-in algorithms can later make recommendations about other learning opportunities she might like. Spoke has developed a learning profile for her based partly on what she's entered manually and partly on what we set her



My daughter's art class at the local museum

devices to monitor and report automatically. Every day, my daughter can look at Spoke and find out what learning activities match her profile. Sometimes she chooses those activities, and other times she decides to do something else, but we know so much more about what's happening because the devices of everyone in our network – the parents, the kids, the tutors, the community organizations that provide learning experiences, and online learning providers – all connect up with Spoke. Because of those connections, Spoke also learns from other kids' experiences in recommending matches for my daughter, and her experience can help them too.

Some parents were wary of all this data sharing. I knew that our devices would house private information about a friend down the street and vice versa. When objections arose, Anat reminded us that using Spoke's distributed architecture allows us to stay truly independent. Our network, not a company, manages the data, and we all have encrypted pseudonyms to protect our identities. Because we're a consortium-style blockchain network, we collectively set the terms of what types of data and what information about transactions every person within the network can see. Anat also reminded us that the distributed approach to storage and verification is vastly safer than having everything run through a single server. We had a few holdouts. But when hackers infiltrated the local school district's database and tried, unsuccessfully, to hack Spoke, we grew to nearly unanimous participation in the network.

Now that we've been up and running for a year, Spoke really is making our lives easier. Once Spoke recommends a learning opportunity, sometimes it's as easy as selecting "Accept" and showing up next Tuesday. Other times, it's more complicated, so Anat and the students built smart contracts into the system. Coordinating specialized space – like science labs and art studios – and finding subject-matter experts used to be a nightmare. Now, once our kids decide to work on something together, Spoke automatically finds and pays for a place for them to meet and coordinates a contract with the educator or other professional.

Spoke often feels like magic. Unfortunately, getting the guitar teachers, makerspaces, libraries, and every other possible source of learning opportunities to see that magic hasn't always been easy. The bigger our network, the better the offerings and the faster the processing time. So we've been feverishly working to add more learning providers. Because each provider has its own systems for

continued...

coordinating activities, marketing their services, and dealing with data, our request to use Spoke in addition to or in replacement of those systems has often been met with a brush off; the initial leap to a whole new way of doing things can feel too big to them. Even though every day it feels as if another person or organization starts to see the value of shared and dispersed systems over closed and centralized ones, we still have a long way to go to realize our goal of having a fully-formed web of learning opportunities our kids can access.

And we've had some growing pains. Because of the way blockchain verifications work, a majority of our devices have to confirm that a transaction or data point was logged incorrectly before it can be changed. That is an essential security feature, but it also causes headaches. For example, our neighbor was triple-charged for a ride to the arboretum. Another student, who was protesting data tracking and trying to show flaws in the system, gave his device to a traditionally schooled friend for a day. His data is now enormously skewed to the point that his family has to coordinate his learning manually. Anat is working on fixing both of these problems. Being a DIY shop has its downsides.

Spoke is lowering the barrier to accessing alternative ways of learning for all kids.

Bottom Line

I believe the best days of Spoke are yet to come. The tool will get more helpful once we are able to persuade more families and learning providers to believe in its power, but I am happy with what it provides thus far. I am especially proud that Spoke has made unschooling accessible to a few families who otherwise never would have had the time to coordinate their kids' learning opportunities or would have been too intimidated to try. Spoke is lowering the barrier to accessing alternative ways of learning for all kids.

I'll continue to reflect on our experiences with Spoke, and you keep the questions coming!



Systemic Synergy

Public demand for greater control over and decentralization of education has led a regional learning ecosystem to diversify. Larger numbers of learners now access education in new ways, both inside and outside of school buildings, with a blockchain-based ecosystem management tool being used to store, analyze, and verify learning-related data. Written from the perspective of a learner who sits on the region's learning ecosystem stewardship council, this scenario explores the opportunities and limits to using blockchain and smart contracts to coordinate the activities of an expanded learning ecosystem.

