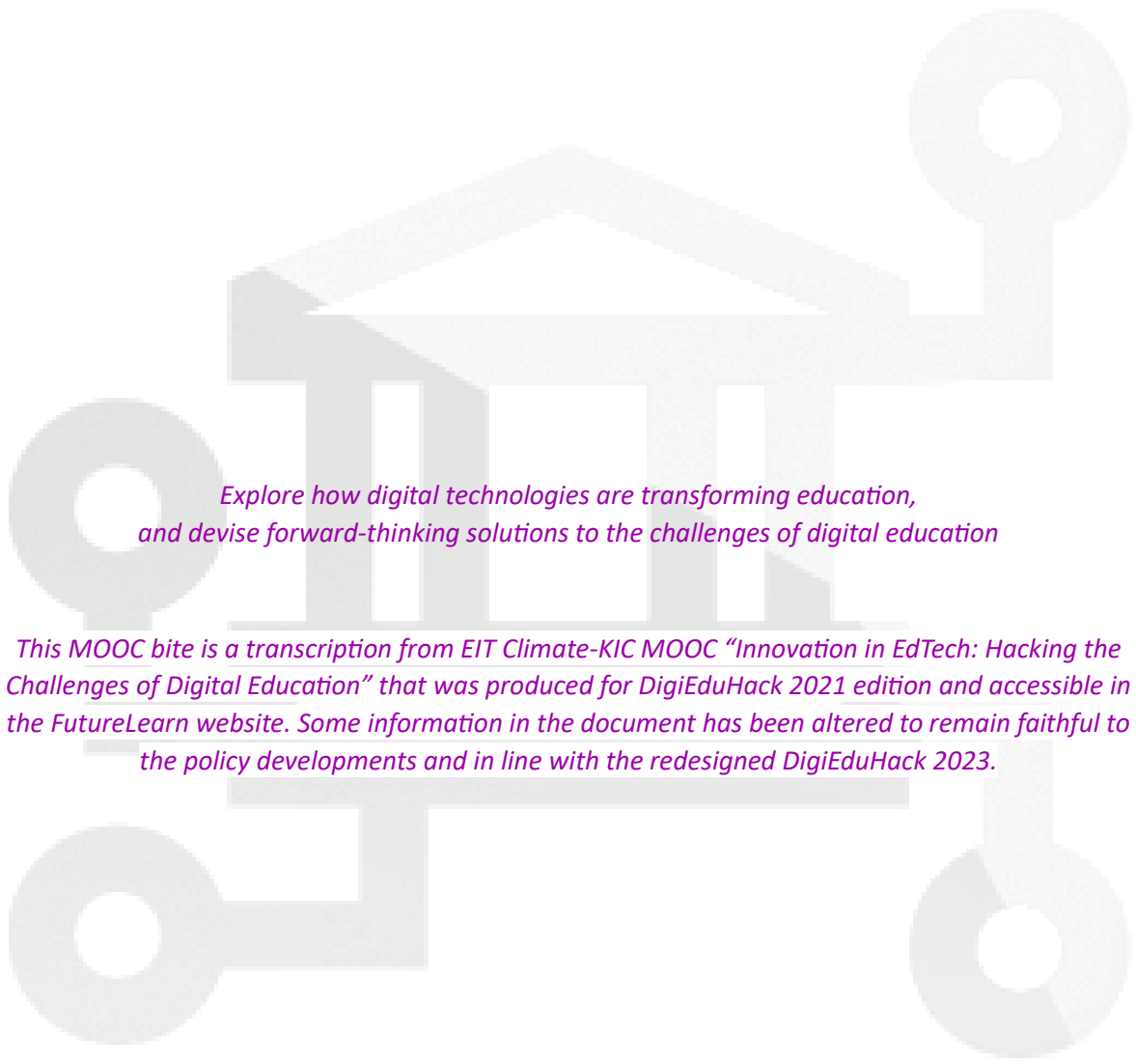2023

Education in the digital age

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*Explore how digital technologies are transforming education,
and devise forward-thinking solutions to the challenges of digital education*

This MOOC bite is a transcription from EIT Climate-KIC MOOC "Innovation in EdTech: Hacking the Challenges of Digital Education" that was produced for DigiEduHack 2021 edition and accessible in the FutureLearn website. Some information in the document has been altered to remain faithful to the policy developments and in line with the redesigned DigiEduHack 2023.

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1. The future of education in a digital age

Digital technology is driving innovation across every aspect of life, including education. This brings opportunities in schools, colleges, universities, lifelong learning and training. However, educational technologies are not magic bullets. Just as they offer great benefits, they also create challenges, which educators need to explore and address to help shape the future of education for the benefit of all.

Digital education - where we are today

Covid-19 has prompted us to accelerate the digital transformation of education

Around globe we saw amazing resilience from students and educators as they adapted to the 'new normal'.

Over 100 million learners, educators, education and training staff world-wide were affected, and digital technologies were used on a massive and unprecedented scale. There has been a paradigm shift in how students learn, requiring a more independent yet disciplined approach. Students and educators not only have to grapple with new technology, but also a different educational framework.

There are many positives to this shift, and innovation is key to success. As we look forward to the future, things will continue to evolve, moving away from purely face-to-face, to a blended mix of physical classroom and online. This will impact many aspects of teaching and learning, including perhaps how learners are assessed

One thing is certain, students will need greater self-reliance to keep focused on learning, and for this they will need support and robust, safe and reliable learning spaces. As educators we need to create these spaces, offer this support and ensure the learning content is delivered to fit this new way of learning.

Head teachers, lead educators, local authorities and governments are looking to the future and how they can build on the foundations already laid in 2020. Many organisations, like Microsoft, Zoom and Google, offered vital support to schools to enable remote learning.

To ensure that everyone can thrive in a digital age, the right education and training is vital. This will involve using digital technology to teach the digital skills for the future. Innovation is a must to ensure this happens and to be able to tackle the challenges we will face.

What does the future of education look like?

Education is being transformed by technological and societal factors. You now have the opportunity to re-imagine how teaching and learning will be designed, developed and delivered in a complex, uncertain and precarious world.

Digital education revolution drivers and issues

A hackathon, or hack, is a powerful and intense tool that brings together individuals from a variety of disciplines to work collaboratively in a short space of time (normally 24-48 hours). The purpose of the hack is to explore difficult problems and ideate innovative solutions.

