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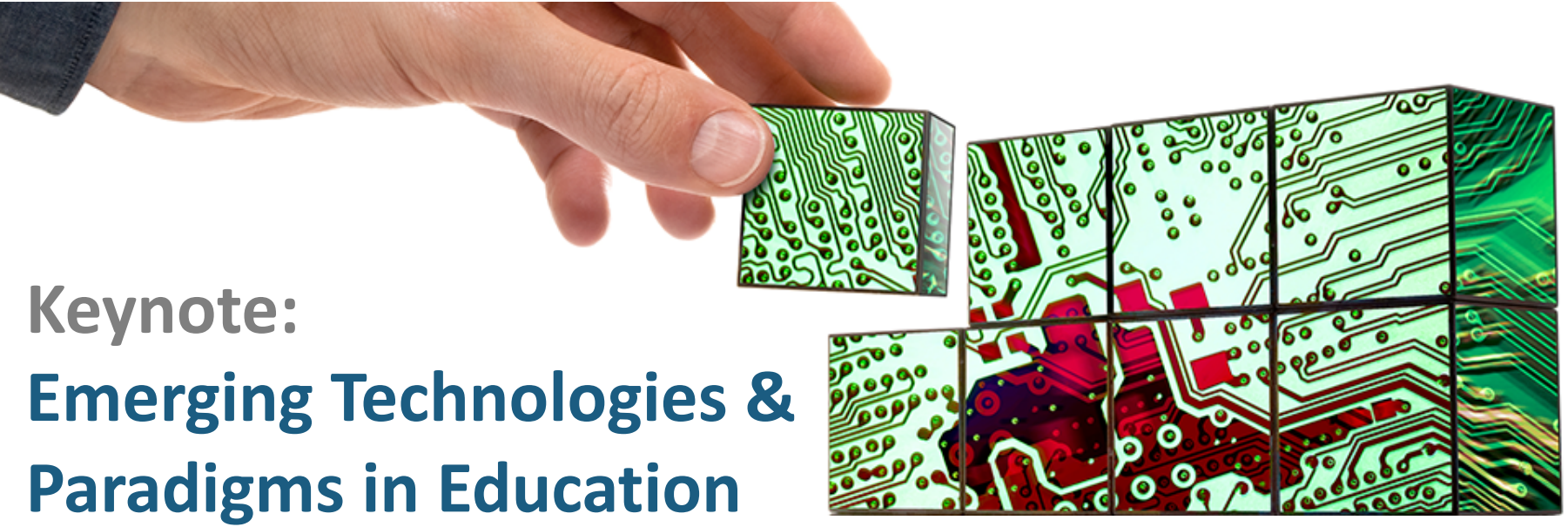
IARIA

The Twelfth International Conference on Mobile, Hybrid, and On-line Learning
eLmL 2020
November 21-25, 2020

The Open University



Keynote:
Emerging Technologies & Paradigms in Education

Dr Alexander Mikroyannidis
The Open University, UK
https://alexmikro.net

The Speaker

Dr Alexander Mikroyannidis is a Research Fellow in the Knowledge Media Institute of The Open University. He has more than 10 years of research experience in the field of Technology-Enhanced Learning and specifically in personalised learning, self-regulated learning, lifelong learning, open educational resources and rich interactive learning materials, as well as applications of blockchain technology in education.

