

OER have been [defined by UNESCO](#) as teaching/learning materials that are in the public domain or openly licensed and allow users to reuse, adapt and redistribute at no cost. Blockchain can be described as a digital, ledger that is distributed on a network. The development of [Blockchain technology](#) holds promise of becoming a useful enabler for supporting the storage and dissemination of OER on a global scale. Likewise, there is also a case for OER themselves supporting Blockchain implementations in educational contexts.

OER can be stored in a Blockchain for security while limiting access only to legitimate users such as the unique student, institutional administration, student-selected potential employers and instructors. Blockchain is not controlled by any central authority and so OER as the “blocks” in the “chain” can be securely and effectively shared in a network.

The new “sharing economy” marks the future of education. To date, however there has been no efficient utilization of OER allowing for maximum accessibility; many quality OER are wasted because of this. Blockchain is a technology that can effectively support accessibility and sharing of OER, creating an easily accessible distributed global knowledge base.

Blockchain can also be used to address some of the significant concerns that faculty have expressed regarding OER. Among these, the fear of not being attributed is reduced, because the Blocks in the chain cannot be altered, and the original creator can always be determined, no matter how much an OER is changed. Each time a Block is changed, it is distributed to every node for acceptance, thus ensuring the reliability of the data and the content. Adaptations require the creation of a new Block that is automatically linked to the original. The Block-encapsulated OER are incorruptible. Blockchain can also prevent users from disregarding restrictions placed on the OER by the author, for example [Non-Commercial or No Derivatives](#). If the open licence includes these restrictions, then the Blocks cannot be changed and thus it eliminates copyright infringement, protecting the copyright and the moral rights of the original creators. When every Block in the iteration of an OER is time-stamped and recorded, [plagiarism becomes obsolete](#). [Block-ED](#) is a British Columbia-based application under development that aims to address these problems.

The tracing features of Blockchain allow authors to see if or when their work is being misused allowing them to challenge any improper usage. Copyright protection of OER is also ensured as faculty can rest assured that evidence of their authorship will follow the Blockchain, no matter how or where it is used. Teachers can use Blockchain to create a traceable and tradable record of their lessons or creations. The security of Blockchain can also support more [trustworthy networks](#) of scholars and ensure the integrity of scholarly research papers. Blockchain allows faculty to post, control and further authenticate their papers using smart contract technology. New versions of the OER can be uploaded and trackability is maintained as each Block or ledger is distributed on the network.

Blockchain also ensures the sustainability and accessibility of the OER. All the OER 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. OER in Blockchain can also be used to address problems of high operational costs, barriers to sharing OER, and poor resource quality.

Blockchain, once created, are shared across the network accessible to all at no cost. Quality can be assured by the instructors, who can determine the educational effectiveness of each OER, and signal its quality through actual use.

Presently, OER on the Web are all too often hidden from view and so become, for all practical purposes, inaccessible. Blockchain allows for the wide distribution of the OER on a publicly accessible network. Blockchain can also ensure that OER will have a permanence on the Web, preserving all the improvements and other adaptations are made, while ensuring that the original authors and those who add to the OER have their moral and other rights recognized.

The Blockchain can be used as a distributed management platform, facilitating user management of the OER as well as OER creation. They can then be managed as their copyright is secured. The platform can also be used as a virtual currency exchange and for learning certification management. On the other hand, Some are developing a digital rights management system using Blockchain to ensure the copyright restrictions on commercial content, desiring to ensure that their content can only be accessed by authorized users.

While Blockchain can be good for OER, the openness of OER can be used to ensure the scalability and accessibility of transactions on the Blockchain. With the ubiquitous accessibility afforded by the Internet, a global knowledge commons becomes possible, in which institutions, such as libraries and colleges provide stable long-term access to, and the preservation of, content. Researchers provide peer-reviewed content. OER ensure that learners anywhere can have free content whenever they need it, wherever they are.

However, in considering Blockchain, as a large system, it could be vulnerable to unexpected failures. The encryption feature of the Blockchain can also be problematic, because of the reliance on a numeric key. Unfortunately, if a key is lost, the Blockchain cannot be accessed and the record cannot be recovered. The persistence of Blockchain can also become a hindrance, for example if unwanted, fake or illegal content is accidentally or maliciously added to a Blockchain, it cannot be removed. Leaked personal or other sensitive data that should not have been circulated also remains in the permanent record.

There is also a shortage of useful Blockchain applications that can be adopted or adapted for specific uses. In addition, there are small risks of regulatory interventions or of hacking. The anonymity of Blockchain leaves it open to fraud, although very secure, data could still be hacked and altered; then it becomes virtually impossible to rectify the information.