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Rethinking Educational Technology

Scenarios

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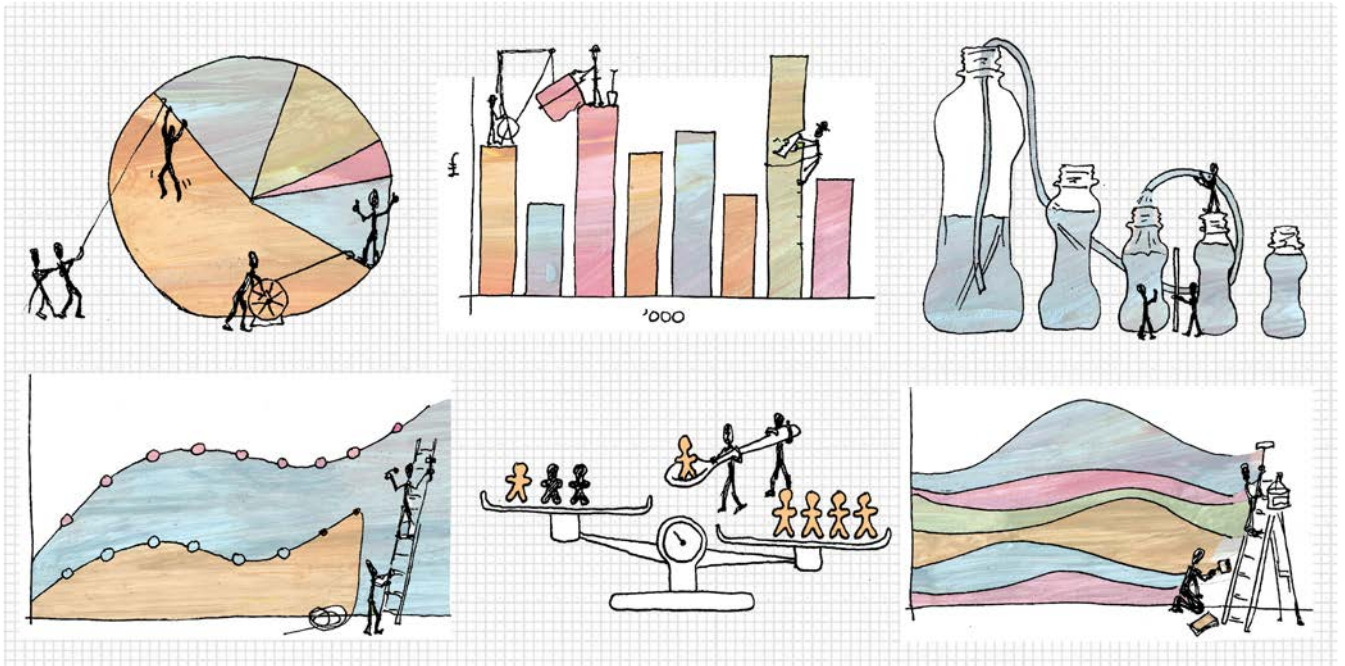
Tim Rudd
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Authors

Richard Hall, David Holmes, Peter Humphreys, Sal Mckeown,
Carlo Perrotta, Jonathan Breeze & Tim Rudd

Illustrators

Lawrence Dodgson, Marisa Harlington, Stephanie Hope & Emma Strauss



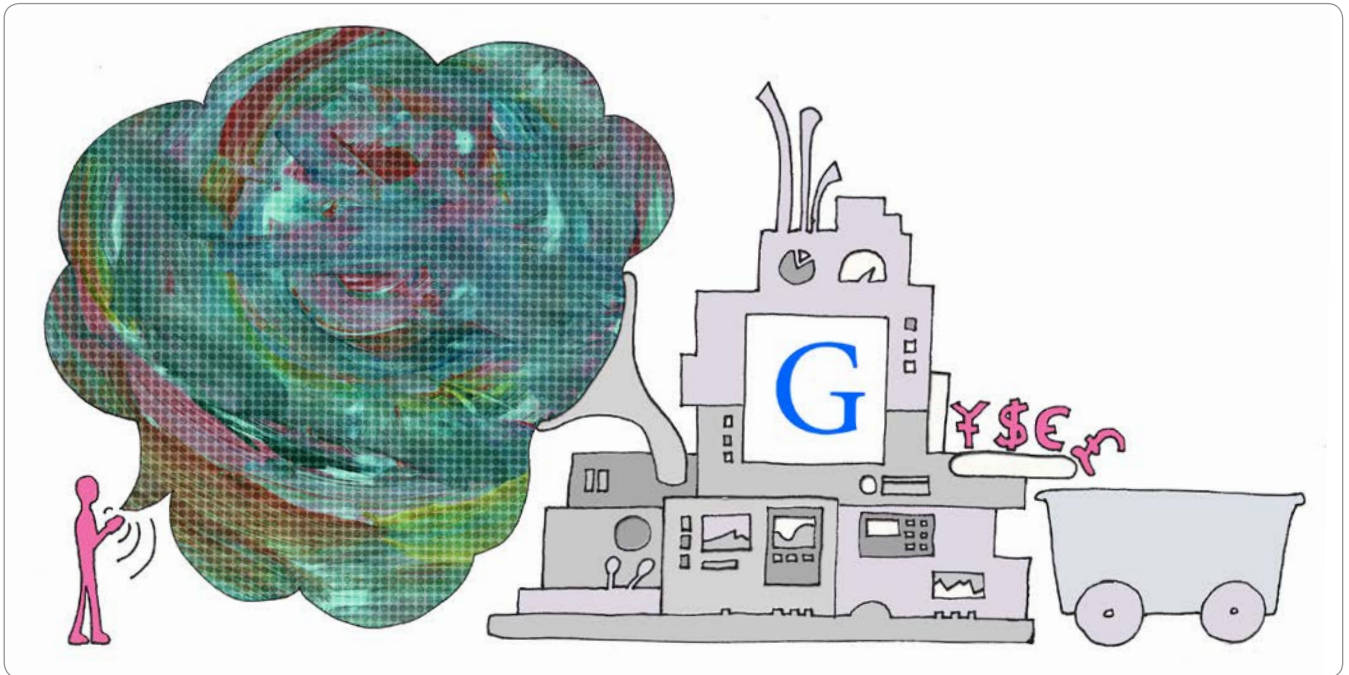
Introduction

Despite the significant investment in our schools, and further and higher education institutions, the evidence as to the extent of any impact of educational technology remains patchy at best. Yet the debates rage on, with a seemingly blind assumption that investment is not only necessary but will also deliver the potentially paradoxical outcomes of both ‘transformation’ in education and raised standards within the current system.

Seldom is there serious discussion of the structural or organisational constraints restricting innovative practice, the standards against which the ‘impacts’ are being judged, the nature and extent of the marketplace that has been created, the true beneficiaries or losers, or the wider socially constructed nature of educational technology.