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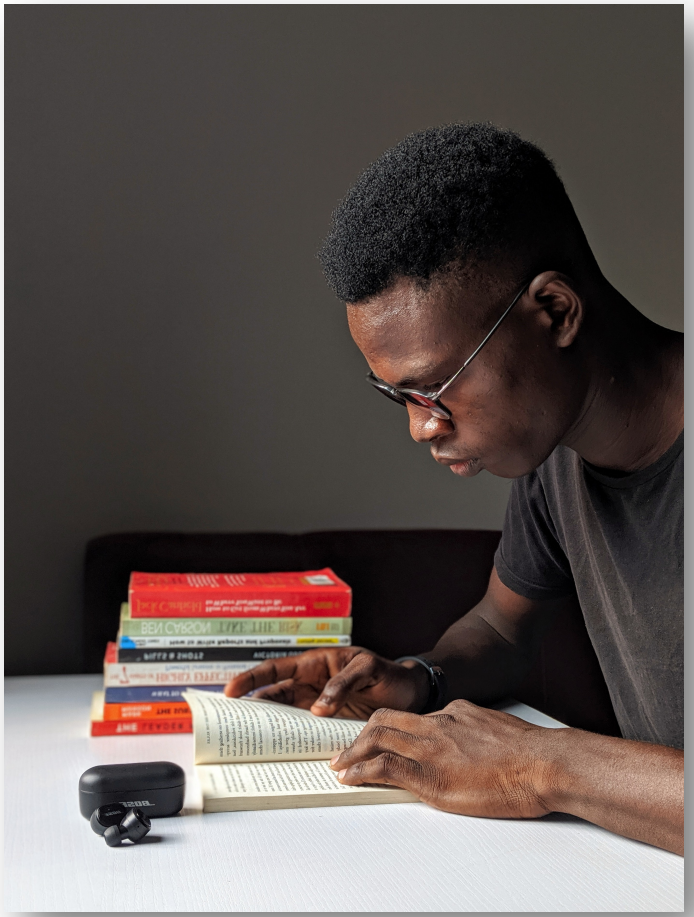
Outline

This talk discusses the following emerging paradigms in education, as well as the technologies driving these paradigms:

- Part I: **Decentralised Education**
- Part II: **Practical & Social Education**
- Part III: **Conclusions**



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Part I

DECENTRALISED EDUCATION

Motivation

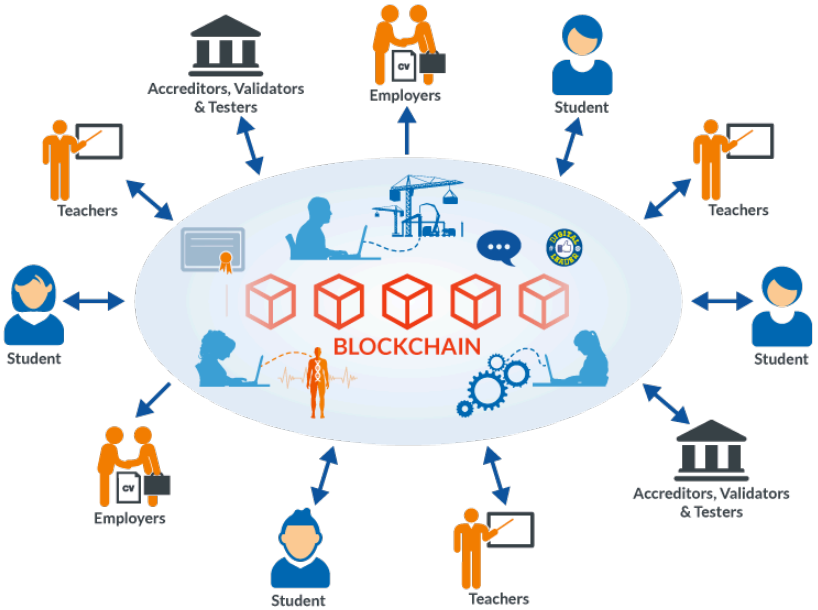
The centralised education model is **no longer sustainable**:

- Learning happens increasingly **outside the brick-and-mortar lecture halls** of schools, colleges, and universities on online platforms, within communities of like-minded individuals, or by contributing to projects and initiatives in the real-world.
- Learning is far more **international** than it used to be: key education players open campuses abroad, while students travel to different countries to improve their employability prospects.
- In the networked, digitally empowered world of the 21st century, education providers often do not have remit or the means and capacity to cover the range of activities learners engage with, which attest their **achievements, knowledge, and skills**.

Vision

We envision an education model in which the awarding and validation of qualifications **no longer occur exclusively under the management of an education institution or an employer.**

Individual students, teachers, and peers take more **ownership of the learning experience and its outcomes** without compromising on safety, security, and accessibility.



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What is a Blockchain?

