How blockchain could help the world meet the UN's global goals in higher education

By Rory McGreal

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Improving quality of life for people globally means investing in education. By 2025, more than 100 million learners are estimated to be capable of higher education but won't have access to it either because they cannot afford the costs, or because courses aren't available in their region.

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Courses aren't available because communities or institutions lack the technological infrastructure, lack suitable content or students lack the internet connectivity. There also aren't enough qualified instructors in broad disciplines who can teach online.

The United Nations Educational, Scientific and Cultural Organization (Unesco) has declared that free digitalised teaching and learning materials known as open educational resources are essential for increasing access for global learners. These materials are key to supporting the UN's Sustainable Development Goal 4 of ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all.

The technology known as blockchain has also been recognised as [an important resource](#) to help achieve strategic development goals. Through the use of blockchain, it could be possible to ensure the availability of more affordable, equitable and quality educational content internationally.

In the Covid-19 pandemic, educational institutions globally have quickly pivoted to online learning, and are examining their long-term strategies. The Unesco Institute for Information Technologies in Education (IITE) and collaborators have been [supporting educational institutions transitioning to online learning using open educational resources](#).

Online learning, probably in different formats blended with classroom learning, is here to stay. This change ensures the continuing importance of blockchain and open educational resources.

However, there are challenges in using blockchain in education. Policymakers concerned with development in conjunction with educators should explore ways to address challenges in disseminating open educational resources with blockchain while advocating for the internet infrastructure necessary required to support it.

Public domain, free to adapt

[Unesco defines](#) open educational resources as teaching/learning materials that are in the public domain or openly licensed and allow users to reuse, adapt and redistribute at no cost.

Open educational resources are not limited to textbooks, lessons or curriculum. They can also be educational games, podcasts, videos and applications. They substantially reduce the cost of content to students. They have also been used to [empower teachers and learners](#) through increased timely access to quality content, which improves learning.

Blockchain can be described as a digital ledger or database that is distributed on a network. This technology isn't controlled by any central authority and so open educational resources as the "blocks" in the "chain" can be securely and effectively shared in a public network. Blockchain can support the dissemination of open educational resources on a global scale.

Blockchain has become more widely known due to its use in [Bitcoin](#) as a ledger for financial transactions that are secured with encryption, verified and recorded by network nodes (also called a digital cryptocurrency). Bitcoin is based on blockchain, but the technology has many other uses.

Plagiarism concerns

What's relevant to understand is that blockchain can be used to securely facilitate collaborations among two or more people. The original records cannot be deleted or changed. All changes can be easily traced as each new block in the chain is time-stamped. This matters because some authors of open educational resources express fear of not being attributed or being plagiarised.

This fear is reduced with the use of blockchain, because the blocks in the chain cannot be altered. The original creator can always be determined, no matter how much a resource is changed.

Adaptations require the creation of a new block that is automatically linked to the original. The block-encapsulated open educational resources are incorruptible. When every block in the iteration of a resource is time-stamped and recorded, plagiarism becomes obsolete.

The tracing features of blockchain allow authors to see if or when their work is being misused and allows them to challenge any improper usage. Transactions cannot be hidden, and so every adaptation of the original source is traceable. New versions of the source can be uploaded. Trackability is maintained as each block or ledger is distributed on the network.

This means that resources created with blockchain will have permanence online that preserves all content adaptations. All resources preserved as blockchain records are secured and permanent. This can become very important if an institution disappears, or if a creator moves on to work elsewhere or retires.

Another positive dimension of using blockchain is that it helps overcome the fact that many quality open educational resources are hard to find on the web, and are wasted because of this. To date, there has been no efficient means of disseminating open educational resources that allows for maximum accessibility. Blockchain can effectively support accessibility to open educational resources, housed in publicly available, distributed global knowledge databases.

Passwords, legal questions, storage

Applying blockchain in education has its own challenges. These include the difficulty of changing established systems, legal questions on the ownership of the data, limitations in storage space and the need for privacy protection.

Recent news on Bitcoin has focused on the total loss of access to the blockchain if a password cannot be retrieved. This human element of remembering passwords could prove a significant inhibitor of the use of blockchain in education.

In addition, like other online databases, blockchain is vulnerable to unexpected failures. The persistence of blockchain can also become a hindrance: If unwanted, fake, unscientific or illegal content is accidentally or maliciously added to a

blockchain, it cannot be removed.

There is also a lack of people skilled in implementing blockchain. As well, the speed, and particularly the high energy cost of creating and maintaining blockchain are also concerns.

Using blockchain technology to house open educational resources can be a tremendous asset in fulfilling the UN's Sustainable Development Goal 4 of improving access to quality, affordable education globally. But more research and political will is needed to overcome barriers in implementing this technology.

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