To this end, these scenarios seek to present alternative visions of educational technology socially constructed from a range of different perspectives and with different foci. In particular, they aim to present ‘alternative’ visions of educational technology underpinned by an orientation toward wider ‘social good’, rather than practices arising from policies that service current systemic needs. The idea behind the scenarios is to try to challenge existing thinking about the ways technology is used and distributed, and in so doing to ask questions about the purpose of education and educational technology, and the wider ideological influences underpinning them.

These scenarios are aimed at stimulating discussion and provoking debates amongst students, teachers, researchers, and decision makers in order to help people reconsider educational technology and how it could, and maybe should, be ‘constructed otherwise’.



Scenario 1 Educational technology - or the Education of Technology?

Carlo Perrotta

'Mrs V' is a maths and physics teacher and she is very much interested in technology. She has always considered herself lucky for working in a school open to innovations, with a leadership willing to experiment with all sorts of educational technologies. She has used a range of devices and tools in her classroom: electronic whiteboards, student response systems, laptops, tablets, and so forth. On one occasion, she asked students to bring their own devices and mobiles to school, so that they could use them freely in the context of a science project – for instance to look for information online, take pictures, record interviews among themselves, and so on.

Despite her enthusiasm and open-mindedness towards all that is new and “techy”, Mrs V is increasingly dissatisfied. She is certainly aware of the importance and ubiquity of technology in young people’s lives, but as time goes by she finds the mainstream approach in educational technology disappointing and shallow. She thinks that too often educators mistakenly believe that technology can provide clear-cut “solutions” to a range of wildly different problems: from the lack of student motivation to time-consuming lesson planning. On the other hand, Mrs V wants to help her students understand the ethical implications and social contradictions that are thrown into sharp relief by science and technology. Her wish is to encourage students to consider critically what Science, Technology, Engineering and Mathematics (STEM) mean in today’s world, beyond the compelling rhetoric of economic necessity. Yes, she fully understands that the ability to confidently use technology is crucial in many careers, and that technological mastery needs to go hand in hand with proficiency in mathematical and scientific subjects.

However, she is also convinced that technology often reflects, and in many cases contributes to, social and political problems. These include, for instance, the gap between those with and without access to resources and opportunities; the ethical implications of producing electronic devices using undervalued, intensive labour in developing countries; the dangerous temptation to endow technologies with “magical” qualities, which can lead to neglect the need for social action and initiative (“Climate change? Sooner or later scientists will fix it!”).

Mrs V takes advantage of a new development programme for teachers in her school. The programme gives her the freedom to suggest innovative curricula in the STEM area over one semester. Her idea is to design lessons, coursework, homework and classroom interactions based not on educational technology, but on **technology as an educational topic**. Her aim is to get students to explore in detail the many facets and implications of specific technological artefacts. To begin with, she chooses two radically different “objects”: the atomic bomb and the computer science algorithm. The original pedagogic approach she devises is based on dividing students into groups and asking them to act as detectives, treating the technological artefacts as “suspects” whose role in an unspecified investigation needs to be clarified through extensive “profiling”. Students are introduced to the notion of multi-disciplinary inquiry, and invited to consider all possible leads and sources of evidence, exactly like a good detective would do.

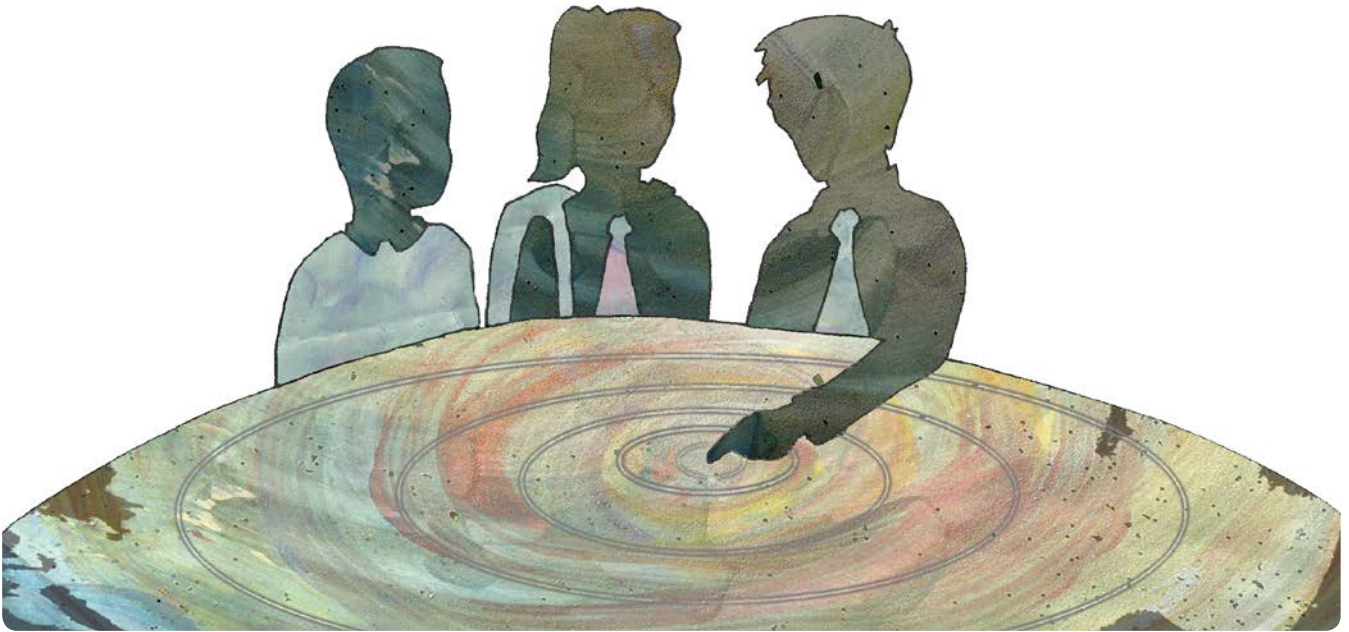
For instance, students working on the atomic bomb case explore some of the dynamics and roles of the “Manhattan project”, which led to the development of the first nuclear bomb in WW2, subsequently used to end the conflict, marking the beginning of a new era of technological progress and cutting edge research. Elements of subject matter (physics, mathematics etc.) blend seamlessly with the documentary analysis. Collaborative discussion of pros and cons, risk assessments, geo-political considerations and structured inquiries into the historical, scientific and economic consequences of the atomic bomb all feature during the course of the semester.