Young Leaders: Jonah Jackson on Competency Education and 'The Ant Hill'

By AVA ESPINOSA, Staff Writer

Springfield, February 21, 2026 -- As part of The Sun Daily's Young Leaders series, 18-year-old Jonah Jackson shared his experiences serving on the Learning Ecosystem Stewardship Council during an overhaul of accountability standards and the implementation of a blockchain-based ecosystem management system (EMS), nicknamed "The Ant Hill." His two-year term ends this month. This interview has been edited for length and clarity.

Ava: Thanks for agreeing to talk with me, Jonah. Let's begin with what the Learning Ecosystem Stewardship Council is and does.

Jonah: We're the governing body that supports, oversees, and solves problems for the region's learning ecosystem. I'm one of seven members, and each of us represents a different stakeholder group in the community. We also have an algorithmic member that helps us crunch the numbers and offers purely data-driven

options. We call him Hank. He doesn't have a vote, but he gives us plenty to think about because of all the data he can comb through and analyze for us.

Ava: What main projects has the Council been working on during your tenure?

Jonah: Probably 80% of our energy has gone toward the related efforts of developing new assessment protocols and implementing The Ant Hill, which is our pet name for the new blockchain-based ecosystem management system that allows the assessment protocols to run. We've been up and running with both for about a year.

Ava: Why do you call it "The Ant Hill"?

Jonah: We like to think of learning in our community like an ant colony, where every one has a certain level of autonomy in how they pursue

continued...

their learning, but we all also have an obligation and commitment to the whole. We decided to use a blockchain-based ecosystem management tool as a backbone because it reflected that goal of coordinated empowerment.

Ava: You said that the new assessment protocols and The Ant Hill

were related goals. What do they have to do with one another?

Jonah: The best way to describe it is to give an example. Serving on the Council is part of my Anticipatory Civic Leadership learning pathway. I wanted to learn about making policy and leading in a way that will set us up well for the future. Even though I learn this way instead of in a traditional school, I still have to prove that I meet the basic state standards. So we started with the standards related to civics, government, economics, public speaking, writing, and statistics and found some initial learning opportunities that aligned with them. Then Seren, my learning pathway designer, and I thought about what else an “expert” in what we called Anticipatory Civic Leadership should know and do. We drafted additional competencies for policy development and foresight and developed rubrics for mastery. Then we asked subject matter experts and educators to review them. Once I started working down my Anticipatory Civic Leadership learning pathway, we had those and other experts – both professionals and deep-learning-enabled machine partners – review my portfolio.

We can do all of that without The Ant Hill, but the process is much easier, more reliable, and more comprehensive with it. Competencies, rubrics, and aligned

learning experiences are put into the system. Experts weigh in on a learning pathway development space. Once they reach a pre-determined level of consensus about the quality and rigor

“ *This creates a transparent trail of the process and ensures that my rubric scores aren’t skewed one way or another.* ”

Jonah Jackson, Learning Ecosystem Stewardship Council

of my learning pathway, a smart contract fires based on the protocols we set up when we started the Ant Hill, and the

competencies and rubrics are approved. Seren and I do one more check-in, and I’m free to start the journey. The Ant Hill also makes it much easier for us learners to see one another’s pathways and adapt and use them for ourselves. Learning providers can also see what we’re interested in and can respond with new offerings.

I carry out my learning journey much the same way I did before: I’m working with Seren, I’m meeting with my learning cohort, or I’m interviewing people I respect in the community. The difference is that, as I do all of that, I upload my work to The Ant Hill. That might be speeches I give at the Council, statistical analysis I complete to make decisions, or a project I do for my foresight class. The initial smart contract fires, and the work is open for feedback and assessment. The experts and educators verify where I have met competencies and at what level. Once they reach consensus, the next smart contract confirming my level of mastery fires. This creates a transparent trail of the process and ensures that my rubric scores aren’t skewed one way or another. Because of The Ant Hill, I have a verified, completely trustworthy, and visible record of what I’ve done and how it matches to what I should be learning according to the state and to my own goals. Once I collect a certain

continued...

sequence of competencies, the final smart contract fires, and the associated credential or micro-credential appears in my Ant Hill learning log, alongside all the interactions I've had along the way.

