

FUTURE OF EDUCATION: ADVANCES AND TRENDS IN AI, BLOCKCHAIN AND 5G

BALAJIV

VICE PRESIDENT

COMMONWEALTH OF LEARNING

PRESENTED AT THE FOCAL POINTS
MEETING FOR THE CARIBBEAN

ST LUCIA

28TH JANUARY 2020



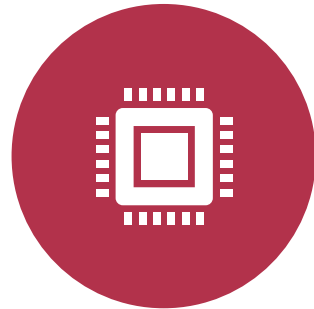
Technology Developments Impact Education in
All Countries Regardless of Economic Status



FOCAL AREAS



AI-ARTIFICIAL
INTELLIGENCE



THE BLOCKCHAIN



5G



RECOGNISE THERE ARE
OTHERS- AR/VR, CLOUD-
BASED SERVICES,

AI IN EDUCATION



COMMONWEALTH
of LEARNING

- An upcoming joint publication of COL and UNESCO
- Tentative Date: March 2020
- Primary contributor: Professor Rose Luckin, UCL, UK



WHAT IS AI?

- Multiple definitions
- Easier one: “Computer systems able to perform tasks normally requiring human intelligence” (Oxford Dictionary, 2018)
- More nuanced: “computer systems that have been designed to interact with the world through capabilities (for example, visual perception and speech recognition) and intelligent behaviours (for example, assessing the available information and then taking the most sensible action to achieve a stated goal) that are thought of as essentially human” (Luckin, 2016)



TWO APPROACHES IN AI

- Deductive
 - Reasoning based on rules; transparent to users
- Inductive
 - Learning from experience; big data required; non-transparent to users
- Deductive approach more compatible in education



AI TRIALS ON LARGE SCALE (LAST 20 YEARS)



- Language learning and culture training
- Improving critical thinking and skills using cognitive sciences
- Evaluation shows that disadvantaged populations can benefit



AI: FUTURE APPLICATIONS IN CRITICAL AREAS OF EDUCATION

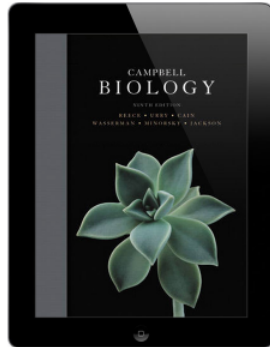
- Intelligent Textbooks
 - “a book that knows the subject matter”
 - In small trials was able to improve performance by one letter grade
- Personalised Tutors (<http://matr.org>)
 - Improve both learners’ as well as tutors’ performance
- Improved Assessment Systems
 - More micro-level assessment of newly developing cognitive skills



Inquire

[basics](#) [features](#) [technology](#) [research](#) [learn more](#)

A prototype of an **intelligent textbook that answers students' questions**, engages their interest, and improves their understanding. [▶ Watch our introduction video](#)



What is the relationship between plant cells and photosynthesis?

define	Define cellular respiration
structure	What is the structure of a chloroplast ?
function	What is the function of a plasma membrane in a eukaryotic cell ?
compare	What are the differences between chloroplasts and mitochondria ?
relate	If the chloroplasts were removed from a plant , what events would be affected?
search	Search book for photosynthesis

INTELLIGENT TEXTBOOKS



AI VIRTUAL TEACHING ASSISTANTS



IBM's Watson
Teaching Assistant
technology

A black box that uses
natural language
processing
technology



Jill Watson (2016)-
first generation virtual
assistant

A few more
iterations carried out



2019- new generation
VTA's- many more
cognitive skills

All based on Watson
TA technology

AI FOR PEOPLE WITH DISABILITIES

- Learners with ADHD
 - Human-like pedagogical AI agents in support (Colorado State University, USA)
- Autism Spectrum Disorder
 - Pedagogical AI agents (Fraunhofer Institute, Sankt Augustin, Germany)
- Individualised support for PWD generically:
 - Big Data Analytic based AI system called nStudy (Simon Fraser U, Canada)



WHAT IS THE BLOCKCHAIN

- A new infrastructure similar to the Internet
- Mainly a financial application
 - Cryptocurrencies
- Tamper-proof, time-stamped Database
- Transactions recorded and stamped without any third-party or intermediary



THE BLOCKCHAIN

- The blockchain is a digital verification infrastructure which solves the problem of how to verify digital identity, one of the building blocks of all digital services
- The technology adds value when users have to verify claims without the obligation to contact the organisation that originally issued them
 - This is its major application in education



MOVING RECORDS TO THE BLOCKCHAIN ALLOWS FOR....



