Open Education, Blockchain and Flexible Learning Pathways

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The New Student: Flexible Learning Paths and Future Learning Environments
Vienna, Austria

@aisantos #heflex18 #EU2018at 21st September 2018

Joint Research Centre
the European Commission's in-house science service
The Joint Research Centre at a glance

around 3000 staff members

Almost 75% are scientists and researchers. Headquarters in Brussels and research facilities located in 5 Member States.
JOINT RESEARCH CENTRE

The JRC (Seville) is the in-house science service of the European Commission. Our main goal is to support policy making in Europe via research evidence. We have over 40 policy reports published in the field of education, to include reports on Open Education, area in which we locate our blockchain study.

Our work is driven by the Commission’s policy priorities: e.g. Communications and Council Recommendations
Current JRC research on Digital Age Learning and 21st Century Skills
Open Education
10 Dimensions of Open Education

- Strategy
- Technology
- Leadership
- Quality
- Content
- Pedagogy
- Recognition
- Collaboration
- Research
- Access
OpenEdu Framework for HE institutions

It can be downloaded from:
OpenEdu Policies Reports

Going Open
Policy Recommendations on Open Education in Europe (OpenEdu Policies)
Andrela Inamorato dos Santos
Editors: Yves Punie, Konstantin D.A. Schierl
2017

Policy Approaches to Open Education
Case Studies from 28 EU Member States (OpenEdu Policies)
Andrela Inamorato dos Santos, Fabio Nascimento, Paul Baccich, Javiero Atronas, Stefania Aceto, Daniel Burgos, Yves Punie
JRC
2017
Creating an open education ecosystem

The following areas for policy development were elicited in the research process. Together, these areas contribute to building 'an open education ecosystem':

1. awareness raising
2. regulation, legislation and funding
3. partnerships
4. teachers' professional development
5. accreditation and recognition of learning
6. open educational resources (OER)
7. support and infrastructure
8. research and evaluation
open education activities. This could be done by:

- **Creating and supporting technology infrastructures** (by providing a common EC platform in which MS could access and publish OER, MOOCs, provide training and have communities of practices). It should observe being open source and interoperable with other formats, as well as based on the participatory web. The MS should have full responsibility over their share of the platform, common services and joint activities to be offered to all.

- **Supporting the approach for information tracking**, making available and keeping up-to-date an open-licensed and open source platform which gathers information and results of all EC-funded projects (research and practice) on open education, OER, and digital technologies for education.

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<th>EU</th>
<th>National</th>
<th>Regional</th>
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- **Encouraging and providing infrastructure** for schools and universities to experiment with new types of digital certification, to include those based on the blockchain.
- **Co-designing and co-sponsoring** regional platforms/databases of OER, based on the principle of the participatory web.
- **Working in partnership** with ministries, local governments, schools and universities to foster citizen’s digital competence for open educational practices.
- **Empowering** individuals to be open learners (awareness raising, skill development), by working alongside other stakeholders in the development of the technological infrastructure and support which are necessary to reach the local community and wider audiences.
- **Supporting** open learners to use technologies as routes to developing their employability (e.g. via face-to-face adult learning courses, printed and digitised materials, open online courses or MOOCs).
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Blockchain in Education
Blockchain in Education – JRC report

It can be downloaded from:

BLOCKCHAIN’S SOCIAL VALUE PROPOSITION

**Self-sovereignty**: users are able to identify themselves while at the same time maintaining control over the storage and management of their personal data; ownership of their data.

**Trust**: in a reliable technical infrastructure and in the validity of the transactions carried out in it.

**Transparency & Provenance**: users to conduct transactions in knowledge that each party has the capacity to enter into that transaction (i.e. verification (signing) of credential by both issuer and recipient).

**Immutability**: records are written and stored permanently, without the possibility of modification; reduction of fraud risk.

**Disintermediation**: the removal of the need for a central controlling authority to manage transactions or keep records.

**Collaboration**, i.e. the ability of parties to transact directly with each other without the need for mediating third parties.
WHY USING BLOCKCHAIN IN HE?