“ **You can't crowdsource without a crowd.** ”

Jonah Jackson, Learning Ecosystem Stewardship Council

I am meeting all of the standards at a high level. And I know that I will always get credit for my work because the Ant Hill shows an indisputable record of its creation and assessment.

Ava: Wow. That seems better than getting an 'A' and calling it good. Why do these experts from the community participate in your learning?

Jonah: The ecosystem is continuously building its bank of experts in different fields, which is crucial to success. You can't crowdsource without a crowd. We have smart contracts in place with many local companies, organizations, and professional associations that award their employees or members civic reputation points if they contribute. Many people volunteer because they want to give back to kids, and some get paid for their time. We've heard feedback that this process helps them know what people coming up in their fields are learning and helps them think about any skills gaps they see in their industries. Some regional and national experts and organizations have agreed to participate, but we need to expand the incentives to grow the network to the level we need, and that's a challenge.

Ava: So what's different for you as a learner now that these new systems are in place?

Jonah: There's less of an ad hoc feeling to what I'm doing now. Before it felt like I was always asking for favors, and I was never sure if I was asking the right people or if they were just signing off on my rubrics or my work because they liked me or wanted it to be over. Now I can be sure that

I also know so many more people now. At first, our ecosystem was just the true believers: learners and educators who wanted to break out of a lockstep model and a few partners who wanted to offer new kinds of educational experiences. We all had to be incredibly dedicated because coordinating learning was difficult. The missing piece of the puzzle was a way to broker relationships and verify learning securely and productively without putting learners and providers back into traditional boxes. The Ant Hill is that missing piece, and since we've been using it, more people and organizations have come forward wanting to be part of our ecosystem. Kids whose families didn't have the time or resources to personalize their learning can now more easily learn this way. We can now spend more time on learning and on getting to know one another and less time on the logistics.

Ava: What's next for you?

Jonah: I will be taking an apprenticeship with a social impact finance company and also taking a few classes at the community college. I'll still come to Council meetings, though. The other members have become like my second family, and I'm proud of the work I've done here, so I'll always be invested in this work.

Ava: Thanks for your time and insights, Jonah. Best of luck to you in the next stage of your learning.



Evaluating the Potential of Smart Transactional Models

Each of the Learning on the Block scenarios addresses ways in which the smart transactional models driver of change could impact education. They illustrate different ways in which various stakeholders and types of learning ecosystems could adopt blockchain and smart contracts to facilitate learning or to improve administrative processes, along with varying motivations for doing so. They also illustrate different kinds of challenges, opportunities, and outcomes that we think education stakeholders should consider as blockchain and smart contracts continue to develop and as mindsets around the ways in which we coordinate our daily activities continue to shift.

As we mentioned at the outset, these scenarios do not represent an exhaustive set of possibilities, but rather highlight areas for consideration and further exploration. Having read them, you might find it useful to revisit the questions that we posed earlier:

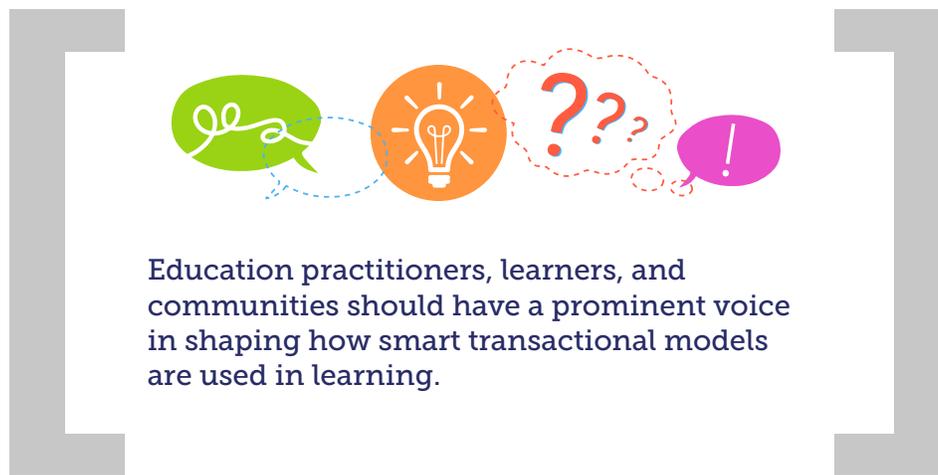
- As you read each scenario, what made you feel hopeful or curious to learn more?
- What alarmed you or sparked you to think, "Yes, but...?"
- How do the values and priorities of each scenario's narrator match or differ from your own?
- Which outcomes might you hope to enable or prevent?
- What other implications do you see that the scenarios did not fully explore?

Your answers to these questions can help inform your ongoing learning on this topic as well as your plans for moving forward. In addition, below are some strategic questions that can help you evaluate the potential for smart transactional models to provide a new architecture for education.

- **People's relationships with traditional institutions are shifting, and emerging technologies are enabling that shift.**
 - How might those factors affect learning?
 - Could the purpose of education change as society changes?
 - Could new forms of coordination allow the broader community to be more involved in learning?
 - Will learners and families seek more transparent and less hierarchical ways to organize learning, and will those ways be widely accessible?

- Alternatively, will current education systems withstand such social and technological pressures?
- **The ways in which we collect, store, and share student data have the potential to change dramatically.**
 - What policies might need to be put in place to support equity, privacy, and student-centered learning?
 - How might those policies intersect or conflict?
 - Could the adoption of blockchain and smart contracts enable us to collect more meaningful data safely and to use it more purposefully?
 - Alternatively, could having more efficient and secure data systems create the illusion of improvement but actually reinforce our reliance on limited and sometimes inequitable measures of student achievement?
- **Today's public education system has bright spots that education stakeholders will want to build on moving forward. It also has problems, especially in terms of providing all learners with a student-centered and equitable education.**
 - What are the implications, both positive and negative, of using blockchain and smart contracts to make current systems and structures more efficient?
 - Could using these technologies free up resources and attention to enable educators to focus more on individual students' needs?
 - Alternatively, could using these technologies present the guise of personalized learning without truly enabling new approaches to instruction or better outcomes for learners?
- **Differently organized learning ecosystems would have their own bright spots and problems.**
 - What might be the implications, both positive and negative, of using blockchain and smart contracts to build a new architecture for education?
 - Would these technologies be developed and implemented with equity and personalized learning in mind, enabling true empowerment for learners and families?
 - Alternatively, would they be developed and implemented in a way that prioritized other interests or shored up power for a few?
 - What else, beyond or instead of blockchain and smart contracts, could be used to enable personalized learning and an expanded set of learning activities?
 - Ultimately, what technological and cultural shifts would need to take place to enable an expanded, equitable, personalized learning ecosystem?

Technologies such as blockchain and smart contracts are developing quickly and are already being applied to education. Those developments are intersecting with a cultural shift toward personal empowerment and inclusivity, distributed authority, and increased transparency. Education practitioners, learners, and communities should have a prominent voice in how smart transactional models develop and in considering whether and how these forces of change might provide a new architecture for education and enable personalized learning.



We can't know the future, but we have a responsibility to use foresight to make informed decisions today that will help shape it. Having a sense of possibility – including understanding what each of us hopes to see or avoid and looking at multiple implications of any given development – can help us make those choices with eyes wide open.