Self-sovereignty, i.e. for users to identify themselves while at the same time maintaining control over the storage and management of their personal data;



Trust, i.e. for a technical infrastructure that gives people enough confidence in its operations to carry through with transactions such as payments or the issue of certificates;



Transparency & Provenance, i.e. for users to conduct transactions in knowledge that each party has the capacity to enter into that transaction;



Immutability, i.e. for records to be written and stored permanently, without the possibility of modification;

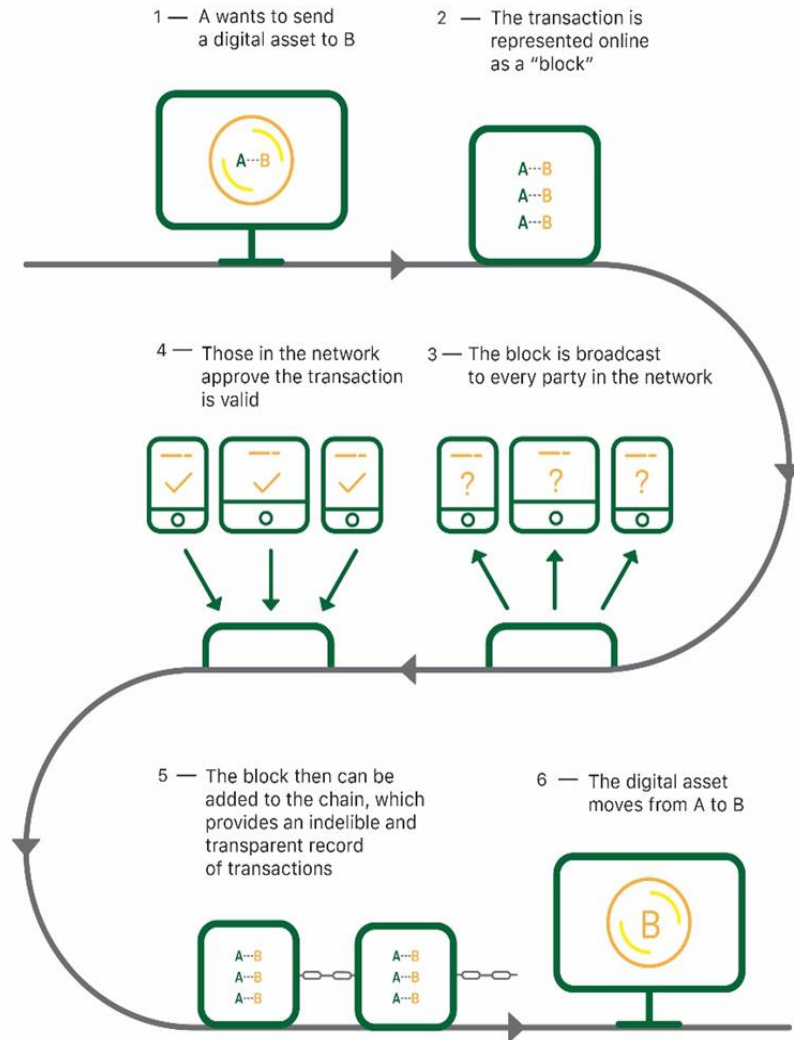


Disintermediation, i.e. the removal of the need for a central controlling authority to manage transactions or keep records;



Interoperability, i.e. the ability of parties to collaborate and transact directly with each other without the need for mediating third parties.