On the other hand, students working on the algorithm case are introduced to key mathematical notions in computer science like the logarithmic approach: using mathematical formulas to find valuable patterns in large datasets in the most efficient way. Students are taught how to create small computer programs using simple maths functions in the high-level coding language “Python”. They are then invited to consider the ramifications of the logarithmic approach in a range of contexts. For instance, the ways in which aspects of social life become “digitised”, in order to be efficiently analysed through specific algorithms. Students consider how these computer science artefacts lie at the very heart of the digital economy (e.g. Google’s PageRank algorithm, Facebook’s EdgeRank algorithm, and Amazon’s algorithmic suggestions), and how they impact on identities, values like privacy and private property, consumption patterns and several other dimensions. In this vein, they explore how algorithms have become central components of the most innovative and cutting-edge economic strategies – those that seek to “monetise” digital content and the digital lifestyles that revolve around it. Students are encouraged to reflect on how these phenomena coexist with – or challenge – traditional, non-digital economies and lifestyles; and how automated procedures treat individuals as pools of information to mine in order to identify and exploit profit opportunities. Students explore phenomena such as personalised advertising, shopping recommendations, location-based services, reputation-based trust and

other mechanisms where things and humans alike become datasets that must be disaggregated, re-aggregated, ordered, sequenced, abstracted to unlock and increase their profitability.

Throughout the semester, Mrs V is driven by the conviction that the technologies that we choose to use or not use in education (or more broadly for that matter), are not neutral and apolitical but have important consequences for the type of society we would like to create. She is not sure her experiment will be successful, and it is far from guaranteed that the school leadership will give its backing to turn her vision into something more “permanent”. Nonetheless, as an educator she remains convinced that technology should be treated not (or not only) as a tool that will enhance, accelerate or “empower” learning, but as a contested and controversial topic of educational practice in its own right.

- Carlo Perrotta, Research Fellow, Anglia Ruskin University
carlo.perrotta@anglia.ac.uk



Scenario 2 Coding for a Purpose?

Tim Rudd

A disillusioned teacher was reading through the National Curriculum Programme of Study for Computing and began to take a critical view of what was contained in the document.

The details stated that a high quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Whilst, as a teacher, she feels capable of supporting pupils to develop their creativity, she has reservations about being able to help them thoroughly understand how to be capable of changing the world. This seemed like an impossible task for a teacher in her position: how could she increase the likelihood that her students could change the world? More importantly, she considers what sorts of changes these might be, and whether they might always be positive. As she reads through the document, she becomes increasingly angry. There is no talk about the broader purpose of education in an increasingly unfair and unjust world. There is however, a cursory mention of students being equipped to use this technology 'at a level suitable for the future workplace and as active participants in a digital world'. She begins to consider what this actually may mean and ask many questions.



- Could using technology in the workplace inadvertently lead to a distinct possibility that we will end up with more efficient and skilled workers to service the institutions and systems that reproduce and exacerbate broader inequalities?
- Does it mean developing the skills of students so they can take part in developing products, services and consumer goods that most people don't really need?

- How might we even begin to guess what jobs the future may hold, or more importantly, what will be the key skills and issues in the lives of her students in the future?
- What does it mean to be active participants in a digital world, and does this participation automatically result in positive effects socially, culturally, environmentally, or globally?
- Moreover, is there really such a thing as a digital world? Shouldn't we avoid thinking of our digital actions as distinct from our wider intent and role in society?
- Has this supposed digital age really brought about fundamental change and wider benefits for the majority of the world's population?
- Who really influences and sets the conditions for most of the dominant forms of participation in the digital world? Who really wins and loses as a result of participation, and non-participation, in this idealised vision of a digital world and related future employment?



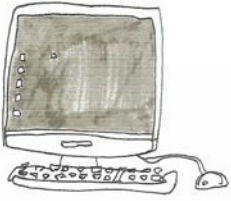
As she reads on, and thinks more deeply, she begins to feel that the aims are also presented as a set of skills, competencies, or capabilities to be achieved. Yet, it suggests that students are meant to be digitally literate. In its broader sense digital literacy, in all its forms, should not be about the development of skills but the consideration of the source, application and implications of technology in society and globally as a whole, not merely in terms of individual employment prospects or national economic competitiveness. Yet nowhere can she find official texts that meaningfully suggest the broader underlying purpose might be to support wider social good. It does not mention harnessing technology to address inequality, stop suffering, or social injustice. What indeed should the ultimate aim of any education system, subject or learning experience be? Why do we seldom discuss these wider issues as a core purpose or outcome of education?

Was there anything she could do in her own small way to address this? To turn a competency based subject and related set of activities into a more meaningful educational experience? Could she change her teaching approach to tackle skills development whilst focusing on wider moral and societal issues?

By this time, her mood had darkened further. Everything that she had initially got involved in education for had been reduced largely to the transmission of knowledge so that students could be measured and supported to pass exams. But could she develop her teaching in some way to attempt to address inequalities and social injustice, and to scaffold students to think more critically about the application of technology in a wider sense in terms of its broader effects on the world?

Over the next few weeks she began to redesign her lessons, pedagogy and teaching aims.

Her first steps would be to engage her students in discussion about the potential negative effects of technology in society. She would challenge students to think about their own use and consumption, and some of the wider social challenges facing the world, and ask students whether they felt that they reproduced or alleviated such problems.



Her second step would be to work with the students to identify a particular area of injustice or inequality that they felt was important to address. This would provide the wider context for her subsequent teaching of computer science.

Thirdly, she would look again at the schemes of work, aims and competencies to be developed and reorganise these around a single consistent, yet broader learning challenge. This would mean refocusing her teaching activities and orientating these around a meaningful and tangible learning experience.

She would aim to identify and work with an organisation whose role it was to address a particular issue of inequality or injustice, and see if there was a clear project or area of support that could be addressed through the collective energies and abilities of her students.

Finally, she felt that this was merely the beginning of her 'project' and that she would seek to establish a sustainable partnership with such groups, and even investigate potential funding to support their new project-focussed, research and development-inspired learning approach. She felt that in moving toward this new approach, learning would not only be richer, more focussed and meaningful but that it would also convey clear messages about the purpose of both education and participation in a digital age.

- Tim Rudd is a Principal Lecturer within the Educational Research Centre, University of Brighton, and runs his own educational research and development organisation, [Livelab](#). His research interests include: educational technologies; the sociology of education; alternative forms and perspectives on education; educational inequalities and social justice. He leads on the 'critical perspectives on educational technology' programme at the University of Brighton.



Scenario 3

Dyslexia: What if Everybody Had it?

Sal Mckeown

Dyslexia is often portrayed as a disability which limits academic success and life chances but, people with dyslexia are an elite, argues Sal McKeown, and schools should find ways to tap into their unusual abilities.

By way of explanation

In 2013 I created a series of cards called Dealing with Dyslexia at School. This was for a company called FINK and the aim was to encourage teachers, students and support staff to talk about problems and solutions, barriers to success, and to tease out the highs and lows of dyslexia.

The question which elicited the best responses from users was:

“If all the students in the school had dyslexia, how would the school change?”

This set me thinking. When schools identify children with dyslexia, they focus quite single-mindedly on remediating the problems with reading, writing, handwriting and spelling but it doesn't have to be that way.

An article by Robert Verkaik in the [Daily Mail in July 2013](#) highlighted the fact that dyslexia can be a real advantage. The article was called Dyslexia is Britain's Secret Weapon in the Spy War. It alleges that top code breakers at the Government Communications Headquarters (GCHQ) in Cheltenham have dyslexia and are especially good at seeing codes with patterns, repetitions and omissions.