Sustainability and digital education

Developing and applying digital education tools must never become the goal itself. It's always a mean to enhance the learning, to create better insights and to help people change their behavior. One area where foster learning is needed is the area of sustainability, or you could say creating a more sustainable future. Science does tell us that we have not more than 10 years now to actually change the way that we use the resources of our planet, the way that we design our transportation and energy systems, and the way that we take care of the species on our own on Earth. So in order to get there in time, we need to start thinking about how to creating the knowledge, the actions that are needed. The problems we are dealing with this in this area are systemic and they are wicked. They are intertwined. They connect to each other and they are not easy to grasp. In this area, we need more than knowledge and know how. We need insights and personal capabilities such as creativity, problem solving, decision-making and other skills like that tragedy. Deal with the challenges of our times.

Schools and higher educations are focusing on sustainable development in their teaching and learning. They do that, for example, by focusing on the UN's 17 Sustainable Development Goals and use the mass direction for learning and training.

Digital tools and methodologies play a central role here by actually making students able to learn both inside and outside school. We talk about continuous learning and continuous education, and that is important to keep up with the challenges of tomorrow.

They enable lifelong learning and they enable collaborative activities across geographies, across disciplines and across all levels of society.

So that's why we must focus in on the role of digital tools in setting up a learning system that leads us towards sustainability in the future.

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Living in a world with a population of more than 7 billion people and limited natural resources, we all have a part to play in living together more sustainably.

Tackling one of today's biggest challenges requires us to work together across the board, so economic, technological, societal and education factors are all interconnected; part of the same system where our actions have consequences.

Education has a part to play

Education has an opportunity to have a catalytic impact on millions of people around the globe, transforming the way we think and behave towards our planet. This transformation will require a radical rethink of the people, technologies and processes in education.

See this video: https://youtu.be/EKqXKNiwP7w

Think about how AI can empower people with disabilities, Blockchain can engender trust, cities can become smarter using augmented reality or through data collection. The possibilities are endless.

Education is one of the pillars in the United Nations 2030 Agenda for Sustainable Development, which aims to ensure inclusive and equitable quality of education and to promote lifelong learning opportunities for all.

Education drives each of the UN Sustainable Development Goals. (Source: *"Implementing sustainability as the new normal: Responsible management education – From a private business school's perspective," The International Journal of Management Education, July 2017*)

But how sustainable is digital?

We have all read about the impact that air travel has on the climate, but do we really understand the impact our daily digital world has on the environment?

According to Open University Professor John Naughton, data centres make up about 50% of all energy consumed by digital ecosystems. Personal devices use another 34%, and the industries responsible for manufacturing them use 16%.

Digital sustainability is something we need to consider when we think about the future of education:

- What do you think we need to consider when it comes to digital sustainability?
- What are the issues and what are the opportunities?

Digital Education Action Plan

The Digital Education Action Plan (2021-2027) is an EU policy initiative aimed at promoting inclusive and high-quality digital education in Europe. Adopted in September 2020, the plan addresses the challenges and opportunities brought by the COVID-19 pandemic and outlines a long-term vision for effective digital transformation of education and training. It engaged involves diversity of stakeholders, such as teachers, students, policymakers, academia, and researchers.

Aligned with the EU's priority 'Europe fit for the Digital age' , the Action plan is aligned with initiatives like Next Generation EU and the Recovery and Resilience Facility. It contributes to achieving the vision of a European Education Area by 2025 and the goals of the European Skills Agenda, European Social Pillar Action Plan, and the "2030 Digital Compass: the European way for the Digital Decade."

The Action plan encompasses two priorities and fourteen actions. The first priority focuses on developing a high-performing digital education ecosystem, where all factors for effective digital education are in place- high-speed connectivity, digital equipment and content, teacher training and pedagogies, as well as effective digital education strategies at institutional level. The second priority aims to enhance digital skills and competences from basic to advanced and in a lifelong learning perspective. Reflecting these two priorities, in April 2023 the European Commission adopted the Digital education and skills package, outlining two proposals for Council Recommendations- on key enabling factors in digital education and training and on improving the provision of digital skills in education and training.

To support further these efforts, the European Commission established the European Digital Education Hub to additionally foster collaboration and exchange in digital education at the EU level.

Building upon the first Digital Education Action Plan (2018-2020), the current plan incorporates feedback gathered through an open public consultation conducted by the Commission.

Explore the related content on the Digital Education Action Plan website and consider which priority areas and actions interest you most.

References
European Commission. (n.d.). *Digital Education Action Plan (2021-2027).*
https://education.ec.europa.eu/focus-topics/digital-education/action-plan

Funded by
the European Union

2. Emerging technologies

There are many educational technologies and concepts coming on stream. Here we introduce some that you might like to reflect on, in terms of their relevance to your own practice.

Internet of everything

First let's consider the Internet of Things (IoT). This is a network of devices that can be connected, can sense, and can communicate via the internet.

Examples include intruder alarms that monitor the security of your home and send a message to your mobile if they sense that security has been breached.

The Internet of Everything (IoE) on the other hand, is defined by Cisco as '*the networked connection of people, process, data, and things—which is becoming the basis for the Internet of Learning Things*'.

Let's take a closer look these four 'pillars':

People

We need to appreciate how people connect to the internet to learn and then apply their knowledge. On the one hand, this might be Just In Time (JIT) viewing of a video to revise a topic before an exam or prior to carrying out a task; for example, giving an interview.

On the other hand, this might be participating in a massive open online course (MOOC), or engaging in a blended learning in which the knowledge aspects of concepts are explained in pre-recorded videos, while class time (either face-to-face or virtual) is used for collaborative application, problem-solving, discussion of issues, and so on.

Process

CISCO talks about this in terms of a correct process ensuring that '*connections become relevant and value is added because the right information is delivered to the right person, at the right time, in an appropriate way*.'

For a blended learning programme, the process would be the flow of the learning. This may be initial online orientation activities, through the delivery of pre-recorded videos and follow-up 'check your understanding' questions, then synchronous activities/seminars, through to application, consolidation and extension activities, and ultimately assessment.

Data

There is much more potential than just reporting raw data. For example, a learner's answers to a diagnostic assessment can be analysed in real time and used to direct them on the most appropriate pathways to achieve the desired outcomes. We've already seen that as devices and programmes

become more intelligent, including the evolution of artificial intelligence (AI), personalised learning can be provided by artificial tutors.

Things

These are the physical devices that can be connected to both people and the internet. IP-enabled sensors have great potential in education, such as gloves that assess and feedback the accuracy of learners who are practising the use of sign-language.

See also
CISCO - the Internet of Everything

Artificial intelligence

A good teacher is well aware that insanity can be defined as 'trying the same thing over and over, and expecting a different result'.