HOW A BLOCKCHAIN WORKS



BLOCKCHAIN APPLICATIONS IN EDUCATION

Issuing certificates to learners

The completion of a specific learning experience

such as a school-leaving certificate in formal education, or a certificate attesting a mobility experience

The totality of learning achieved in a specific area

such as a certificate attesting the award of a degree

Discrete units of learning through the achievement of specific learning objectives

such as the award certificates for micro-learning, the completion of modules or the achievement of credits

Specific experiences which contribute to learning

such as certificates attesting the completion of an apprenticeship, or of another kind of work-experience

The acquisition of specific skills

such as through certificates awarded in procedures

The recognition of prior learning

The achievement of certain excellence criteria

for example by winning certain prizes for achievement, or graduating 'with honours'

The specific level of competence achieved in specific areas

through the issue of examination certificates or grade-cards

Issuing digital certificates in higher learning (e.g. U Gottingen)



BLOCKCHAIN APPLICATIONS IN CREDENTIALING



- Issuing certificates for accreditation
 - To educational organizations
 - To specific educational programmes
- Certificates for Intellectual Property
 - To claim first ownership
 - To track usage of an IP



THE BLOCKCHAIN CAN HELP IMPROVE THE CURRENT CERTIFICATION PRACTICES

- proof necessary to authenticate the certificates will be stored completely, securely and permanently on a blockchain
 - Institutions can disappear or records may get destroyed in a disaster
 - Certificates stored on the Blockchain can still be accessed and used as verified
- The certificate itself would be permanent and immutable
- **Automatic recognition and transfer of credit**
 - transfer of credits between institutions, award of degrees and other transactions involving transfer and accumulation of credits could be verified and executed automatically
 - No need for manual check and approval



IMMUTABILITY OF AUTOMATICALLY AUTHENTICATED CERTIFICATES

- Users have fine control over their certificates
- Can choose with whom and under which conditions to share the certificate.
- Any verifying institution (such as employers, or higher education institutions) can save significant resources
 - verification would happen automatically
- Creation of Verified Institutional Identities



EDUCATIONAL FUNDING, PERFORMANCE-BASED PAY AND MICRO-CREDIT FOR EDUCATION VIA THE BLOCKCHAIN

- payments in education would be made via blockchains, either using standard or crypto currencies.
 - Payments could include state funding, payment of scholarships, payment to content-providers, microcredit etc.
 - Funding formulas and agreements can be coded directly onto the chain to release funding based on preset conditions
- Payment of tuition fees using blockchain is already in practice
 - Cyprus, UK, USA
 - More on the way



MALTA NATIONAL PILOT ON BLOCKCHAIN CREDENTIALS FOR TVET



- Operational since 2017
- Blockcerts focuses on every aspect of the credentials value chain:
 - creation, issuing, viewing, and verification the certificates
- Recipients could share the credentials with others
 - third parties could in turn use Blockcerts to verify the credential
- Highly effective in TVET
 - About 2000 certificates issued up to 2019



MOOC ON THE BLOCKCHAIN (MAY-JUNE 2019)



THE BLOCKCHAIN AND OER

- Tracking OER usage is a major challenge for creators and institutions
- An OER can be “notarised” on the Blockchain by the creator(s) (catalogue description of the OER with date of creation)
- Its usage can then be tracked independently
 - No third party entity is needed to track (saving costs for the institution)



EDUCATION AND 5G

- New Generation Mobile Technology offers significant technological advantages
 - Wider bandwidth
 - Lower latency
 - Location accuracy
 - Reliability
 - Energy efficiency



5G IN TVET

- Immersive Experiences accessible to any 5G user
- TVET can derive significant advantages
 - Haptic interaction of limbs with audio/video can be more realistic



AR/VR AND 5G

- Virtual Reality applications in entertainment are many
- New immersive applications in education on the rise
 - E.g. Study of human physiology
- Students in distant locations can be “present” in the same class room via 5G connectivity



5G FOR PEOPLE WITH DISABILITIES

- For learners with disabilities, Personalised Pedagogical AI assistants can be deployed even better using 5G



- THANK YOU -



The contents of this presentation, except logos/graphics which are property of the respective owners, is made available under [Attribution-ShareAlike 4.0 International \(CC BY-SA 4.0\)](https://creativecommons.org/licenses/by-sa/4.0/).