- A cryptographically secure, shared, distributed ledger.
- Each block aggregates a timestamped batch of transactions and is identified by a cryptographic signature.
- These blocks are all back-linked so that the chain can be traced all the way back to the very first block created.
- As such, the Blockchain contains an un-editable record of all transactions.

The QualiChain Project

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The QualiChain Project Pilots

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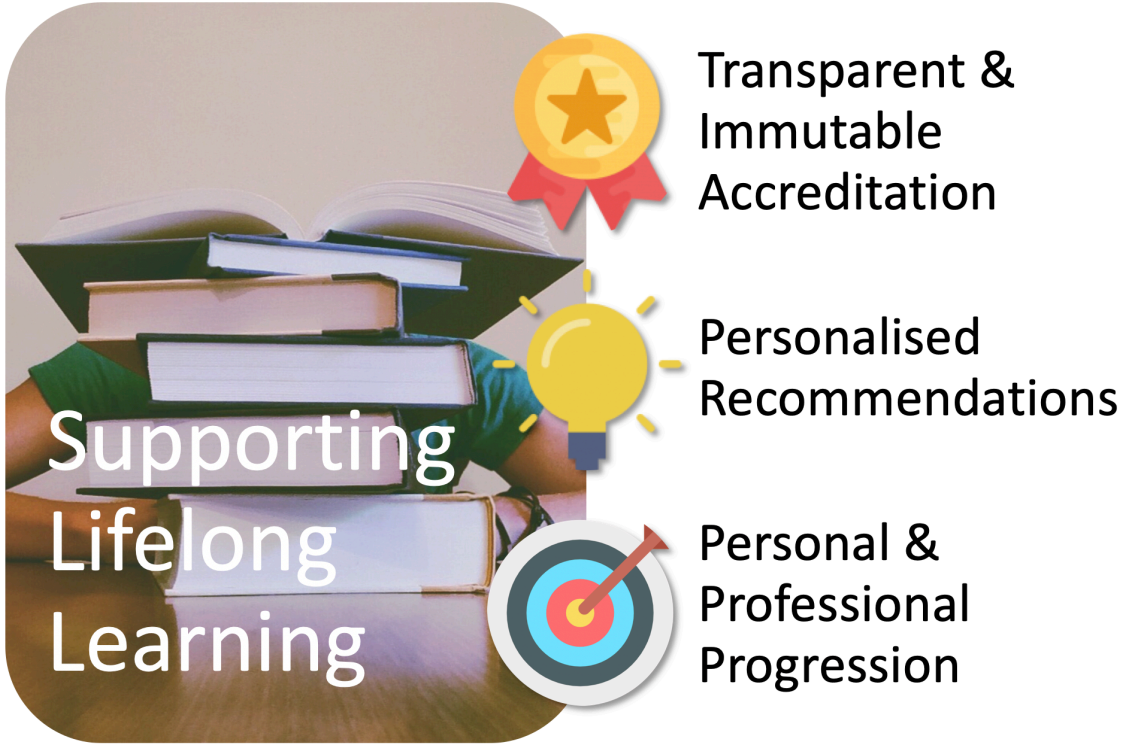
The QualiChain Lifelong Learning Pilot



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The Open Blockchain Initiative

- Investigating the potential of Blockchain technology in a variety of domains and practical applications, from **Education** to the **Internet of Things (IoT)**.
- Using **Ethereum** as a platform for decentralised applications, built on top of a Blockchain mechanism, which can be used for public data storage and computation.