If a student does not understand something they have been taught, there is no point in just keep hammering away, repeating the same approach in the vain hope that the student will eventually 'get it.' Instead, the teacher needs to try another tack – they adapt their teaching to meet the needs of that student.
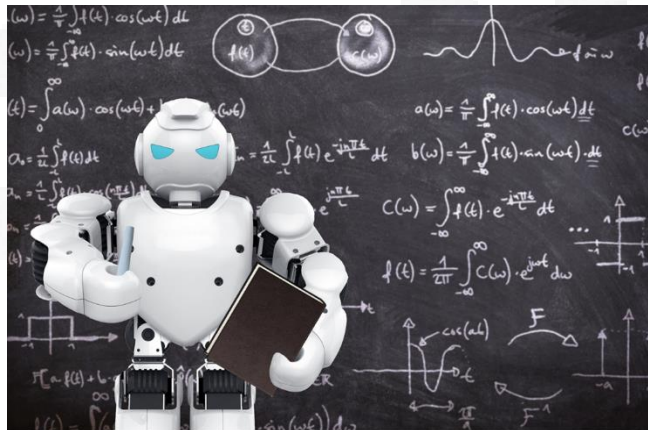
Or at least they would do if only they had time. The degree of personalisation a teacher can provide is often limited by their capacity and pressures such as the size of the group or class, and the pressing need to get through the lesson or seminar.

In these circumstances artificial intelligence (AI) might be an effective solution. When you think about it, AI is already a regular aspect of students' everyday lives, from Alexa, through Instagram filters, to chatbots.

Adaptive learning systems constantly adjust what they present to a learner in light of continuous assessment. One of the most well-known adaptive learning programs is the Khan Academy, which aims to identify and address gaps in a student's learning and fill these on an individualised basis. Technologies such as these use machine learning to synthesise the huge volume of data needed to deliver student-centered learning. They can assemble the background, take input from the individual learner regarding their needs, identify learning deficits, and produce and present the learning path to best accomplish the learning outcomes.

Effective virtual tutoring is much more than just randomly spewing out information and testing the learner's knowledge. What is required of the AI is that it learns the student's way of learning, and leads and responds appropriately. Many critics feel we are not quite there yet.

Personalised learning is just one application of AI. Here are some others:

- Providing additional support through 'AI tutors', which adapt what is presented and asked of learners in real-time
- Flagging potentially dangerous or inappropriate use of technology
- Marking/grading students' work/tests
- Predicting students who are likely to be at risk of falling behind academically
- Designing curriculum or class schedules
- Nudging students to ensure they meet their commitments – e.g. submitting assignments on time
- Identifying where courses need to be improved

Recognizing the potential of AI to transform education and providing personalized learning experiences, while also understanding the impact and risks associated with AI and data, the Commission published Ethical guidelines for educators on the use of AI and data in teaching and learning. An initiative of the Digital Education Action Plan, the guidelines promote a positive, critical, and ethical engagement with the emerging technology.

See also

10-roles-for-artificial-intelligence-in-education

The Impact of Artificial Intelligence on Learning, Teaching, and Education Policies for the future

Virtual and augmented reality
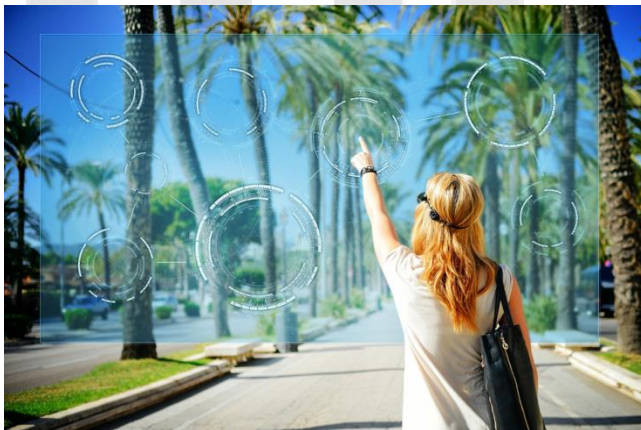
The terms 'virtual reality' and 'augmented reality' get bandied about a lot and used interchangeably but they are two different concepts.

Virtual and augmented reality

Do you want to give your students a field trip to Mars? Do you want learners to tour the world's best museums without leaving the classroom? How about enabling students to get inside the human brain to learn chemistry? What about taking learners to a historic site and have them walk around and see what things looked like on that spot hundreds of years ago? Virtual reality or augmented reality could be the answer.

Virtual reality (VR) headsets completely fill a learner's vision enabling her or him to step into simulated real-world environments thereby providing totally immersive, experiential and active learning. The outside world is replaced by a virtual world.

Augmented reality (AR) on the other hand adds to what a learner sees rather than totally replacing their vision. AR glasses are available but these can be side-stepped by augmenting reality through the ubiquitous smartphone. Instead of needing expensive headsets, the phone's camera tracks the learner's surroundings but overlays information and images on top of it via the screen.

Funded by
the European Union

Phone-based AR software has been around for years recognising surroundings and providing additional information. Much of this has been consumer oriented, such as providing pop-up reviews of restaurants as you point your phone at them. There have been massively popular games such as Pokeman Go, which projects characters on top of the view of the camera. There is also a growing list of educational augmented reality tools.

Reflect on the following:

- How can VR and AR change the way students learn?
- Which aspects of learning are VR and AR uniquely equipped to support?
- Can you think of ways that VR and AR could transform the way you teach now?

See also

[4 Inventive Examples of Virtual Reality in Education](#)

Educational apps

There is a constant eruption of educational apps that threaten to overwhelm and engulf educators and students.

Amidst this constant avalanche of apps, it can be difficult for educators to decide which ones are best suited to helping learners to meet their learning outcomes.

We recommend you to read Allan Carrington's article 'The Pedagogy Wheel – It's Not About The Apps, It's About The Pedagogy' (see link below) and then reflect on the following question: *How can we decide which educational apps and tools to use with our learners?*

See also

[The Pedagogy Wheel - It's Not About The Apps. It's About the Pedagogy](#)

3D printing
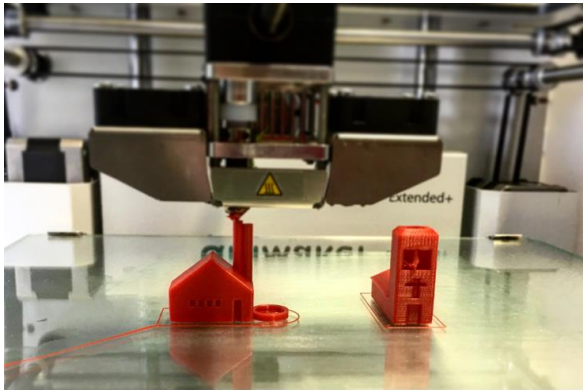
3D printing is transforming the manufacturing industry and is likely to affect many aspects of our daily lives in the near future.

