

Harnessing the potential of blockchain to transform education

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Blockchain technology can help improve old models of data management and bring benefits to learners and educational institutions in the EU—if policymakers are well prepared to embrace the change.

That's the main message of a Science for Policy report from the Joint Research Centre, the European Commission's science and knowledge service. The report highlights how blockchain [technology](#) could improve the education sector, from ushering in paperless degrees and certificates to tracking citations and protecting intellectual property.

While there are regular headlines on how blockchain could transform our daily lives, at the moment its potential application to education does not feature highly on national agendas and has not been widely explored.

Through a number of case studies at European universities, the report confirms that the relationship between blockchain and education is in its infancy and provides recommendations on how the relationship can be fostered.

The report supports the Commission's wider work on innovative education, which is pursued through policy, research, practical tools, funding opportunities and peer learning and exchange with ministries, stakeholders and experts.

How could blockchain change education?

The report explores how key characteristics of blockchain technology could be applied to specific scenarios in the education sector. For example:

- Once a record is on the blockchain, it is there to stay. The immutability of entries has many potential applications, including the ability to permanently secure digital degrees and course certificates, even if an institution were to shut down or an entire country's education record-keeping system were to collapse (which has happened in Syria);
- Entries on a blockchain can be verified with the click of a mouse. This can significantly reduce the burden on both learners and [educational institutions](#). For learners this could mean the end of fishing out paper copies of degree certificates and transcripts to apply for a course. Institutions can check an individual or organisation's credentials instantly;
- 'Smart contracts' can be set up that automatically enact an agreement if certain conditions are met. For a student who is receiving financial assistance to study, this could mean that they only receive funding once they submit compulsory course work. By entering a publication on a blockchain, a smart contract can be set up so that the author receives automatic recognition or even payment for citations.

The report lays out a number of other specific scenarios attainable in the short, medium and long term. This includes [automatic recognition](#) and transfer of course credits, receiving payments like student fees or grant funding and using verified sovereign identities for student identification within organisations—when entering student accommodation or joining the university library, for example.

How the EU can embrace the change

For these scenarios to be realised, regulation and standardisation will determine the extent and speed of progress. The report recommends that policymakers take an open approach to this:

- Further development of technology in the educational field should take advantage of private sector innovation while safeguarding public interest;
- Fully-open blockchain implementations are recommended so that the real goals and promise of blockchain in education can be reached—such as recipient ownership, vendor independence and decentralised verification;
- The EU and Member States should consider setting up a label for 'open' educational records, in order to support or adopt technologies which are in accordance with these goals;
- Policymakers should set up innovation pipelines to further investigate the specific educational uses of blockchain technology;
- Standardisation will be key, so policymakers should urgently look at this area – in particular at how to establish commonly agreed digital meta-data standards for educational records and how to link these to existing course, degree or qualification certification systems;
- An expert committee should be formed to keep policymakers informed of the latest developments;
- Educational organisations and learners will be the main beneficiaries of the adoption of these new technologies, so outreach to help them understand these benefits is vital.

Blockchain and employment

In a similar way to education, [blockchain technology](#) also has implications for the world of work. For example:

- Blockchain has the capacity to become a trusted service to check and validate the accuracy of information provided by job applicants. This could include checking things like [education](#), skills, past work experiences and training courses completed—reducing the time spent by recruiters and hiring managers in verifying individual applications;
- Blockchain could also offer more personalised information management to job seekers and better match their profile with job offers;
- The technology could also prove helpful in automating things like labour agreements, payments, reporting obligations and tax payments.

How does blockchain technology work?

Blockchain is a distributed ledger technology and it operates in much the same way as a traditional ledger—like those used by a bank to track transactions, or a governmental organisation for keeping a record of land ownership.

The difference is that on a public blockchain, information recorded is immutable and it is shared by the whole community. In this community, each member maintains his or her own copy of the information and all members must validate any updates collectively.

The information could represent transactions, contracts, assets, identities, or practically anything else that can be described in digital form.

Entries are permanent, transparent, and searchable, which makes it possible for community members to view transaction histories in their entirety.

Each update is a new block added to the end of a chain.

A protocol manages how new edits or entries are initiated, validated, recorded, and distributed. With blockchain, cryptology replaces third-party intermediaries as the keeper of trust, with all [blockchain](#) participants running complex algorithms to certify the integrity of the whole system.

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