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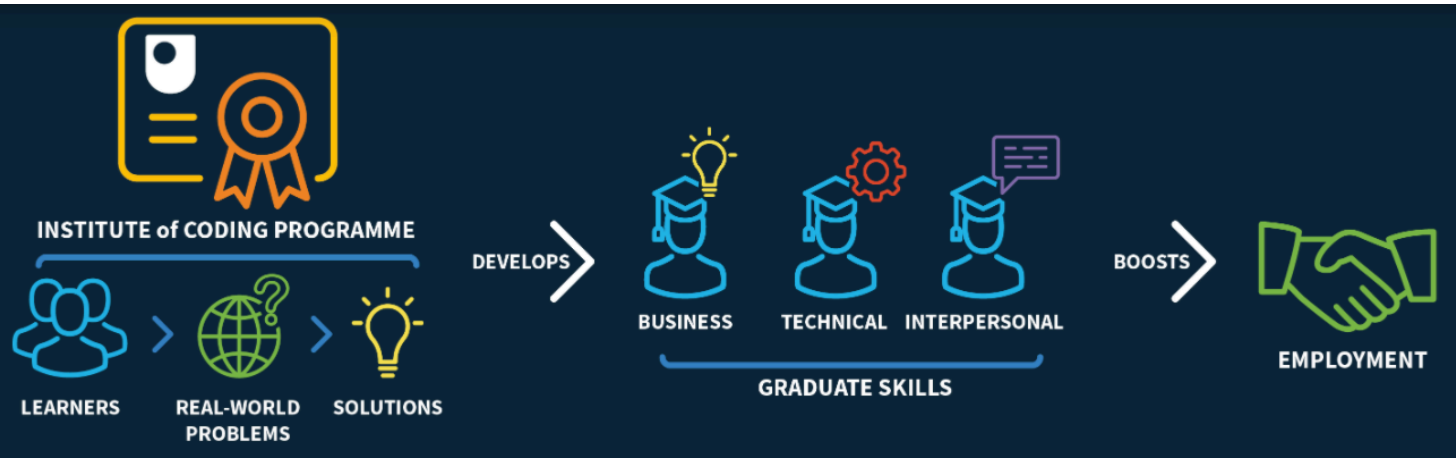
OpenBlockchain

The Institute of Coding (IoC)

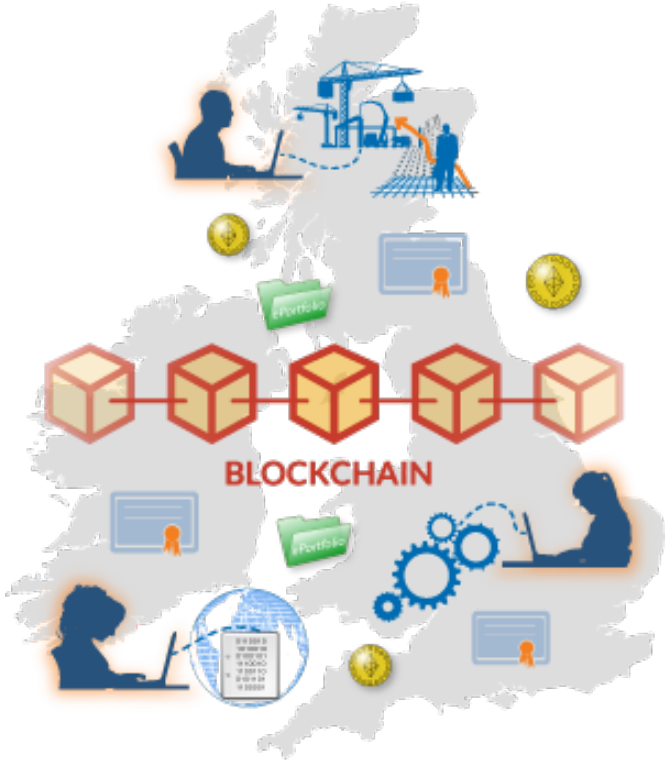
The Institute's vision is to enhance the education and employability of every IoC learner, and ensure that employers and individuals across the UK can access the skills they need to compete in the global digital economy.



Blockchain Badges & Microcredentials

IoC Badges are a crucial element of our toolbox to transform computing education. This form of **micro-accreditation** allows us to give credit for learning wherever and whenever it occurs.

Our use of Blockchains mean that IoC badges can be **verified** easily and securely without loss of privacy.