In education, 3D printing has potential to enhance teaching and learning for STEM subjects and beyond.

Why teachers should bring 3D printers into the classroom with Stephen Elford (https://youtu.be/-yRCUIbl_Do).

Consider:

- How can 3D printing give learners a real sense of achievement?
- What barriers may there be to including 3D printing into education, and how might these be overcome?
- Can you think of ways in which 3D printing could be used to enhance the way you teach currently?

Games and gamification

Digital games are extremely popular, as evidence by the success of strategy games like Minecraft, Sid Meier's Civilization, The Sims, Call of Duty, FIFA Football and so on.

Researchers have argued that many digital games are designed around respected theories of learning in order to engage players and teach them how to play the game. They suggest that games help to develop:

- Goal-orientated actions
- Problem solving
- Higher cognitive skills
- Group decision-making

Early digital games were designed to be played individually but many commercial games are now designed for multiple players. Gaming does not have to be all about individuals endeavouring to triumph over their competitors – it can be just as much about teaming up with others and collaborating to achieve shared goals.

Digital game playing is often considered a boy's pastime, but in 2020, it was calculated that women accounted for nearly 41 percent of all gamers in the United States (statistica.com). The creation of games for mobiles has also extended their use.

So how can educators tap into the potential of digital games? Perhaps the most obvious way is to integrate commercial off-the shelf games into teaching. Most of these games do not have formal educational goals, but educators have successfully used such games across a wide range of subjects, from business studies, through history and criminal justice, to engineering and politics.

Another approach is to create games from scratch. Few educators may have the required skills and budget to create games of commercial quality but companies who produce educational games are hungry for good ideas, so if you have a great concept you might be able to find a partner with whom you can work to develop your game. Also consider the option of students developing digital games themselves. Coding is being seen as a key competency, so why not giving students the opportunity to learn and apply their skills in creating digital games?

As opposed to using educational games per se, educators may want to infuse their teaching with 'gamification' – using elements and approaches of game design and mechanics to enhance non-game contexts. Think about how these gaming tropes could make your digital teaching more engaging:

- **Goals**: all games have a quest which players strive to attain, so make sure you have a clearly defined aim for every lesson, seminar and workshop
- **Rewards**: these can be in recognition of individual or group achievements; they might take the form of badges, merits, and so on
- **Stories**: the human brain is hard-wired to get hooked by storytelling; think about how you can build-in a sense of narrative into your educational quests (tip: all stories have a beginning, a middle, and an end)
- **Characters**: this could include role-playing, or creating visual or pen-portraits of characters in a narrative
- **Randomness**: think about how you could in do the equivalent of rolling the digital dice to introduce an element of chance, for example using a random method for selecting who plays which role in group activity, or which scenario to work on gets pulled from the pool.

See also

[Ben Bertoli's ClassRealm Is Gamifying the Classroom](#)

[Digital Games in Education: The Design of Game-Based Learning Environments](#)

[Distribution of computer and video gamers in the United States from 2006 to 2020, by gender](#)
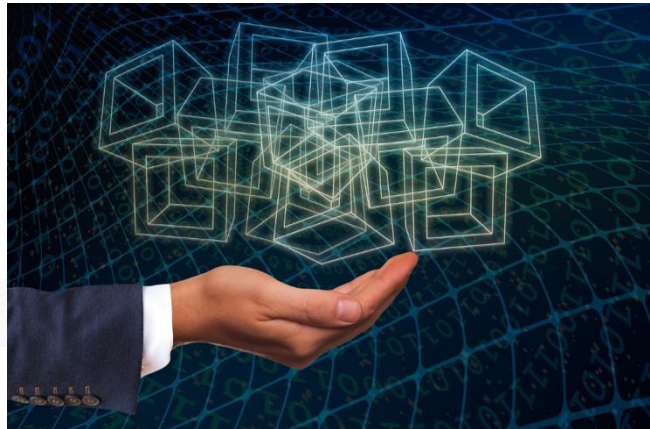
Blockchain

The **blockchain concept** is based on is growing number of records ('blocks') that are cryptographically linked (and hence secure).

Blockchains are resistant to the modification of data, therefore they can record transactions between parties efficiently and in a manner that is verifiable and permanent. To put things simply, blockchains efficiently ensure the integrity of the data.

The most well-known application of blockchain is the Bitcoin, but it can be used far beyond cryptocurrencies, such as in contracts, financial services, video games, and supply chains. But what about education?

At first glance, applications in the world of education may not seem obvious. However, when you consider that education organisations need to store voluminous records, verify learners' identities, transfer learning credits, and so on, the benefits of blockchain start to become apparent. For example, it could reduce the costs of manual verification of documents and records while at the same time eliminating fraud.

Education organisations are also involved with protection of intellectual property rights (IP), for example the creation and publishing of research papers. Again, blockchain may have a role to play in verifying intellectual property rights.

However, before blockchain in education can be widely adopted, barriers need to be overcome. One such stumbling block is standards. Organisations store and manage data in many different ways, whereas blockchain relies on a common set of standards

Blockchain in education may be in its infancy, but every educational institution needs to keep its eye on the horizon, and work across organisations to be prepared to take advantage of blockchain opportunities as they enter the mainstream.

See also
Understand the Blockchain in Two Minutes

3. Changing Classroom Dynamics

In the context of post-COVID technology expansion, a 'new normal' emerged in the way that educators plan and deliver learning digitally, which includes:

Teaching in chunks: segmenting teaching and learning into activities including questions and answers, quizzes, collaboration. For example, through document sharing, peer assessment, and so on.

Allowing learners to 'have a voice': for example, setting clear goals but providing a range of resources, teaching episodes, and pathways, from which learners can 'mix and match' according to their own preferences and circumstances, in other words offering them 'hybrid learning' where they can choose between synchronous (live) offerings and asynchronous (not-live) offerings.

Giving learners a say in how assessments are designed and delivered

- What do you think about these ideas in relation to your own practice?
- What other ideas do have for ways of making digital learning active and engaging?
- Share your thoughts on these questions in the discussion below.

It may be tempting for educators to try to simply 'bolt-on' digital elements to their current practices, but many recognise that they may need to re-think their overall pedagogical approaches.

The digital educator

According to Dell Technologies1, 85% of the jobs in 2030 that Generation Z (those born between the 1990s and early 2010s) and Generation Alpha (those born between the early 2010s and the mid-2020s) will enter into have not been invented yet.

And a World Economic Forum report2 suggests that 65% of primary-school children today will be working in job types that do not even exist at the moment. Young people no longer have to wait for their teachers to give them information – instead they can access masses of knowledge with just a few clicks on their devices.