Using Smart Transactional Models to Shape Learning



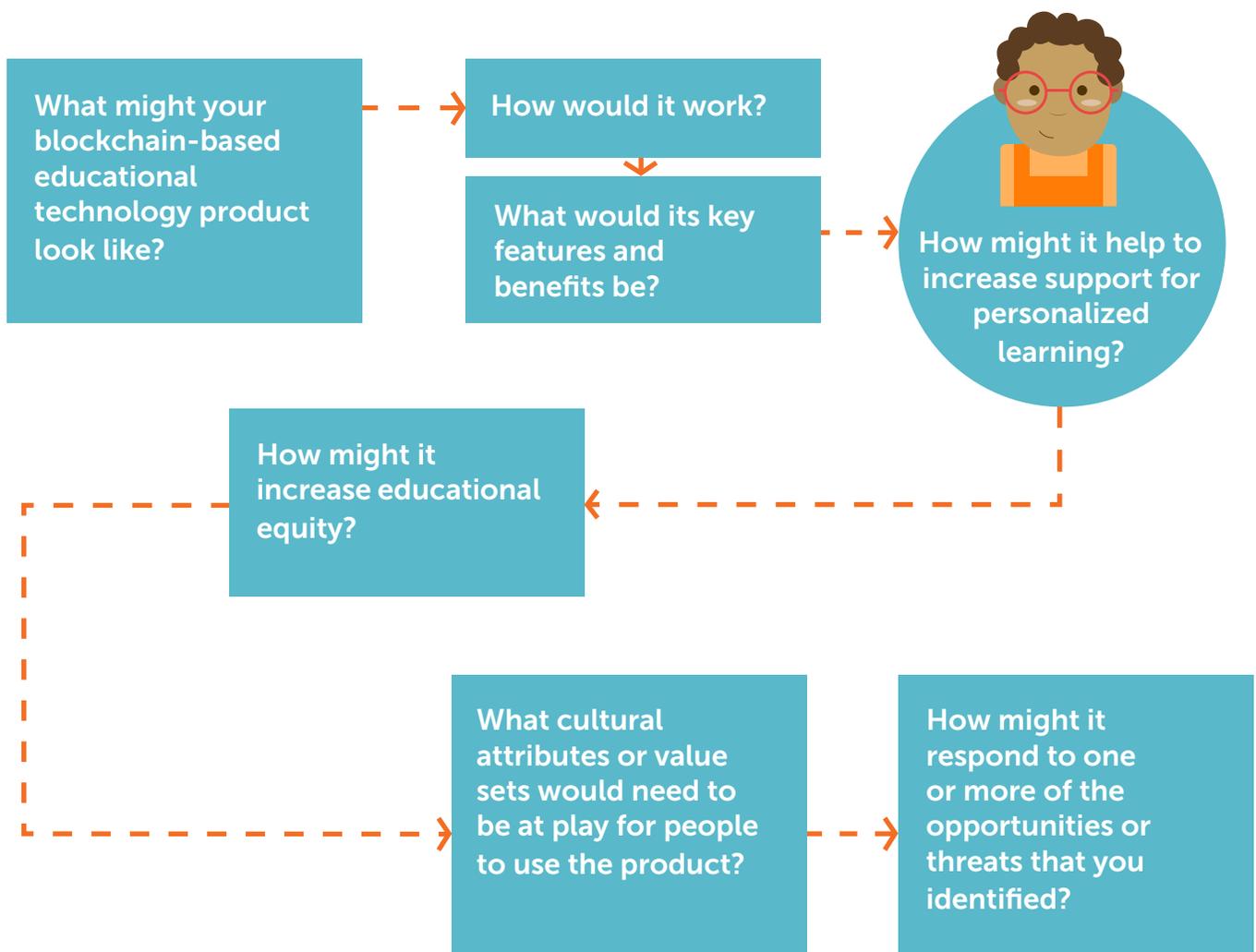
To consider further what the smart transactional models driver of change might mean for you, your organization, and the learning ecosystem(s) to which you contribute, complete the activities below.

1

Taking into account your answers to the strategic questions on pages 22 and 23, where do you see potential opportunities or threats for your organization or learning ecosystem? How might you and others take advantage of those opportunities or mitigate those threats?

