

# Science MATTERS!

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# Blockchain

## – The New Frontier

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There is an emerging technology that could become just as big as the internet and has the potential to change the way we do business and may even alter how our economies work. It is called blockchain and it will likely transform healthcare systems, financial services, energy companies and so much more.



So what is blockchain? Simply, it is a chain of blocks that contain information. Digital information that is added to a blockchain is packed into a new block which then connects with other blocks which are linked together to form a chain.

Blockchain is also called

**Distributed Ledger Technology (DLT)** as it records all transactions on a distributed or **decentralized network**. Decentralized is a way to say there is no central hub where the transaction information is stored. Instead, different computers from all over the world hold pieces of these blocks of data (a single computer can hold the whole blockchain, but it is not required that every computer hold all of the blocks). This network of computers, connected to one another on the internet, are called **nodes**. When new information is added, all of these nodes are updated. Additionally, each block on the chain stores a unique code called a **hash**. A hash is very much like a fingerprint. It is unique and identifies a specific block and its information. Blockchain also uses something called **consensus protocols**, which are rules that allow different computers on the network to agree on what should be added to the chain. This makes it impossible to break into a single device and change the block. Once something is added to the blockchain it cannot be changed; the term used for this is **immutable**.

## Meet the Scientist

I am a technology evangelist who has worked diligently to improve the learning experience for students of all ages with a primary focus on getting and keeping underrepresented populations in STEM education. I founded science and technology incubators and am a passionate advocate for promoting social good. Currently I oversee Strategic Initiatives and Outreach for Southern Connecticut State University. My latest initiatives center around blockchain technology, augmented reality, and digital health.



## SKILLS and KNOWLEDGE

To become a blockchain developer students need a basic understanding of computer programming, networks, data structures and cryptography. A college degree in Computer Science would provide the fundamental skills necessary to enter this type of work. Currently the demand for blockchain developers is extremely high.

## hyperlinks

### Blockchain for kids

<https://lisk.io/academy/blockchain-basics/blockchain-for-kids>

### Here's a blockchain explanation your parents could understand

<https://www.afr.com/technology/web/ecommerce/heres-a-blockchain-explanation-your-parents-could-understand-20170627-gx00oq>

### What is blockchain? The most disruptive tech in decades

<https://www.computerworld.com/article/3191077/security/what-is-blockchain-the-most-disruptive-tech-in-decades.html>



Everyone is allowed to join blockchain and because of this anyone can directly interact, record information or send money to another person without the need for an intermediary or middleman. It is like going to a theme park with a magic wrist band. You do not have to stand in line to pay anyone, buy tickets or tokens. You do not have to wait in line to give your tickets to a ticket collector, put tokens in a machine or pay a cashier. You can get on and off different rides, play different arcade games and buy food from vendors, all with the swipe of your wrist. If you have enough credit on your wrist band you can transfer some of your currency to anyone else with a band. Even better, this magic wrist band allows you to have the same experience at any theme park in the world because blockchain is global.

While blockchain is associated with Bitcoin and other **cryptocurrencies**, it can be used for anything of value. That is why it is being used in areas such as banking, finance, supply chain management, luxury goods, intellectual property, social media, and digital assets. It is the internet of value and is the fastest growing market the world has ever seen.



## WORDS to know

**Distributed ledger technology:** a digital system in which records of currency are simultaneously maintained at multiple points throughout a network

**Decentralized network:** a network that uses peer-to-peer connections rather than using a single point network access

**Nodes:** devices or data points on a larger network

**Hash:** a mathematical algorithm that maps data of arbitrary size to a bit string of a fixed size and is designed to be a one-way function, that is, a function that is infeasible to invert

**Consensus protocols:** rules that allow the devices on a huge network of computers to agree about what should be added to the database that is a blockchain

**Immutable:** unchanging over time or unable to be changed

**Cryptocurrency:** a type of digital or virtual currency that does not need to exist in a physical form to have value

## For Students and Teachers Making Curriculum Connections, see the following:

### Connecticut State Department of Education (CSDE) - Common Core State Standards (CCSS): Mathematics

- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them
- CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others
- CCSS.Math.Practice.MP5 Use appropriate tools strategically

### CSDE - Next Generation Science Standards: Scientific and Engineering Practices

- Asking questions and defining problems; developing and using models; planning and carrying out investigations; analyzing and interpreting data; using Mathematics and computational thinking; constructing explanations and designing solutions; engaging in argument from evidence; and obtaining, evaluating, and communicating information.