‘A GCHQ spokesman said some of their most talented code-breakers were affected: “They are very creative but may need support, including adjustments in the workplace, such as IT tools and computer software, or [reductions] in their working hours.”’

If an organisation such as GCHQ can harness the unusual talents of people with dyslexia and make adjustments so they can focus on what they are good at, why can't schools do the same?

Teamwork

People with dyslexia are often not conventional team players and can be written off because they lack the 'esprit de corps'. This perpetuates a system based on competition and ability sets where more children lose than win. What about motivation and preparation for learning? A child in the bottom set feels a sense of frustration and boredom. What they experience is failure. There has to be a better way to serve a talented and remarkable group of learners.

A school could devise its own ways of creating groups and teams to see what made the best use of pupils' talents and gave insights into new ways of working. Why do pupils have to be in classes with children who are all the same age? Schools could investigate and try out management techniques such as De Bono's 'Six Hats', which challenges people to try different approaches to problem solving. Imagine creating a project for science or business studies which brought together the skills of the Blue Hat organiser and the creative Green Hat. The dyslexic learner need not do the writing. Instead they could focus on patterns, anomalies, the big picture and 'blue skies' thinking.

Teamwork means harnessing the talents of a disparate group of people and respecting their differences, instead of trying to reduce them to the norm. It is about creating something bigger and better than the achievements of the chosen few. Groups would not necessarily be formed of people in the class or even in their school. Technology opens horizons so why be constrained by the four walls? Belbin's 'nine team roles' for example, takes on a different dimension when you use Skype, messaging and Google Docs to work on a project. What could our children learn from those in central China, for example, or share with others in Venezuela?

What would a school look like?

Classes would be smaller so children could get more individual attention. There would be comfy bean bags in the classroom and rest breaks so those who tired easily could have time out and then come back into the fold. Children could choose to work with a talking buddy and crystallise their thinking before responding to a question, and would also have the key words for a topic in advance so they were not held back.

As well as working on core curriculum subjects, they could choose from a range of electives for a session each week, choosing from a menu of options to stretch them. Subjects might include chess, meteorology, philosophy, cookery, sport, debating, astronomy, music technology and online games. They could learn Mandarin – another form of code breaking – and computer programming, which is after all another way of writing in code. If they wanted to pursue a topic that the school cannot offer, they would have access to online experts. Pupils could do one or two homework tasks each term in any way they chose – making a video, producing a play, writing a poem.

There could be a large 'Found Property Room' in a central location with belongings sorted into categories such as sportswear, shoes, bags etc. This would be open every break time and support staff would help pupils to find their belongings,

instead of berating them for losing them. They might also suggest strategies to help the absent minded or accident prone: ticklists, coloured labels, checking they have everything at the end of lessons and the end of the day.

A school with a majority of dyslexia learners would also need teachers and support assistants with dyslexia. Joe Beech was diagnosed with both dyslexia and dyspraxia at age seven. He completed a Schools Direct PGCE in Science and won an Outstanding Achievement Award from the British Dyslexia Association in October 2013. His smart phone has transformed his life:

“For the first time I had a product which was quite versatile. Up until then everything served just one purpose. Suddenly, I could make notes on the move so I did not have to rely on memory. It also offered all the benefits of predictive text which helps so much with spelling, so I could think about what I wanted to say instead of focusing on individual words. I now plan everything on my phone. There is so much technology in a mobile phone these days, so it is a shame that as teachers we don't tap into them more.”

So schools would need to invest in good technology: different mice, voice recognition, tablets, and cameras. They would be encouraged to use smartphones, so they might use a voice recorder app for lectures or to note sudden thoughts, a camera to take still images of the board or to video a process, voice recognition to dictate a first draft.

Each child would have an e-reader so they were not distracted by text on an opposite page, and could have white text on a black background, or whatever colour combination worked well for them, instead of black text on a white page. They would not be required to copy down text from the board but would access notes via technology so it was in a font, text size and colour to suit their reading preferences. They would also be able to print out work on different coloured paper so they could read back their notes without visual stress.

What are the barriers to this vision of the future?

Let's look at the obstacles. These are not as insurmountable as we might think. We are nearly there but there would have to be changes in political will.

The Department for Education's [National Curriculum framework document: Language & Literacy](#), published in July 2013, requires pupils to: “develop the stamina and skills to write at length” and work towards: “fluent, legible and, eventually, speedy handwriting.”

It is a shame the DfE hasn't realised that we are now in the 21st century, or recognised the disproportionate disadvantage such policies may inflict on certain groups of pupils already facing significant learning challenges. Once children leave school they will rarely be required to write by hand, so why not give them the skills of touch typing so they can create a body of text that can easily be edited, redrafted and polished. Writing should be so much more than a manual skill.

So much of education is about examinations and bench marking. Recently, the Joint Council for Qualifications (JCQ) announced a change to regulations that means that literacy software can now be used in exams to read questions and rubric. The main criteria are that the school can 'prove need' and that the software has been used as a normal method of working for the pupils.

Some schools already use a reading pen, or a text reader, such as Read and Write Gold. Trials have shown that pupils will use a text reader to read passages of text over and over again but would feel embarrassed at asking a human reader to keep repeating the same text. Now they can work in a separate room with headphones and have the text read aloud as many times as they want. Schools have saved money too because they do not need a human reader for exams, and this has removed the stigma of needing support in examinations.

At the moment many examinations are written by hand but times are changing. David Hanson, the chief executive of the Independent Association of Prep Schools, told the association's annual conference in 2013:

"I predict that in 10 years' time maths, English and science will still be core subjects but technology will have been completely embraced ... Assessment will be by online adaptive tests. All schools, including independent schools, will be required to benchmark and thereafter monitor and report on pupils' progress and achievement using national standardised tests."

This change is another argument in favour of developing good keyboard skills.