When you also consider that digital technologies become out of date almost immediately due to continuous innovation and development, it seems that educators need to reconsider fundamentally their roles.

The traditional model of the educator as a gatekeeper; someone who decides when and how to impart knowledge and wisdom to their students, is drastically outdated. Instead, it looks like the prime purpose of an educator may be to facilitate learning, especially in enabling students to develop life skills they need for the future such as:

- Resilience
- Flexibility and Adaptability
- Emotional Intelligence
- Continuous learning
- Entrepreneurial skills
- Creativity
- Critical thinking

And what skills are required by the digital educator? Consider some of these aspects:

Learning design; structuring episodes of learning and the pathways through them; selecting the most effective methods and technologies to convey concepts, to apply knowledge, to develop and practise skills, and to assess learning;

Orchestrating technologies and tools; for example facilitating virtual classrooms, including breakout rooms for group-working, sharing and working on content jointly with students in collaborative workspaces

Supporting learners, including pastoral aspects; for example how can you identify and support students who have emotional or other issues when you engaging with them remotely instead of face-to-face?

We will explore educators' digital competences in more detail in a later step.

References

Realizing 2030: A Divided Vision of the Future (Dell Technologies)

The Future of Jobs and Skills (World Economic Forum)

4 ways COVID-19 could change how we educate future generations by Poornima Luthra, Founder and Chief Consultant, TalentED Consultancy ApS, and External Faculty at Copenhagen Business School, and Sandy Mackenzie, Director, Copenhagen International School, (The World Economic Forum).

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See also

Realizing 2030: A Divided Vision of the Future

Here's what you need to know about the future of work

Active and engaging learning

First of all, we have selected this picture here because we think that this represents approximatively our vision on the learner of today. You see here a young girl climbing a wall. It seems for sure an active learner because she is applying some strategies to find her way to the top. And what you also may notice is that she has some freedom in finding the path that suits her best. This is the type of learning that we want to promote: not a teacher displaying a video of someone else climbing a wall, but rather the students doing it themselves.

If learners learn by doing, they will be more aware of the goal of their actions: finding the top.

As you can see, there is also a rope: which makes us think it could be held by teammate. So, this could be a representation of a group activity with different independent roles. Anyway, to organise this type of teaching and learning, you need the right environment: you need the environment that is more or less an ally for your pedagogical view.

Of course, we don't need the climbing walls in our classroom, but classrooms and learning spaces in general should offer a variety and a choice and make the right conditions to organise different learning activities and also promote the development of versatile skills. Because, quite often, the fixed and the traditional learning environments that we have in our schools lead to very stereotype practices, and, in most cases. we don't see that active learning happening. It could be compared with the spaces we have at home, where there is a choice: we choose the right environment and the right tools for the activity that we want to do. This same conditions should, according to us, also be possible in a school environment.

One and a half billon students around the world, according to UNESCO, were engaged in remote learning at the height of the COVID-19 pandemic in March 2020. All of a sudden, everyone had to go into lockdown and students couldn't go to school anymore; the living room or another place at home suddenly became their own space. At first sight, you could say, well, this was nice: it offered freedom and gave choice and opportunities for learning. But, of course, it was not as simple as that: the spatial conditions were, in most cases, not so ideal for many students and not to mention that the whole family was sharing the same space.

It is not just about the students not having the best conditions (no good devices or no good connections for the Internet, etcetera), but even if the spatial and the technical circumstances are ideal, we could not expect spontaneous engagement from the learners when they are isolated at home; students need more self-regulation skills.

On the educator side, some with no previous experience of teaching online or at a distance, needed to try new approaches to teaching and learning. At first, many sought to replicate online what they normally do in a classroom but soon discovered this was neither practical nor effective.

Now, most schools have brought their students back to school. And what we see here now is, in fact, the total opposite of a student climbing a wall. It is, again, a very, very traditional environment with the science seats, very individual. And, in this environment, we also see that that teaching has been reduced to lecturing again. So the very old type of lecturing has come back in this new space, while we think we must try to have the ambition to organise active learning and think of that girl climbing the wall.

Enabling active and engaging learning in the digital space

So, how can active and engaging learning be enabled in digital learning spaces? Arjana Blazic shares her thoughts.

It is important to structure the learning process, so, of course, students need some kind of guidance so that they can rely on and what we shouldn't do is to replicate what we usually do in our physical school building. It should be very well structured, but in smaller segments, we should think of a lesson as a combination of small chunks, for example, small chunks of teacher instruction, followed by small chunks of energisers, then shorter meetings so that we can help students stay focused and promote their active participation in learning.

Teachers can boost student engagement and support student centred learning by providing them rich choice: they can encourage students to choose their own learning pathways and, by doing this, they can make their learning more personal.

Teachers can do this by letting students set their own learning goals, choose their own learning materials, make substantial decisions about, for example, which activities they will complete. Also, how to organise teamwork or even how to design their own learning space. Providing students with the responsibility for their learning, which just amplifies students' voice, they becomes autonomous and confident, and they can demonstrate that they are learning in so many different and also so many creative ways. To show what they know or even why not, why no letting them create new knowledge?

This leads to new challenges for teachers: how can teachers assess student learning and the products they create? The response is that we also need to change our assessment practices: make a shift from grading, rote learning, rote memorisation and grading facts, to assessing deep learning and assessing creative artefacts produced by our students.

Blended learning

What is the perfect blend?

When COVID-19 made face-to-face teaching and learning impossible, many educators were faced with need to 'go-digital' for the first time. However, many others were already delivering education digitally, not because there was no other available way to teach, but because they recognised the pedagogical benefits of blended learning.

One of the first types of blended learning was the **flipped classroom**: in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter.

For example, learners asynchronously self-study the concepts of a new topic by watching videos, reading, doing e-learning, and then participate in a synchronous classroom session (face-to-face or virtual) in which, along with other learners and with teacher facilitation, they further investigate, apply, or practice what they were introduced to in the self-study phase (**learning by doing**).