2

Prototype the design of a blockchain-based educational technology product that leverages the key attributes of blockchain (distributed authority and security, transparency, immutability of records, potential to be combined with smart contracts to carry out tasks) and takes into account the cultural shift toward more open culture and distributed authority. Use the questions below to think through your design.



Technology Primer

As described earlier, blockchain and smart contracts are the two technologies contributing to the emergence of smart transactional models. More information about how they work appears below.

Blockchain

Today, blockchain is the digital ledger that tracks the transactions of the [Bitcoin](#), the digital currency that can be exchanged peer-to-peer without governments or banks mediating the process. Beyond that limited use, many people think that its collective approach could be a game-changer of the same magnitude as the Internet. As described earlier, blockchain is a distributed, encrypted ledger technology that tracks and verifies basic transactions. Its distributed approach eliminates the need for a [central verifying authority](#) and makes it hard, if not impossible, to hack.

For a real-life example of how blockchain could change everyday transactions, consider what it takes to wire money internationally today. A person puts in an order with a bank, which sends instructions for the transfer to another bank through a secure system. The banks often need some kind of pre-set agreement, they collect fees, and the process can take several days. Using blockchain, the person sending the money would simply open her digital wallet, select the recipient, and hit “send.” The network of computers running the blockchain would go into action, checking the transaction history to ensure that she had enough funds and was authorized to send the money and that the instructions for the transfer were correct. Once the money was sent, a record of the transaction would be created. That record would include the amount sent, a time stamp of when the transaction took place, and the participants who were involved.

Blockchain stores this kind of information by bundling it into blocks that are strung together into chains of transactions. The blocks are secured through a type of encryption called a hash, which

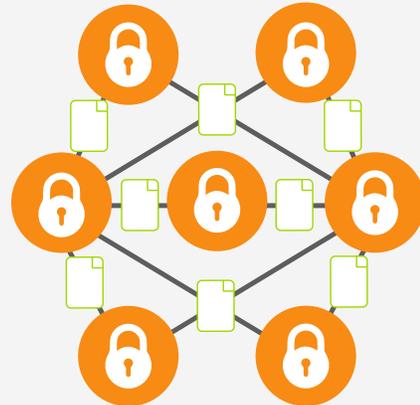


renders the information on the blocks into gibberish and has up to this point been impossible to crack. The network runs continuous verifications on the blockchain. All of the computers in the network must continuously agree on the current state of the blockchain ledger and every transaction in it. If anyone attempted to hack or corrupt a transaction, the network would no longer arrive at a consensus and would not incorporate the fraudulent transaction into the blockchain. Once information is verified, it becomes immutable, meaning that the past history cannot be changed or altered. Thus, unlike traditional methods of wiring money, which require a central authority or a trusted third party such as a bank to verify the process, the blockchain’s verification process requires no human intervention, central authority, or third parties.

Today, Bitcoin transfers follow this process and are relatively inexpensive. Anyone can join the Bitcoin network, and people’s identities are hidden behind encrypted pseudonyms. Bitcoin has never been hacked, and no fraudulent transaction has ever been verified. That said, today’s blockchain technology is only equipped to handle simple financial transactions. Though it may be faster than a traditional wire transfer, it can’t compete with a process like a credit card authorization in terms of speed or capacity. Nonetheless, interest in blockchain is high, particularly when paired with smart contracts.

Smart Contracts

Smart contracts add another layer of functionality to blockchain and can carry out more complex tasks than blockchain can accomplish alone. As described earlier, they are self-executing contracts stored on the blockchain that use algorithms to check against pre-programmed conditions. Once those conditions have been met, smart contracts can verify and automatically execute the terms of a contract.



Few working smart contracts exist today, but people are exploring their use for [multiple purposes](#). To get a feel for how they might work, imagine that a person has set up his will as a smart contract. Because the smart contract is built on blockchain and maintains its networked approach, the will would be unhackable and immutable, just like the wire transfer in the example above. However, in this case, a smart contract would sit ready to take action when the person died. Per its terms, algorithms would check the Social Security Administration's Death Master File at regular intervals. When they saw that the person had died, the smart contract would trigger into action. It would check the terms of the will and would then order the transfer of money, deeds, stocks, and all other specified assets to their new rightful owners without the need for any human executor.