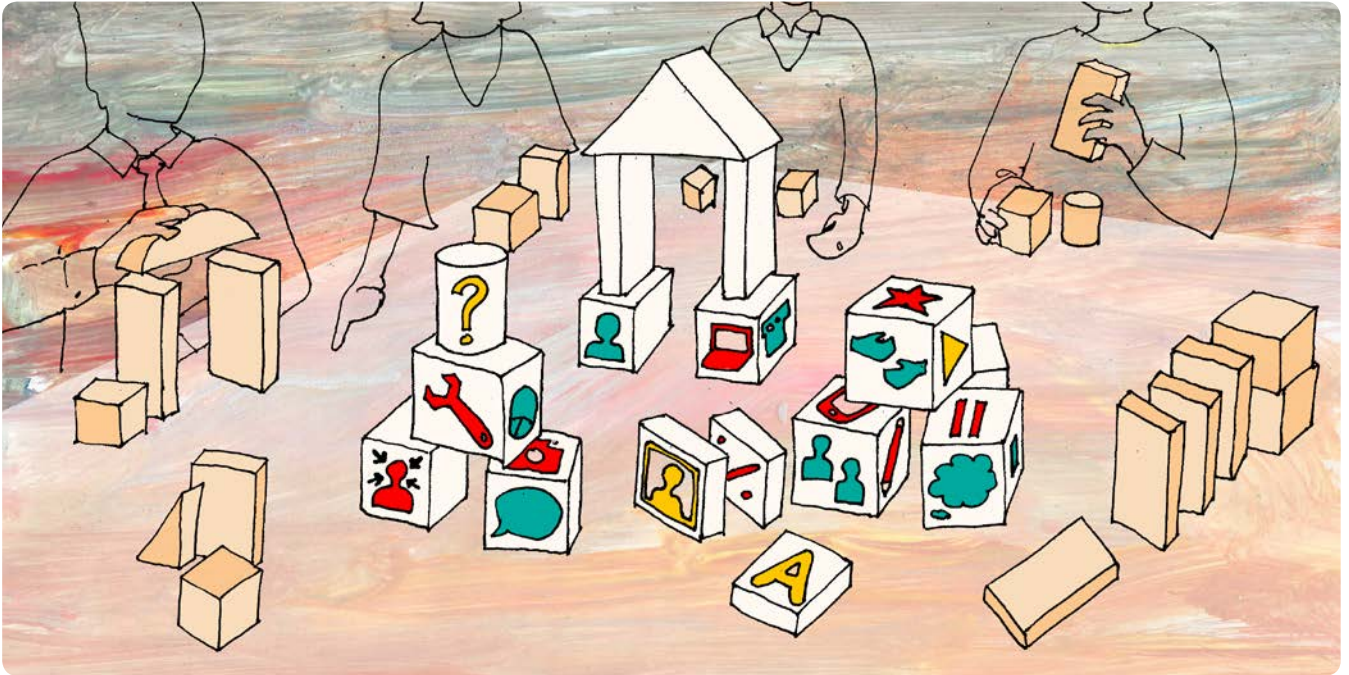
Another objection is that 'basic skills' are what employers look for. In truth, many employers want candidates to show they can gather, organise and evaluate data and make sensible decisions. They also expect competence in using all the basic ICT packages, good spoken and written communication, and they particularly value effective interpersonal skills – the ability to communicate and work with people from different walks of life. In schools we spend a lot of time on some of these elements, especially researching and writing, less on speaking and listening, and virtually no time coaching individuals in presentation and interpersonal skills. This is an area where people with dyslexia often excel.

In the old days, people might have gone to an agency or filled in a form to apply for a job. These days a handwritten application is a thing of the past. The process is likely to be digital as people upload their CVs to a website and search online. An increasing number of jobs require candidates to show evidence of their social media/ Twitter skills. One estate agency group requires applicants for its graduate management scheme to upload a YouTube video where they answer three set questions. A travel company asked for a short CV, a two minute video uploaded onto YouTube and links to other social media profiles such as a blog, Facebook profile, fan page, or Twitter page.

Many people with dyslexia have gone on to be leaders in their field, such as Bill Gates, Richard Branson, Keira Knightley and Einstein. At present many more fall at the first hurdle because they are in a system which is rigid and prescriptive. But it really doesn't have to be like that.

· Sal Mckeown

[Dealing with Dyslexia at School](#) by Sal McKeown, published by Fink.



Scenario 4

Developing Meaningful Professional Development Approaches to Enhance Critical Learning Skills

David Holmes and Tim Rudd

A young headteacher is keen to incorporate new technologies into learning and teaching. However, he is somewhat sceptical due to his prior experiences, and in particular, in relation to developing professional development experiences that adequately address the need to develop '21st Century Skills'.

Like so many 'buzzwords' related to educational technology over the last 20 years, he has seen the potential of technology supporting new forms of learning but has also soon become frustrated as some individuals and groups interpret and mobilise concepts such as 21st Century Skills differently, whilst others colonise the discourse to their own personal advantage. This results in outcomes, changes, and information that are often unclear and of negligible value in terms of highlighting the specific ways technology has supported any improvements in particular skills development.

Having spoken to many different training providers from various sectors, he hears the same sort of language associated with the promotion of technology unsupported by evidence of detailed understanding. Moreover, there is little in the language used that is meaningful to him as a teacher. Underlying this discourse, he feels there is an assumption that somehow just adding technology miraculously 'works', and magically future-proofs schools and learners. He knows this is not the case, and such hollow words do little to increase his confidence in developing a professional development programme for the staff.

However, after some consideration and discussion with other educators and researchers in the field, he realises he has to take control into his own hands and develop a bespoke, evidence-informed programme alongside staff members from scratch.

Step 1: Background research

Following much discussion, it was felt that before they considered any training, they would first have to do their own research into what 21st Century Skills might actually be. Following initial desk research, they soon realised this was not a straight forward exercise. Much of the general 'evidence' was thinly disguised promotional material utilising terms to create fear, panic and a sense of being left behind, less than subtly presented alongside the sale of some product or service.

Even in the more considered evidence and models, terms like 21st Century Skills, 21st Century Pedagogy, digital literacies, ICT skills, ICT competencies, and so forth, were often used interchangeably, described differently by different authors, were associated with different models portraying a wealth of varying perspectives, and perhaps as importantly, would not necessarily or readily be identifiable in many of his teachers' current practices.

Step 2: Sharing and developing consensus: debating the value of models and approaches with staff

After reviewing the available literature, they'd consider a wealth of different and diverse models and perspectives, including:

- Futurelab's [Enquiring Minds](#) and their [Learners Charter](#);
- [Educational Origami](#);
- [Comparing Frameworks for 21st Century Skills](#);
- the Buck Insitute's [Project Based Learning](#);
- CISCO's [Transforming to 21st Century Pedagogy](#);
- Pacific Research Center's [21st Century Skills for Students and Teachers](#);
- Microsoft's Partners in Learning [21st Century Learning Design](#);
- RSA's [Opening Minds](#);
- the Educational Testing Service's [Digital transformation: A framework for ICT literacy](#);
- Dedé's [Comparing Frameworks for 21st Century Skills](#);
- the American Association of Colleges of Teacher Education & the Partnership for 21st Century Skills (P21) [21st Century Knowledge and Skills in Educator Preparation](#);
- the Campaign for Learning's [5R's of Lifelong Learning](#);
- NCREL & Metiri Group's [enGauge 21st Century Skills: literacy in the digital age](#);
- the OECD's [The definition and selection of key competencies](#);
- the eTQF's [Teachers Competency and Qualifications Framework in the use of ICT's](#);
- the ISTE's [New Teacher Standards \(NETS\)](#);
- Mishra & Koehler's [Technological Pedagogical Content Knowledge model \(TPACK\)](#);
- and UNESCO's [ICT competencies standards for teachers \(CST\) framework](#),

to name but a small selection of an increasing set of interpretations.