The blend can be further enhanced by adding a follow-up phase in which students consolidate or extend their learning, for example by applying what they've learned to real-world challenges. This offers a basic blend:
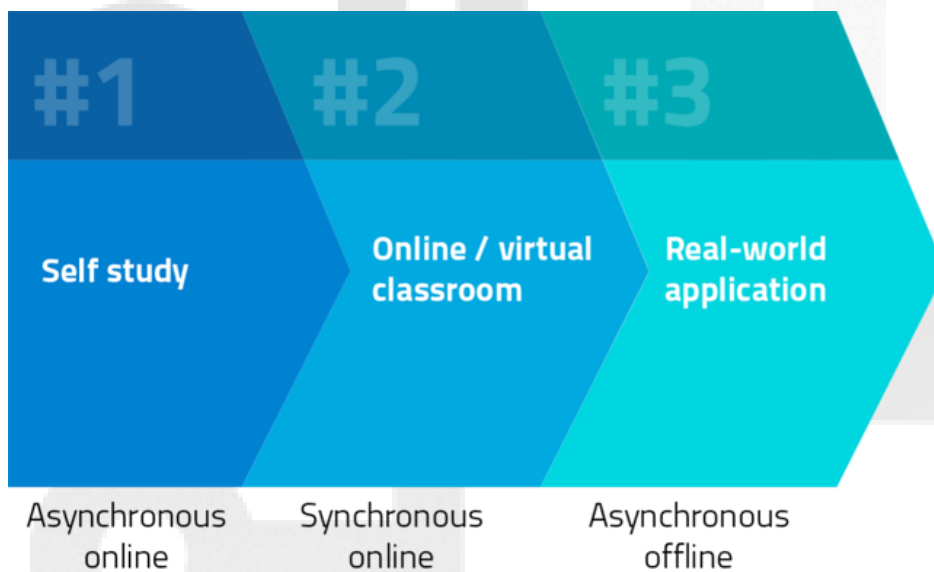
The basic blend can be developed further by the addition of other elements, such as diagnostic, formative and summative assessments, and a carefully planned combination of online and offline self-study and collaborative sessions.
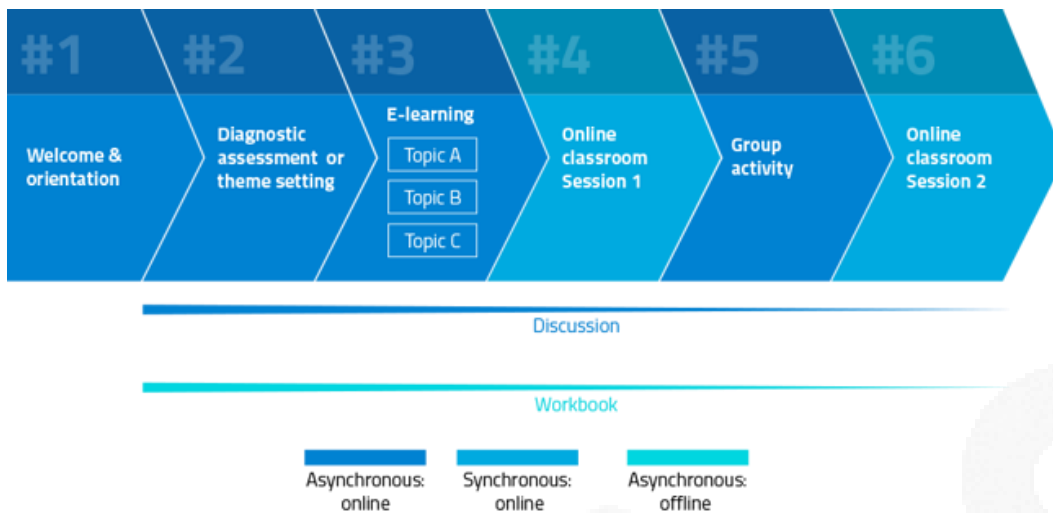
The key to designing a blend is to identify which type of learning is most the most effective and efficient way of enabling the learning outcomes to be met.

Hybrid learning is another term that came into use, which is often treated as a synonym for blended learning. However, the term is more often being used to describe teaching that happens both in-person and remotely at the same time. For example, learners participate in a seminar either by being physically present in the classroom or by participating online.

This has obvious advantages, such as allowing flexibility, however, the main challenge for educators is to ensure that learners who participate online have an equivalent experience to those who are attending in person.

A shared understanding of blended learning was developed in the Council Recommendation on blended learning approaches for high-quality and inclusive primary and secondary education, part of the Digital Education Action Plan.

Peer to peer and collaborative learning

The ability to work effectively in teams is of critical importance in the workplace.

Educators can help students develop collaborative and cooperative capabilities and, crucially, at the same time harness this capacity as a key aspect of pedagogy.

Just as social media has revolutionised peer to peer interactions, social learning technology is transforming the way that student-to-student interaction can be used in education.

There is nothing new about learners working together, for example in pairs or in groups, in which students learn from each other. There is great value in learners working together to solve problems

and tackle challenges. Students learn very much when they need to explain their ideas to others, not only about the subject in hand, but also about evaluating their own learning.

Technologies such as discussion forums, feeds, wikis, and other collaborative spaces, have vastly extended the scope of social learning. For example, students might be required to use the feed or discussion forum on a learning management system (LMS) to post answers to questions and then to provide feedback on the answers posted by their peers.

Learners may be allocated to groups and asked to work on assignments or projects for which they present their solutions and ideas in a subsequent live (synchronous) class or seminar. This collaborative work might happen through a variety of channels, such as video calls, discussion boards, and shared and editable online documents (for example Google docs), and online collaborative spaces (for example Miroboard).

There are many different models of peer and collaborative learning. Educators need to evaluate these and select those that best fit the learners' needs and the objectives of their course. Similarly, there are a host of different technologies through which social learning can be facilitated, and which educators need to orchestrate.

Facilitation

When using technologies such as discussion forums, educators might post a question or exercise, sit back and leave things to the students, and then become disappointed when there is little participation. To ensure that discussions are successful, educators need to facilitate them. Techniques for this include the educator:

- Adding a post themselves at the start to get the ball rolling
- Posting some information in the discussion that the learners cannot get elsewhere, and making this clear to them so that this is the case so that learners have a compelling reason to visit the discussion
- Participate in the discussion; this doesn't mean replying to each and every learner's post, but instead identifying the trends and issues that emerge (for example, common misconceptions) and then posting feedback on these
- Incentivising participation by awarding marks to those who make relevant contributions

The educator may also want to create and share some ground rules for participation. We all know how social media can bring out the worst in some people in terms of the comments they make about others, so educators are well advised to guide learners away from such behaviour, and instead give advice about how to give constructive feedback.

See also

Integrating Collaborative Learning in Policy and Practice - CO-LAB's Conclusions and Recommendations

A teacher's guide to moderating online discussion forums: From theory to practice

5. Digital competences for all

We live a world where digital technologies are ubiquitous, hence people of all ages need the right skills to effectively use these technologies for various purposed including working, getting a job, learning, training, shopping online, finding health information, participating in society, and so on.