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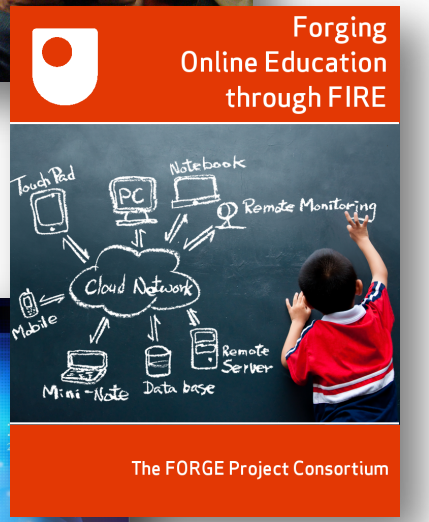
Part II

PRACTICAL & SOCIAL EDUCATION

Remote Laboratories

- Making world class experimental facilities accessible to **anyone / anytime / anywhere**.
- Approach is based upon:
  - New learning paradigms.
  - Rich multimedia interactive eBooks.



FORGE

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Hands-on Vocational Learning

- Addressing the significant **technical skills gap** in the industry by providing high quality online experiential learning resources for teaching computer networking to novice learners.
- Providing and promoting **lifelong learning resources** in a key industry area, in order to help more people into skilled employment.
- Allowing **visually impaired learners** to acquire basic computer networking skills through the use of accessible network simulation software.

Open Networking Lab

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Building Interactive Learning Resources

out there, but you cannot see it from here". Behind this cloud icon, we have hidden some network technology. This may be on a remote server or locked away inside this eBook.

The Network Server

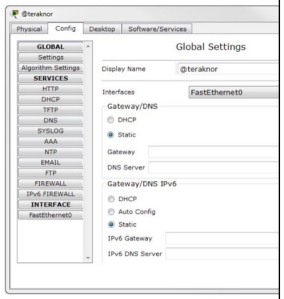
Learning about servers are an entire eBook in their own right; as are each of the other technologies in this section. We will give you a very brief introduction, to help you understand a little more about your simulator and network technology.

The google definition of server is "a computer or computer program which manages access to a centralised resource or service in a

Figure 5.4 Representation of a network server in Packet Tracer.

Movie 5.1 Demonstration of a server room.

Figure 5.5 List of protocols used in Packet



network". For the purposes of this eBook, t
description, but you will discover Network
that will tell you that there is much more to t

Often servers have been used to help us wi
of files. Somewhere on the internet, there
copies of this eBook that you downloaded
you visit a web page, a web site or use a
You are interacting remotely with a server.

We also use servers for to support the ma
our networks running. Domain Name Servic
link the names of web sites to the IP (intern
of these servers. Don't panic, during the pr
this eBook we will give you a little bit m
addresses.

If you look at Figure 5.5, you can see some of the protocols used in Packet Tracer. Why not use a search engine to discover what FTP, TFTP, DHCP, NTP and HTTP all do.

Servers come in different shapes and sizes, as you can see in the server room demonstration of Movie 5.1. In this video, Andrew Smith from the Faculty of Mathematics, Computing and Technology of the Open University and Ben Hawkridge from the Knowledge Media Institute of the Open University show the equipment typically found in a server room and discuss its usage.

The Router

Routers normally sit at the edge of your network. Their role is to move packets of data at high speed across a larger network such as the internet. Before your data leaves your device (such as your personal computer or a tablet device), it is split into many packets to aid transit across the network.

Figure 5.6 Representation of a router in Packet Tracer.

Commercial routers are programmed with a form of simple artificial intelligence called a routing protocol. It is the job of the router, when communicating with other routers to learn the best route to send your network traffic. Like a highway system in your country, network lines of communication can become congested, blocked or in the case of networks a connection to another system goes down. Where the router will attempt to learn a better route.

There are many different routing protocols each having their own advantages, you will learn more about these in later updates of this eBook. What is also important to understand with commercial routers are the interfaces (types of connections) they use. In Movie 5.2 you will have an opportunity to take a close look at one.

The Switch

One of the pleasures of becoming a networking expert is discovering that words in one context have different meanings in another. As a switch on a wall turns the light off and on. A switch on the network will at high speeds 'switch' or 'move' the network traffic in different directions according to its destination.

Figure 5.8 Representation of a switch in Packet Tracer.