Faced with such an array of different information, the headteacher, along with a small group of his colleagues began reading, and divided the various models and perspectives into **3 broad categories: student skills; pedagogy; and critical digital literacies**. They highlighted the merits and drawbacks of each model and perspective, and discarded certain models and approaches, or aspects of them. Following this, they set up the first of their new professional development activities, giving the whole staff overviews of various texts and models for consideration. The main intention of this first wave of professional discourse was to clarify what they intended to do and why, and also to enable the staff to be actively engaged in influencing the focus of the professional development activities directly. As importantly, the headteacher was wary of ‘off the shelf’ models due to prior experience, and also questioned whether some of the ‘transformative’ models highlighted would do little more than preserve the status quo, rather than affecting longer term change and progression toward a new mode of teaching and learning.

Eventually the teachers developed their own bespoke set of characteristics under each of the three broad headings. For example, under ‘**student skills**’, qualities included:

- critical thinking and problem solving;
- collaboration;
- communicating;
- cooperation;
- reflection;
- resilience;
- resourcefulness;
- responsibility;
- self managed learning;
- curiosity and imagination;
- innovation and creativity skills;
- knowledge construction;
- and information literacy.

Staff were then tasked with writing their own level descriptors for each of the skills to give greater detail as to what this would look like in the classroom. In doing so, they were also better able to consider their own areas for pedagogical development.

Under ‘**pedagogy**’, or the means through which to develop those student skills identified, the following were included:

- enabling learner-led and learner-centred learning;
- creating tangible and hands-on learning;
- developing real-world learning and problem solving;
- supporting learner voice and choice;
- developing curiosity and creativity;
- encouraging critical thinking;
- developing engaging, dynamic and interactive learning experiences;
- and encouraging communication, collaboration and cooperation with others using multiple media.

In relation to ‘**critical digital literacy**’, they decided to take a broader view and not specifically define it. They felt that this would be a ‘shifting sand’, which would require that they engage one another and students constantly to consider a wide range of issues. Nonetheless, they felt that some explanations of digital literacy were far too simplistic as they focussed on the functional use of technology and e-safety elements only. They preferred instead to utilise conceptions offered by others, such as [Futurelab \(Payton & Hague 2010 p.4\)](#), who suggest:

“Conceptually, digital literacy goes beyond a focus on the individual technical competence and functional skills needed in order to operate digital tools; it refers to the more subtle and situated practices associated with being able to create, understand and communicate meaning and knowledge in a world in which these processes are increasingly mediated via digital technologies... It means being able to communicate and represent knowledge in different contexts and to different audiences (for example, in visual, audio or textual modes). This involves finding and selecting relevant information, critically evaluating and re-contextualising knowledge and is underpinned by an understanding of the cultural and social contexts in which this takes place”.

Step 3: Considering the purpose and analysing the technology

Staff now had a much better understanding of the various skills they needed to support learners to develop, and moreover, they had a clearer idea of the pedagogical skills they wanted to enhance to facilitate this. However, three key elements still needed to be considered, namely:

1. The wider intent and purpose

2. Mapping technology for skills development areas and pedagogy

3. Training and development approaches – fitting around existing system requirements

1. The wider intent and purpose

Whilst a number of core skills had been identified, it was soon recognised that most of these could be developed and utilised in a myriad of situations and for numerous reasons. It was agreed that the more general approach needed an accompanying vision that would navigate and direct teachers and students toward more meaningful and morally sound learning contexts and experiences. This turned out to be:

“Striving to support the development of a range of 21st Century Skills amongst students, in order to actively engage and empower them as active and curious life-long learners, and to support their moral and social development as global citizens.”

2. Mapping technology for skills development areas and pedagogy

With a clear indication of the main areas for skills development, coupled with level descriptors for each, it was clear that different technologies might be utilised in diverse ways in supporting that skills development. The differing levels provided greater flexibility to take a range of approaches in keeping with the teachers (and pupils) preferences and needs. This also reduced the likelihood of costly, and potentially inappropriate, ‘one size fits all’ approaches toward procurement and training, and provided a greater degree of professional autonomy and learning from each other.

For example, under ‘student skills’, two key areas were cooperation and communication. Some of the examples that arose in the first 12 months ranged from

- a teacher supporting some children to cooperate in using voice recorders and presentation technologies to support and engage other students with communication difficulties and confidence issues;

through to

- another teacher supporting students to cooperate with students across Europe to raise awareness about climate change through online face-to-face communication tools, and by developing co-constructed videos to upload to the internet.

Each utilised different technologies, and each context was significantly different, however they utilised broadly similar learning skill sets and pedagogies, and moreover, were applied to meaningful learning experiences.

3. Training and development approaches – fitting around existing system requirements

This proved initially to be the biggest challenge. However, each teacher took on a project specifically focussing on particular skills, and considered the functionalities of a technology with which they had some familiarity in order to see how learning opportunities and experiences might be enhanced. These ‘pilot interventions’ happened in small batches, rather than across the whole school at once. This enabled other staff to cover certain lessons and requirements, thus enabling the ‘pilot interventions’ to be undertaken in an appropriate context, space and over an appropriate time period.

For three years now, these interventions have continued, and whilst they have not yet totally changed the culture, the headteacher is extremely hopeful about the future and confident that students are experiencing learning that is both more purposeful and more suited to their needs in life beyond the school.

- Dave Homes is a Senior Development Manager at OCN Credit4Learning.
- Tim Rudd is Principal Researcher within the Educational Research Centre, University of Brighton and runs his own research and development organisation, [Livelab](#)



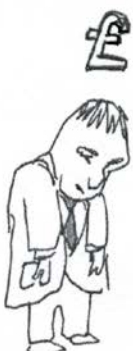
Scenario 5 Rethinking Educational Technology

Richard Hall

Introduction

Our educational landscape is increasingly framed by the rule of money. We witness the birth of a deterministic, manifest destiny for the student who bears the risk of the price-tag for her higher education. We witness statements that divide student and teacher, where education is reduced to employability, consumerism and economic growth. Here technology becomes a means of accessing and corraling sufficient resources to ensure progression across years; a means of enclosing and commodifying sufficient emotional, cultural and social capital to be employable. Educational technology reveals a student-teacher relationship that is predicated on entrepreneurial activity.

What is lost is the critical relationship between the student and the teacher. What is the complicity of the teacher in the entrepreneurial, technological reinvention of the student? What is the definition of the pedagogy and of the curriculum worth in the face of the entrepreneurial reinvention of the student? What is the purpose of the teacher in the face of the risk- and compliance-based culture of higher education? What is the value of the teacher's academic labour inside a marketised higher education?



In order to fundamentally challenge the rule of money in education, teaching and research need to be radicalised to include an alternative, cooperative political economy of the student experience. This radicalisation includes the ways in which technology enables new forms of organisation to be revealed. Technology enables alternative ways of connecting the civil society of academics and students. At issue is whether and how technology can reinforce a progressive relationship between academics and students both inside and outside of the curriculum. This is education

as the practice of freedom. This is technology co-opted for a different form of value. This is utilising technology to redefine the organising principles and values of the curriculum. This is education and technology as a site of struggle for solidarity and for liberation.