The Digital Competence Framework for Citizens (DigComp) is a widely recognized framework for understanding digital competence in the EU and beyond for over a decade. It has been instrumental in shaping digital skills policy and contributes to achieving the Digital Compass targets, including that at least 80% of the population possesses basic digital skills and that there are 20 million ICT specialists by 2030 with a good gender balance.

AAs part of the Digital Education Action Plan, the framework was updated in 2022 to reflect the rapidly evolving landscape, including emerging technologies and new digital literacy requirements. The update process for DigComp 2.2 involved extensive consultation with stakeholders, including international organizations like ILO, UNESCO, UNICEF, and the World Bank.

DigComp 2.2 encompasses the following competences:

- Information and Data Literacy: This competence area focuses on the ability to search, locate, evaluate, and effectively use digital information and data. It involves skills such as conducting online research, critically evaluating sources, understanding data privacy and protection, and interpreting and analyzing data to make informed decisions.
- Communication and Collaboration: This competence area emphasizes effective communication and collaboration in digital environments. It includes skills in using digital tools and platforms for communication, sharing information, and collaborating with others. This competence involves the ability to navigate online communication channels, adapt communication styles to different contexts, and work collaboratively on digital platforms or in virtual teams.
- Digital Content Creation: This competence area pertains to the ability to create, edit, and publish digital content using various tools and platforms. It includes skills in multimedia creation, such as producing images, videos, audio recordings, or presentations. Digital content creation also involves understanding intellectual property rights, creative expression, and effective storytelling techniques in digital formats.
- Safety: The safety competence area addresses the knowledge and skills required to navigate the digital world safely and securely. It encompasses understanding privacy issues, online identity management, and digital security practices. This competence involves being aware of potential risks and threats in digital environments, employing strategies to protect personal information, and promoting responsible digital behavior.
- Problem Solving: This competence area focuses on the ability to identify and solve problems using digital tools and technologies. It includes skills in logical thinking, algorithmic reasoning, and troubleshooting in digital contexts. Problem-solving competence involves leveraging digital resources, using computational thinking approaches, and applying critical thinking skills to analyze and solve problems encountered in various digital settings.

See also

A graphical explanation of the Digital Competence Framework for citizens.

Digital competences for educators

Just as citizens need digital competences, educators need competencies to fully harness the potential of digital technologies and for adequately preparing their learners for life and work in a digital society.

The DigCompEdu framework is the European Union's Digital Competence Framework for Educators. It is specifically designed to support educators in developing their digital competences to effectively integrate digital technologies and pedagogies into their teaching practices. The framework outlines six key areas of digital competence for educators:

1. Professional Engagement: This area focuses on the ability of educators to engage in ongoing professional development and reflection in the context of digital technologies. It involves skills in staying updated with digital advancements, exploring new teaching strategies and tools, and participating in professional networks and communities.

2. Digital Resources: This area pertains to the ability of educators to find, evaluate, adapt, and create digital resources for teaching and learning. It includes skills in locating and selecting appropriate digital materials, assessing their quality and relevance, and effectively integrating them into educational activities.

3. Teaching and Learning: This area emphasizes the use of digital technologies to enhance teaching and learning experiences. It involves skills in designing and implementing digitally enriched learning activities, promoting active and collaborative learning, and fostering digital citizenship among students.

4. Assessment: This area focuses on the use of digital tools and approaches for assessment and feedback purposes. It includes skills in designing and administering digital assessments, analyzing and interpreting data from digital assessment tools, and providing timely and meaningful feedback using digital technologies.

5. Empowering Learners: This area centers around empowering learners to become confident, responsible, and critical users of digital technologies. It involves skills in promoting digital literacy and digital citizenship skills among students, fostering digital creativity and innovation, and addressing digital equity and inclusion.

6. Facilitating Learner Collaboration: This area emphasizes the use of digital technologies to support collaboration and communication among learners. It includes skills in facilitating online discussions, promoting collaborative projects and problem-solving activities, and utilizing digital tools for remote or blended learning environments.

The DigCompEdu framework provides a structured approach for educators to develop their digital competences and enhance their teaching practices through the effective integration of digital technologies. It supports the professional growth and adaptability of educators in the digital age, ultimately benefiting students and their learning outcomes.

- **How would you assess your digital competence?** *(ask this question for each of the DigComEdu's six key areas)*

1. novice/newcomer
2. ⬆
3. ↑
4. ↓
5. ⬇
6. trailblazer/thought-leader

Based on DigCompEdu, the SELFIE for TEACHERS self-assessment tool, allows teachers to see where they stand with their digital skills and competences and in the integration of digital technologies in the teaching process. In complementarity, the SELFIE tool for schools is targeted at the whole school community-leaders, teachers and students- with the objective to provide a diagnosis of the use of digital technologies at institutional level.

References

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6. Addressing Challenges and Establishing Routines

As with any type of revolution, the digital education revolution is sparking a series of issues that need to be addressed by educators and policy makers.

Setting expectations

The uptake of digital education brings forth a range of challenges and new routines that educators and policy makers must address. One significant aspect is the need for safe online learning spaces. Virtual learning environments (VLEs) and Learning Management Systems (LMSs), along with video conferencing tools and collaborative spaces, have become increasingly familiar platforms for education at higher, further, and lifelong learning levels. These platforms offer opportunities for remote teaching and learning, enabling educators to deliver engaging content, interact with students, and facilitate collaborative activities.

The COVID-19 crisis has further accelerated the adoption of these platforms in schools, allowing teachers and students to continue lessons, share materials, and maintain communication during school closures. However, the shift to online learning also brings forth new challenges that need to be addressed to ensure a safe and productive learning environment.

New rules

Ensuring the safety of children in online environments is of utmost importance. While physical classrooms have established rules and child protection policies, the risks of exposure to inappropriate content, cyberbullying, and privacy breaches increase when children are learning from home. Therefore, it is crucial to apply the same rules and policies in the virtual classroom. Setting clear expectations for parents, caregivers, and students is essential before transitioning to online teaching and learning. Reminding everyone that the rules applied in physical schools also apply in the digital space is important. For example, capturing and sharing images of students and teachers on social media should not be allowed without permission. During video calls, private chatting should be restricted to public channels to maintain a transparent and inclusive learning environment.

Video calls

In addition to reinforcing existing rules, schools need to establish new guidelines specific to digital spaces. For video calls, decisions must be made regarding the physical location of students and teachers during the calls. Some schools prefer public spaces like living rooms or kitchens, rather than personal spaces like bedrooms, to ensure a more supervised environment. Considerations such as

whether students will participate by video or just audio should be addressed, taking into account factors like internet bandwidth and device capabilities. Students may also be advised to cover their device's camera when not actively participating to protect their privacy. Furthermore, when using external video conferencing tools, schools should follow guidance on not sharing session IDs and passwords on public forums but instead sending them directly to participants to prevent unauthorized access.