Normally switches move traffic on your local area network, your home router may have some switch ports, your place of study or work will definitely have switches running their network. Again if you ask a network engineer or geek to explain switches, they will correctly tell you that there is nowadays more to a switch and these can be used to run very large systems and some have the ability to act like routers as well.

Movie 5.2 Demonstration of a Cisco router.

Figure 5.7 A gridlocked motorway intersection.

Cables

Many networks are still wired, often corporate systems, core network communications and academic networks still use cables. Wireless has become more common, but this is something we will find at the edge of the network. We still need to connect a wireless router to your cabled broadband service.

Figure 5.9 A network cable.

Packet Tracer has different types of cables and there are different rules for these cables depending on the technology you use. You will have a pre-cabled network on this eBook. Nevertheless, it

Movie 5.3 Demonstration of five types of network cables.

Free Online Course:
Discovering Computer Networks

A Badged Open Course available on the Open University's award-winning **OpenLearn** platform.

Currently featured in the UK government's **Digital Skills Toolkit**, preparing the UK for the post-COVID economy by offering essential digital skills to job seekers and furloughed workers.

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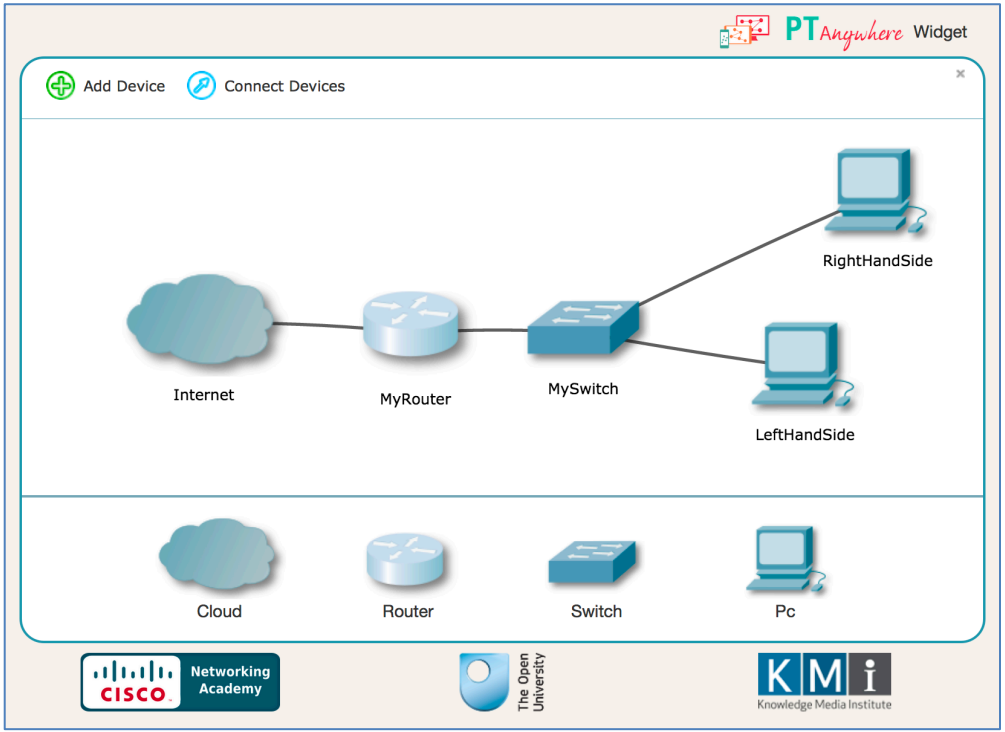
The PT Anywhere Network Simulator

Offers a network simulation environment via a web interface that can be accessed from **any web browser** or as a widget inside an **interactive eBook**.

Developed in collaboration with the **Cisco Networking Academy**.



