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BLOCKCHAIN TECHNOLOGY IN EDUCATION

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Introduction

This report is trying to explain the basic principles of Blockchain technology and to show its possible implementation for the education.

With Blockchain, we can imagine a world in which contracts are embedded in digital code and stored in transparent, shared databases, where they are protected from deletion, tampering, and revision. In this world every agreement, every process, every task, and every payment would have a digital record and signature that could be identified, validated, stored, and shared. Intermediaries like lawyers, brokers, and bankers might no longer be necessary. Individuals, organizations, machines, and algorithms would freely transact and interact with one another with little friction. This is the immense potential of blockchain [1].

What is Blockchain technology

Blockchain is a database, which is distributed between many computers and has no central control. Sometimes it called "distributed ledger". The name of technology came from two words: block and chain. So it can be imagined as a kind of a special chain consisting of blocks (Figure 1).
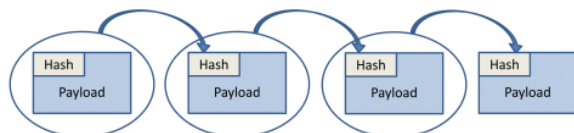

Figure 1 – Scheme of Blockchain

Block is a fixed structure in which the date of blockchain is stored. The important parts of a block are: header and content. Its Header includes metadata, such as a unique block reference number, the time the block was created and a link back to the previous block. Its content usually a validated list of digital assets and instruction statements, such as transactions made, their amounts and the addresses of the parties to those transactions [2].

The basic logic is that the latest block linked together with all previous blocks, so a Blockchain database retains the complete history of all assets and instructions executed since the very first one – making its data verifiable and independently auditable. The data in Blockchain is secured by modern cryptography algorithms and by the consensus algorithm. Both of these tools makes Blockchain sustainable and robust.

Moreover, the consensus algorithm suggests the confirmation of each transaction by the most part of the network. Using of Blockchain allows us to get rid of any mediators and interact directly to each other (even without trust). This could save a huge amount of administration, bureaurocracy, effort and time.

In fact Blockchain can be implemented by anyone who wanted to store educational data securely. Nowadays education has a tendency to become 4D: democratic, distributed, diversified, decentralized. But despite these principles, we still need such things as, for example: trust in certification or proof of learning. Blockchain can provide a massive open, online, secure system.

How can it be used in education

At the moment lots of the applications cannot be even imagined yet. But it is obvious that in the nearest future Blockchain technology will accelerate the end of a paper-based system for certificates. Any kinds of certificates issued by educational organisations, in particular qualifications and records of achievement, can be permanently and reliably secured using blockchain technology. More advanced blockchain implementations could also be used to automate the award, recognition and transfer of credits, or even to store and verify a complete record of formal and non-formal achievements throughout lifelong learning [3].

As an example, Holburton School in San Fransisco, a software school that offers project-based education as an alternative to college courses, has already used Blockchain to store and deliver its issued certificates [4]. Very soon it will be possible to share repositories of certification and achievements between global groups of universities and even between educational institutions and employers.

If educational institutions will be the owner of the diploma or training certificate in the Blockchain, then potential employers will have no difficulties to make sure that you really were trained in this University. Such data, which will be in the public domain, and also will benefit investors which search perspective diploma works.

Confirmation of the validity of attestations and certificates of the candidate for membership can be very expensive and time-consuming for the educational institution or enterprise. In common existing system of certificication is not useful for mobile students and workers. Every time they need to spend money and time just for confirmation of their documents. It is possible to make even worldwide system, which will provide a confirmation of all your documents independently of place where are you and the office hours of some burocratic organization.

Also Blockchain technology removes the need for educational organisations to validate credentials. Since certificates issued on the blockchain can be

automatically verified, educational organisations will no longer need to commit resources to this task, significantly reducing their administrative load, and practically eliminating the 'after-sales support' they need to provide to learners following the end of courses. However, since many organisations also offer this service at a profit, it may also mean that institutions will need to adapt their business models accordingly.

One more important usage if for intellectual property**.** Blockchain technology has the potential to revolutionise the management of intellectual property. Depending on the policy choices made, it could be used to increase openness or to close intellectual property.

By publishing hashes of documents onto a blockchain, a person can provide proof of first publication without actually needing to share the document or invention being published. This turns conventional notions of copyright and patent law on their heads, allowing the possibility for a far more restrictive system whereby knowledge could be protected without being shared.

Blockchain technology also allows for detailed and incremental tracking of who has used intellectual property, where and how, and for these to be associated with credit – either in the form of payment or in the form of academic credit. Such systems for intellectual property could, for example, serve as the basis of future journals, or even as the basis for tracking the production and re-use of open educational resources. As such, they would be able to significantly incentivise the opening up of education and educational resources.

It is always a big issue to continue professional development (CDP). Obviously it is difficult to deliver, often fragmented, and poorly tracked. Blockchain system can take issued data from conference attendance, courses, and other forms of learning. Teachers and other professionals could get inputs from trusted providers and thus be incentivised to do more CPD, if those experiences and learning opportunities were securely stored in a reputable system.

In modern time people get myriads learning experiences from various sources. Imagine a system, which stores and confirms all micro-learning experiences of the person. The realization could be like "experience" in computer games.

The most spread usage of Blockchain is in the sphere of finance. Here Blockachain is also trying to make a revolution by removing intermediary. Usually financial transactions use expensive third parties who charge fees. Blockchain allows free transactions between parties. So, a student can make payments for the use of educational resources, courses, etc through Blockchain.

All in all, it frees up the system, makes it more open, flexible and adoptable.

Conclusion

Currently, the only implementations of blockchain technology for education are in pilot stages. As demonstrated by this report, there are several way of using Blockchain in education.

Blockchain is a technology that clearly has applications in the world of learning at the individual, institutional, group, national and international levels. It is relevant in all sorts of contexts: schools, colleges, universities, MOOCs, CPD, corporates, apprenticeships, and knowledge bases.

Rather than the old hierarchical structures, the technology becomes the focus, with trust migrating towards the technology, not the institutions. It is really is a disintermediation technology.

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