Scenario

We are in the initial meeting of 30 lecturers who are new to higher education. They are studying on a post-graduate certificate in higher education, and are beginning a module on “Assessment and Feedback in Higher Education”. This takes a formal, institutionalised form, whereby the learning outcomes, assessment tasks and weekly schedule is given by the programme teaching team. As module leader, I attempt to set the first session up discursively, so that we could discuss the content and structure of the curriculum, and analyse how the use of technology might reveal the power/social relations of the curriculum, and why they might need to be renegotiated. Such a renegotiation is a refusal of the consumption of a predefined curriculum. It is a redefinition of the curriculum as a cooperative space for a community of scholars.

However, the creation of a cooperative space is predicated upon its insertion inside a formalised University, whose curricula and use of technology are rarely defined in terms of co-production. Those technologised curricula and their assessment are structured and disciplined by external agencies (like the Quality Assurance Agency), external imperatives (like forms of accreditation or licenses to teach in higher education), and the cultural norms of the institution (like workload demands and predetermined academic/student uses of technology). In this way, a constant and terrifying performativity moderates and nuances the labour of the module’s participants. How will we demonstrate our capability in a range of administrative, teaching and research spaces, and balance the demands on our labour? How do I refuse to monitor these learners? How do I push-back against individual entrepreneurial activity that focuses upon value rather than human values?

In terms of the use of technology, the module is a space where participants are able to re-work their use of social media and a virtual learning environment to liberate some freedom to act and to write, in the first instance about assessment and feedback practices. At each turn is a question over the validity of our interpretation of the use of technology for learning and teaching. We ask whether sufficient trust exists in the space so that we can collectively, as students and teacher, come up with a better approach. Is there a possibility for overcoming the alienation that we feel where:

- our engagements online and face-to-face are time-bound;
- our cooperative engagements online sit uncomfortably with our didactic or individualised practices in other areas;
- our engagements online involves judging our own labour or that of others as non-enhanced or non-optimised or non-legitimate;
- specific technologies dominate the learning and teaching landscape, so that the space and time that teacher and student are together get recalibrated by it;
- specific technologies make and reinforce a boundary between students and between student and teacher?

Our alienation is challenged through an ongoing process of negotiation in connected online and face-to-face moments. In these connected moments, a willingness both to give voice and be heard underpins the creation of a cooperative pedagogy. This is an alternative, social means of producing and consuming that pedagogy and the curriculum that emerges from the spaces where education and technology meet. These spaces encourage participants to question the common ownership of the module as a common treasury from which all could draw-down. This does not mean that it is not challenging or uncomfortable, but that technology could be used:

- to reorganise and renegotiate the content of the curriculum, modes of assessment and feedback, and finding ways of sharing;
- to base face-to-face sessions on contributions that are based on courage, fidelity, restraint, generosity, tolerance and forgiveness;
- to define contact time socially and around use, rather than the production of things that could be exchanged;
- to help participants to take a pedagogic lead.

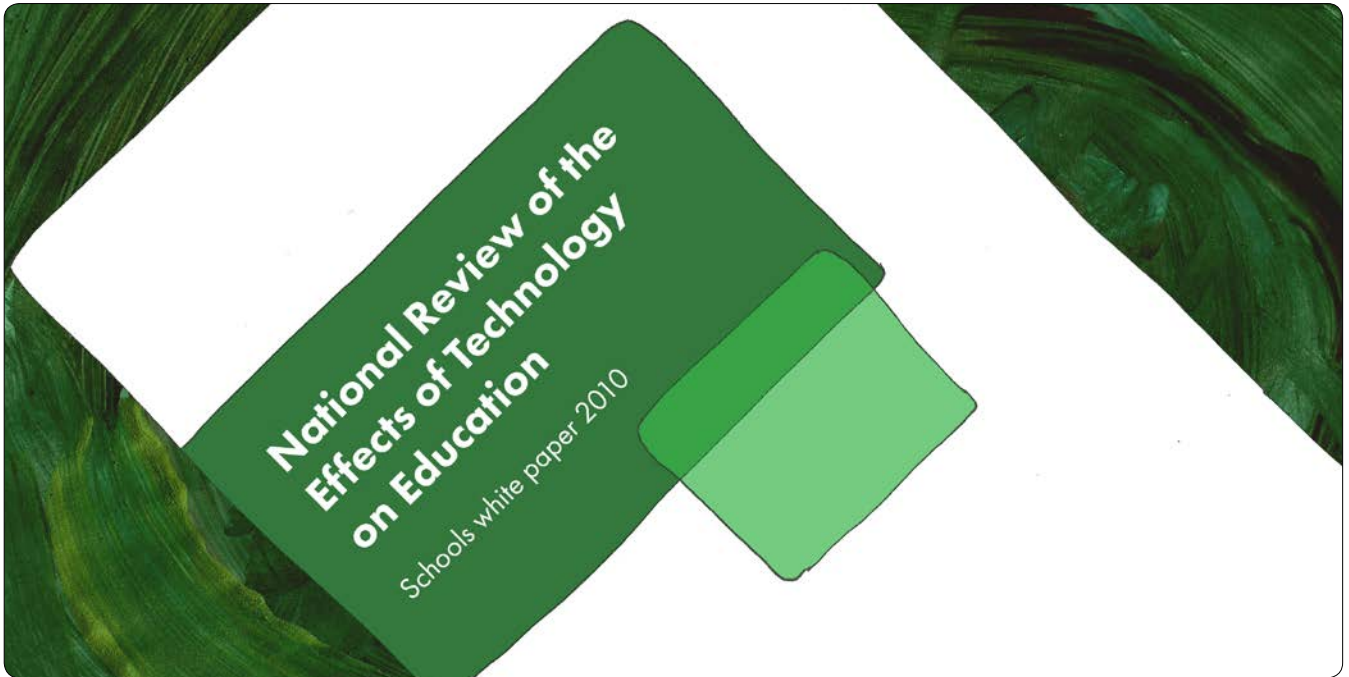
Collectively and over time the participants revealed technologies as critical tools. In the important words of one participant they became “a sign of solidarity.” As a result of these ongoing conversations, the participants realised that an educational experience based on cooperative practices and values might be able to build a shared conception of its own pedagogy through the use of technology. In particular by using technology to:

- share readings that ground and focus a discussion, and connect it to other content, ideas, skills, practices;
- share roles in/against the classroom (teacher, student, scholar, blogger, note-taker, tea-maker);
- produce and contribute to communal artefacts like a common module bibliography or glossary, as a commons that might circulate a new form of collectivity;
- give voice and be heard;
- develop the curriculum as a form of struggle to know or to become, so that the form of the curriculum, its assessment and content is not prefigured.