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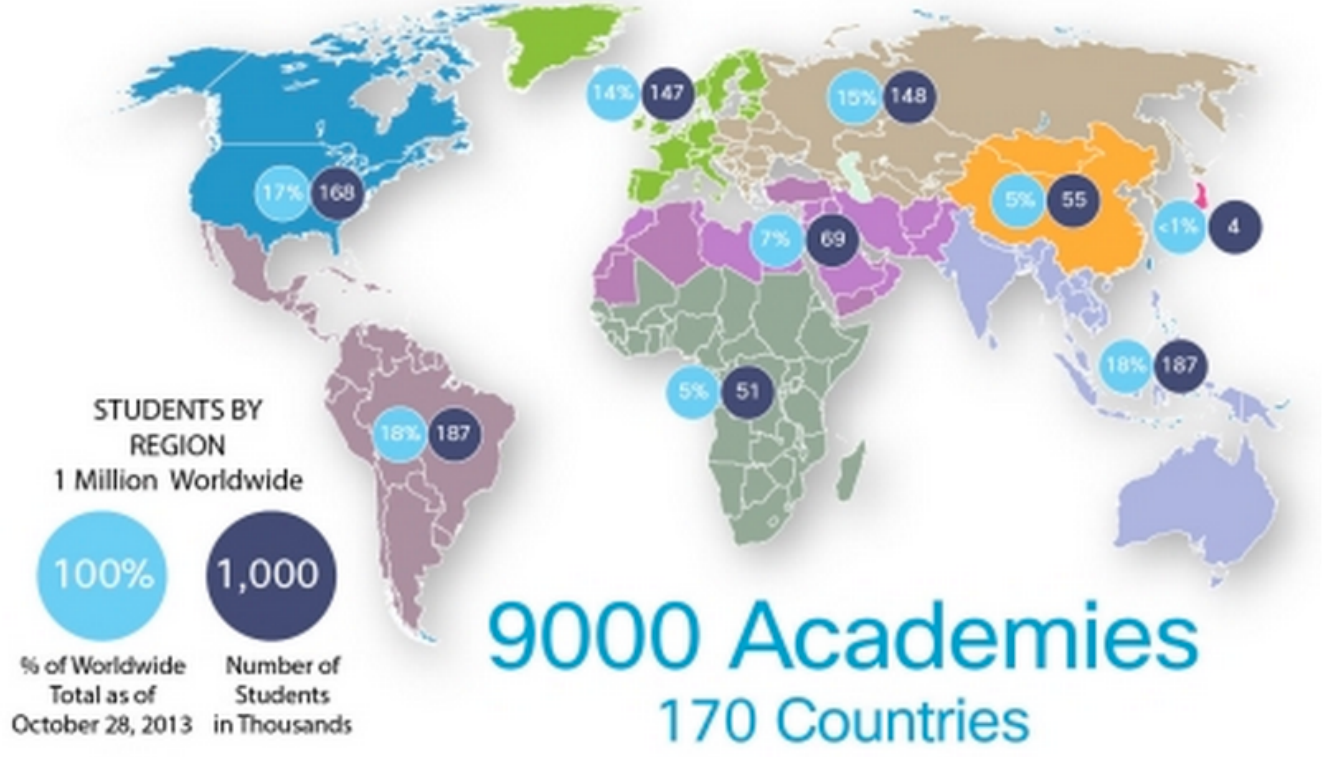
The Cisco Networking Academy



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Cisco Endorsement

“Cisco see the PT Anywhere implementation of the Cisco Academy Packet Tracer platform as a significant strategic development.”

“While we currently reach over a million students using Packet Tracer, the potential for the iPad and possibly HTML5 brings a new and very exciting dimension.”

Nuno Guarda, Head of Corporate Affairs for the United Kingdom and Ireland

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Addressing the Data Science Skills Gap

The European Data Science Academy (EDSA) has been established to:

- Deliver the learning tools that are crucially needed to close the **skills gap** in Data Science in the EU.
- Build a **European community** of educators, learners, practitioners, and policy makers on Data Science.