Communication outside of lessons

Effective communication outside of lessons is crucial to maintain a connection between teachers, students, and parents. Using the school's platform or internal messaging systems is preferable to using personal mobile phones, as it allows for centralized communication and ensures data protection. Group texts or including parents and caregivers in communication can help avoid the need to share personal mobile numbers, promoting a secure and professional communication channel.

Preparing materials

Preparing materials for online learning requires additional vigilance. Children who are at home on their own devices may have access to websites that would normally be blocked within the school network. Educators should be prepared to spend more time identifying and checking content to ensure its appropriateness and alignment with the curriculum. When using video materials, it is important to be aware that third-party platforms may contain unreviewed advertisements that cannot be guaranteed for suitability. To mitigate this, utilizing free sites that share necessary videos without redirecting students to third-party platforms can be a safer alternative. Additionally, educators should provide clear instructions on how to navigate online resources and ensure that students understand the importance of responsible and ethical use of digital content.

Strengthening security

Strengthening security measures is essential to prevent hacking and maintain the integrity of virtual classrooms. IT teams need to work closely with educators and administrators to maximize security on the platforms used for teaching. This includes implementing strong access controls, encryption protocols, and regular updates to prevent vulnerabilities. Educators should also receive training on best practices for online security, such as creating secure passwords and recognizing phishing attempts.

Furthermore, schools should establish protocols for data protection and privacy to ensure that students' personal information is safeguarded. This involves complying with relevant data protection regulations and obtaining necessary consents for the collection and use of student data. Regular audits and assessments should be conducted to identify and address any potential security risks.

In addition to technical security measures, promoting digital citizenship and responsible online behavior is crucial. Educators should educate students about the importance of maintaining their privacy online, being respectful to others, and critically evaluating online information. By fostering a culture of digital responsibility, students can develop the skills and knowledge necessary to navigate the digital world safely.

By addressing these challenges, establishing appropriate routines, and implementing robust security measures, educators and policy makers can create safe and effective online learning environments for students. This will not only support the continuity of education during times of crisis but also prepare students to thrive in a digitally connected world.

In order to ensure a safer online space for young people and empowerment in the use of digital technologies, as part of the Digital Education Action Plan, the Commission published Guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training. The guidelines support teachers and educators in primary and secondary level of education to discuss topics like disinformation, deep fakes, pre-bunking and debunking. In addition, the updated EU Better Internet for Kids (BIK+) strategy ensures that young people and children are protected, respected and empowered online.

See also
Safe Online Learning: For Teachers

7. The digital divide

The digital divide is the uneven access to and use of information and communications technology.

This gap can be between those with and without:

- fast and reliable broadband
- devices such as computers and tablets
- digital skills and competencies
- the motivation to use such technologies.

The divide creates digital exclusion that affects millions of people including the poor, older people and girls and women.

Education

The COVID-19 lockdowns have deepened an already existing divide. With many schools only providing teaching online, huge numbers of students have been missing out, with a potentially devastating effect on their education and on the rest of their lives.

Many families simply cannot afford Wi-Fi or computers, and where they do have devices these are often shared among siblings. In crowded locked-down homes there is often no quiet space or time for children to study. Many parents lack the digital competencies that are needed to support their children to learn online

Access to the internet and support from libraries has not been an option where they too have been closed due to lockdown. The coronavirus crisis has greatly exacerbated what was already a problem in some countries – the drastic cutting back of library services.

Regional divides

The divide between the digital haves and have-nots within developed countries is mirrored by a gap between wealthier and poorer parts of the world – the well-connected North and the mostly tech-deprived South. The chasm also yawns between different countries in the same region. Take Europe for example; some populations enjoy excellent broadband and mobile connectivity, all at a modest price. In Scandinavia this amounts to approximately one percent of a person's income, whereas in countries such as Bulgaria and Hungary this may be about seven times higher.

Age

Older people are significantly affected by digital inequality. Many services that they are used to accessing in-person – such as banking and retail – have shifted to online. Older people who don't have the connectivity, the kit, and the competencies to use the internet are inconvenienced and they miss out on cheaper deals that are not available off-line. But for many older and disabled people, the COVID crisis has magnified inconvenience into serious problems.

If you cannot get out to shop and are not able to order groceries online how do you get food and supplies? If you cannot use online banking how do you pay your bills? If your doctor is only offering consultations via video calls and you cannot use this technology how do you look after your health? Everyday activities that tech-savvy younger generations take for granted can be almost insurmountable barriers for older people who have lived their lives almost entirely off-line.

Gender

Another aspect of the digital divide is the gender gap that impacts women and girls. A study by the FEMM committee for the European Parliament (European Parliament & Davaki, 2018) reported a gender gap in digital-related education between girls and boys, and women's low participation in the digital labour market, and in particular high-quality jobs and senior management positions.

The study reports that "*The most recent Programme for 15-year-old International Students Assessment (PISA) shows that across OECD countries, 25% of boys and 24% of girls on average reported that they expect to work in a science-related occupation. However, girls see themselves as health and social science professionals more than boys, while there are almost four times as many boys as girls who envisage a career in ICTs, science or engineering. To a large degree such diversity in expectations is based on gender stereotypes about what constitutes masculine or feminine subjects, which need to be challenged through training and awareness.*"

The study also reveals that "*Women tend to avoid ICT-related studies and are even less likely to choose 'digital' careers. In 2012 only 2% of all women in the labour market worked in the ICT sector, compared to 3.6% of men. Only around 32% of employees in the ICT sector are women. At the OECD level, trained female professionals are less than 20% of ICT professionals. Such a rapidly growing sector, improving women's literacy and skills would strengthen their inclusion in the labour market. In addition, given that ICT is a high paying sector, this inclusion would reduce the gender pay gap.*"

As part of the EU efforts to close the gender digital divide, the Girls Go Circular project promotes the development of digital and entrepreneurial skills among 14-19 year old girls by offering them a free learning programming. Artificial Intelligence, the circular economy and the transformation of cities are just a few of the modules that are offered. In addition, the ESTEAM Fests initiative ("Entrepreneurship, Science, Technology, Engineering, Arts and Mathematics") provide a two-day hybrid workshops, where girls and women of all ages come together in a nurturing, positive environment to improve their digital and entrepreneurial competences.

Closing the gap

Given all this, what part can educators play in helping to narrow, and ultimately close, the digital divide?

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See also

Digital Inclusion is a right, and not a privilege, an introductory video on the MEDICI project

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