From the Open University UK’s experience:

- to remain competitive and up-to-date, academic excellence and adaptive culture
- to constantly revise and re-shape higher education in order to fit the needs of the students
- The OU identifies a clear value in modular courses, and in smaller or ‘bite-size’ chunks of learning which gradually add credits towards full qualifications
- micro-credentials is perceived by the OU to be a better fit for lifelong learning (badges)

Enhancing employability
MIT: diplomas on the blockchain - added value for the learner

Step 1 of 5
Computing local hash [DONE]

Step 2 of 5
Fetching remote hash [DONE]

Step 3 of 5
Comparing local and remote hashes [DONE]

Step 4 of 5
Checking Merkle root [DONE]

Step 5 of 5
Checking receipt [DONE]

Verified

Public Key
1HYPitzbwR3M3Sw6GWe5XeQzBWoJARes

Blockchain Address
4bf64ff1517554dac3496e9da0a28ca9ae492682b0898e384eal7e7f90ee1295
Recipient-owned credentials

Step 1 of 5
Computing SHA256 digest of local certificate [DONE]

Step 2 of 5
Fetching hash in OP_RETURN field [DONE]

Step 3 of 5
Comparing local and blockchain hashes [PASS]

Step 4 of 5
Checking MIT signature [PASS]

Step 5 of 5
Checking not revoked by issuer [PASS]

VERIFIED

Public Key
1HYFIt2bw83m3Smw6GNt5Xosq2nWcVAKE6s

Blockchain Address
4bf6ff1517f5d62c3496e9da0a2bca9ae43682b0899a384ea17e7f90ee1295
COMMUNICATING ‘BLOCKCHAIN’ TO STUDENTS

VIDEO FROM THE GOVERNMENT OF MALTA
Self-sovereign Identity: recipient-owned credentials
Analytics: waiting for GDPR further conclusions

Blockchain Records for Maltese Learners and Workers
Other uses for blockchain in education...

Intellectual property management (scientific papers, research)

Funding tracking from higher level authorities

Students’ payments, grants management, students’ services (e.g. academic records, transcripts), credit transfer, learning portfolios

Pedagogical enhancement: anonymous marks/student performance comparison leading to personalised learning
Why do we need to further explore blockchain in education?

May not be a solution to everything (or the best solution)

Requires more pilots (cost efficiency, standards for certificates?) Public or private blockchains? Governance? Standards?

Need for more awareness raising, buying up in order to create trust in the system as well as a common understanding, general acceptance (mindset)

Users digital literacy / identity management (are they ready to use the technology/ control their wallets / keep their keys safe etc?) Do they want to do it?

How ready are the universities for this?
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Flexible Learning Pathways
NON-FORMAL LEARNING  FORMAL LEARNING

MOOC 1  HEI 1  X  CREDITS  ECTS  Micro-credential

MOOC 2  HEI 2  X  CREDITS  ECTS  Micro-credential

MOOC 3  HEI 3  X  CREDITS  ECTS  Micro-credential

BLOCKCHAIN?

XXX  CREDITS  ECTS  FULL DEGREE

TRUST
TRANSPARENCY
COLLABORATION
GOVERNANCE
LEARNING PATHWAYS
LEARNER SUPPORT
DIGITAL COMPETENCE
In a world of blockchain technology ...

HEIs will need to consider:

- **Adapting to change** or being the drivers of this change (e.g. by exploring **unbundling** of certification/accreditation/validation; micro-credentials, new roles for students’ services)

- **Reinforcing collaboration** and increase trust in one another (new ways to operate, offer of joint degrees, offer of open degrees, take up of an **open education** proposition and **enhance networks**)

- **Focusing on the learner** by establishing a **number of routes for formal and non-formal learning** with individual pathways (greater use of ECTS, EQF in non-formal learning)
Thank you

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Thanks to Blockerts and Learning Machine for slides on credential issuing on the Blockchain (16 and 17)