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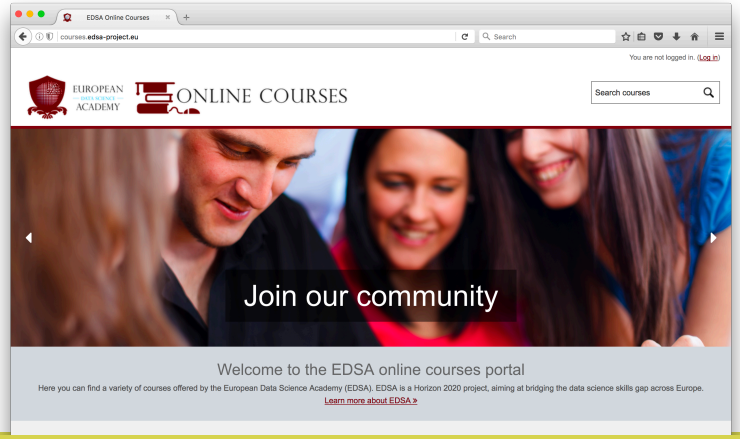
Delivery of Data Science Learning Materials

The EDSA courses employ different delivery channels and formats, e.g. **Massive Open Online Courses (MOOCs)** and **Open Educational Resources (OERs)**, in order to maximise their impact on the community.

The EDSA courses are delivered via:

- The **EDSA online courses portal**
- The **EDSA eBook**



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Building a European Community of Language Learners and Teachers

Addressing the needs for **linguistic skills** and **cultural awareness** of Erasmus+ mobility participants and the **training needs** of language teachers via:

- Connecting stakeholders in an **interactive collaborative environment** that supports their effort to raise language awareness and to develop European intercultural knowledge.
- Fostering the **Open Education European multicultural and multilingual vision**.

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OpenLang Network

Co-funded by the Erasmus+ Programme of the European Union

The OpenLang Network Platform

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Courses & activities

OpenLang MOOC

Language placement tests

Tandem language learning

Recommended language resources

Shared language resources

Community discussions

Find tandem learning partners

Find community members that have a certain language proficiency level to study with them and improve yo

Language 1 ☑ Level

2 English ☐	3 Proficient user - C2
2 French ☐	
3 Greek ☑	
1 Italian ☐	

Find recommended resources

Search

Resource language	Target language	Level	Institution	Type
54 English	1 Dutch	11 Advanced	1 British Council	17 MOOC
	13 English	17 Intermediate	1 Coventry University	37 OER
	6 French	26 Introductory	3 Dublin City University	
	10 German		3 King's College London	

Advanced French: At the science museum in Paris

Using the topic of science and technology in France, this fr
Advanced French: At the science museum in Paris, will sho
structure arguments, write a summary, use the subjunctiv
numbers and express wishes in French.

Crowdsourcing Open Education

- Building on the **wisdom**, **creativity** and **productivity of the crowd** for the co-creation of open educational content.
- Empowering communities of educators to **author**, **share** and **re-use** open educational content in a collaborative way.
- Making open educational content more **accessible**, **interactive**, **engaging** and **qualitative**.

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SLIDE WIKI

Part III

CONCLUSIONS

General Remarks

- **Technology-Enhanced Learning (TEL)** is a key driver for the transformation of education.
- The global COVID-19 crisis has brought forward the need for **online learning and flexible accreditation**, for example through **micro-credentials**.

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Collecting & Analysing Best Practices

The DEL4ALL project is analysing **best practices and success stories** by consolidating TEL initiatives into a cohesive, dynamic, participatory and sustainable **ecosystem**.

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Further Information

The QualiChain project: https://qualichain-project.eu/
The Open Blockchain initiative: https://blockchain.open.ac.uk/
The Institute of Coding: https://instituteofcoding.open.ac.uk/
The FORGE project: http://kmi.open.ac.uk/projects/name/forge
The Open Networking Lab project: http://onl.kmi.open.ac.uk/
The Discovering Computer Networks course: http://cs.co/FreeONL
The PT Anywhere network simulator: http://pt-anywhere.kmi.open.ac.uk/
The Cisco Networking Academy: https://www.netacad.com/
The European Data Science Academy: http://edsa-project.eu/
The OpenLang Network project: https://www.openlangnet.eu/
The SlideWiki project: http://slidewiki.eu/
The DEL4ALL project: https://www.del4all.eu/

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