Because most official transactions must today be triggered by a person, smart contracts' development to date has been limited. However, as people work to make blockchain an automated, trustworthy alternative to processes that today we only trust humans to manage, many see new potential for smart contracts and are willing to spend vast amounts of time, money, and energy to overcome constraints and develop new applications of them.

At their fullest expression, and combined with other emerging technologies, smart contracts could enable the creation of distributed autonomous organizations that operate on their own according to pre-set conditions.

Blockchain and smart contracts enable secure transfer of money and other assets



WILLS



ESCROW ACCOUNTS



FILE STORAGE

The State of Play

The security of a distributed network and efficiency of automated processes are proving to be particularly attractive to the law, real estate, and finance sectors, which are already examining how blockchain and smart contracts could impact their fields. New entrants and established corporations alike are considering how blockchain and smart contracts could be used to help manage [wills](#), escrow accounts, [file storage](#), the [Internet of Things](#), and [everyday bank transactions](#). In addition, some [governments](#) and [public agencies](#) are exploring how blockchain and smart contracts might contribute to the public good by enabling secure data storage, secure voting, efficient civic processes, and even direct citizen empowerment.

Given the sensitivity of the types of transactions that the sectors above manage, the open nature of early blockchain technology is troubling to some. As it exists today, a summary of every transaction is visible to everyone in a blockchain network, and anyone can join. Some blockchain developers believe that this transparency is absolutely necessary for security and distributed management and point to the encryption that keeps people's identities hidden behind a pseudonym. Nonetheless, some stakeholders are exploring less public options. Those include:

- **Private blockchains**, where participation in the network is restricted to individuals and devices within one organization, and the visibility of transaction data can be restricted. This approach would be similar to a shared drive accessible only from computers on a company's network.
- **Consortium blockchains** that take a hybrid approach wherein participation in the network and data permissions must be pre-approved but are not restricted to a single organization. This approach would be similar to the handling of shared folders in Dropbox.

Amid these advances, education stakeholders are just beginning to consider how blockchain and smart contracts could be used to securely [store student data](#), [assess student mastery](#), [issue and verify credentials](#), or [coordinate learning activities](#). The intersection of blockchain and education is quickly becoming a topic of conversation, though no one knows how effectively or equitably these technologies might be implemented or how widely they might be adopted.



About the Authors

Katie King served as Graduate Intern, Strategic Foresight at KnowledgeWorks, contributing to the organization's research on the future of learning and developing creative ways of engaging people with future possibilities. Katie holds a BA in Print Journalism from the University of Southern California and is completing her MA in Foresight at the University of Houston. Having taught middle school English for five years, she focuses her foresight practice on the social sector and in particular on education.

Katherine Prince leads KnowledgeWorks' exploration of the future of learning. As Senior Director, Strategic Foresight, she speaks and writes about the trends shaping education over the next decade and helps education stakeholders strategize about how to become active agents of change in pursuing their ideal visions for the future. Katherine holds a BA in English from Ohio Wesleyan University, an MA in English from the University of Iowa, and an MBA from The Open University.

Jason Swanson is the Director of Strategic Foresight at KnowledgeWorks, where he helps lead the organization's research into the future of learning. Jason holds a BA in Public Policy from West Chester University and an MA in Foresight from the University of Houston, is a fellow with the Royal Society of Arts and former Emerging Fellow with the Association of Professional Futurists.

Acknowledgements

Many thanks to KnowledgeWorks colleagues Nancy Arnold, Sarah Jenkins, Jesse Moyer, Anne Olson, Lillian Pace, Judy Pepler, Matt Williams, and Kate Westrich for their feedback on this paper; to Olivia Bruner for creating the design; and to Mary Kenkel for managing surrounding communications. Thanks also to Aperio Insights for conducting the primary research that informed the development of the scenarios.