This is the use of technology to overcome the fear of freedom that emerges through the objectified social relations of the established curriculum. The at times painful, cooperative negotiation of the curriculum, its content, its (non-)assessment, and its organisation and forms, can be intensely uncomfortable, but it is also a process of legitimising our own claims to what we want to learn and who we want to be. It is a process of reclaiming our labour: for the social uses it has; for the mutuality of its products; for its reconnection of our soul to that of our fellows; and for its recognition and re-making of our alienated selves.

- Richard Hall is a UK National Teaching Fellow and holds a Chair in Education and Technology at De Montfort University. His research interests include: the idea of the University and radical alternatives to it; technology and critical social theory; and resilient education and the place of cooperative practice in overcoming disruption in higher education. He writes at: <http://richard-hall.org>





Scenario 6 Our New Educational Policies and Technology: An Overview

Jonathan Breeze & Tim Rudd

2010: First steps

In 2010 the National Review of the Effects of Technology on Education was commissioned. To begin with there was the usual scepticism that often accompanies Governments reviewing the effects of policies and significant investments, in which they have had a key and vested interest. However, several surprising decisions were made early on that had a significant effect on shaping not just the future of educational technology, but education as a whole.

The first groundbreaking decision was that ownership and control of the commission and its component reports would be given over to educationalists, academic researchers, teachers and other key stakeholder groups. This decision quickly changed the focus of the subsequent reports, with a greater emphasis not only on reviewing the existing literature critically, but also in ensuring a specific emphasis on wider learning skills, competencies and broader educational aims.

One such report focussed on the myths that had grown surrounding the promise of educational technology, which had been perpetuated by new market forces and others with a vested interest in promoting its continued encroachment into the new marketised educational landscape. This, they argued, had ironically served to largely perpetuate existing teaching and learning practices and institutional functions, albeit in a digitised manner. However, this was not an anti-technology stance but rather a position based on a critical analysis of the available evidence, and the negligible effects that had resulted from mass technology implementation policies that were not matched with suitable professional development strategies, thus resulting in costly and unsuitable investment.

This change in perspective caused a domino effect. The Commission identified four key strategies that were put in place to bring about change:

1) The emphasis on developing 21st Century Skills – later to be renamed **Key Critical Learning Skills**. This entailed a broader review of the form, function, content and organisation of schools to a more flexible system that had less emphasis on fixed and limited content knowledge. Instead the proposed new system would enable learners to construct and create their own tangible learning outcomes whilst developing core critical learning skills.

2) **A Programme of Collaborative Professional Development** based on pedagogical and learning requirements and specialisms. This programme saw the development of a new national learning network of connected professional practitioners cooperating to share knowledge and information centred around the new pedagogic concerns, and given the space and opportunity to engage in classroom-based research. The emphasis here was on supporting educators to critically examine the use of technology and specifically focus on the particular functionality of technology, and how it might best support the development of key critical learning skills.

3) **New Conditions for Digital Provision**. A new set of conditions for technology providers focussed specifically around how the technology could support the development of critical learning skills. This arose out of research identifying numerous examples of blanket coverage and implementation, poor purchasing decisions and service level agreements, and underused and oversold software, hardware and an associated range of limited digital content.

4) **The Barriers and Enablers Strategy**. This enabled research-practitioner collaborations to identify school-level barriers to effective and targeted use of technology, and also the potential areas where technologies might be integrated to support new and engaging learning experiences. Subsequent funding to enable teachers to develop their own practice based on classroom-based evidence was made available to support each school's new critical learning skills professional development strategies.

Each of the four strategies were interconnected and long term, iterative and ongoing programmes intended to bring about evidence-informed systemic change over time. They were designed to enhance and empower the teaching profession, and intended to avoid the pre-existing hyperbole that implied technology itself was somehow magically a cure for broader structural problems which were actually a symptom of a system no longer fit for purpose.

2012: Next steps

By 2012, the first review cycle following the 2010 National Review had begun to produce a more nuanced and true picture of a changing educational landscape. More importantly, a clear set of recommendations for further developments in each of the four key strategy areas were identified. Increasingly the fields of education, and educational technology, were becoming de-politicised and free from the political point-scoring of policies that sought to catch voters' imaginations. Ultimately, such policies were not underpinned by research, evidence, or a detailed understanding of either what occurred and worked in schools, nor the best ways to engage and motivate teachers in a collective process of change toward a better educational future based on critical learning skills.

As a result of the review, some significant recommendations for systemic change were proposed, which sought to weed out the true and core barriers to broader educational change. As a critical research review of the research literature had identified in 2010, the core barriers to effective skills development and the meaningful use of ICT in schools remained constant and consistent. The key areas identified were:

a) **Oppressive and over-bearing assessment systems** foregrounding and requiring content recall rather than knowledge construction – these were thought to limit both the ability to develop skills effectively and consequently encourage the use of technologies that might be more readily appropriated for content learning and revision, essentially adding little to the wider requirement for, and direction of, educational change.

b) **Limited time and flexibility** to incorporate the engaging and dynamic affordances provided by technology. This issue was seen to be inextricably linked to barriers arising from the assessment systems but manifest themselves in relation to curriculum demands and content, and related teacher-designed and -led learning experiences. Associated issues related to time and inflexibility were clearly limiting the practical opportunities for utilising technology efficiently, and more importantly, limiting the opportunities for technology being utilised to support critical learning skills appropriately.

c) **Lack of appropriate professional development** foregrounding the matching of technological affordances to critical learning skills development. Despite the introduction of the new programme of collaborative practitioner professional development, it was identified that the structural and systemic issues highlighted above were still making it difficult for a significant proportion of teachers to engage in notable development of this type. Whilst the programme was deemed to be successful, and had provided a much more tangible set of outcomes and evidence for practitioners, policy changes were required if this would develop as a sustainable aspect of professional practice and culture required to bring about longer term changes.

d) **The new conditions for digital provision** had significantly improved the wider landscape. The industry had responded by developing clearer examples of how their products and services support wider key critical skills development, and there are now more examples of practical project partnerships between schools, researchers and commercial providers. However, two other issues still have to be resolved. Firstly, the new conditions of provision lessen margins for technology product and service providers, meaning there is a danger of both reduced competition and availability of viable resources to deliver the wider educational aims. Secondly, and conversely, because there has not been significant change in the over-arching regulatory and performativity structures and systems, sections of the educational technology industry remain in place providing digital content based on 'traditional' and outmoded models of learning. This has led to a related review and emphasis on devising new partnerships and provisions to address the key critical skills areas through the targeted utilisation of technologies, and in new models of public-private partnership. The model proposed at the end of 2012 sees Government working with commercial organisations to support the development of national 'start ups', specifically focussing on the best ways to support the development of skills and learning experiences that specifically target socially,

culturally and environmentally focussed learning and knowledge construction. The suggestion is that industry's emphasis changes to listening to and supporting the design of new learning experiences. They will support start up companies in developing new materials, yet retain a proportion of the 'scale up' profits and rights related to new and valued products and services that spread across the system due to demand.

2014: All change

As things stand at the beginning of 2014, there is a general sense that we have collectively accomplished a great deal. The Schools Educational Assessment Reform Bill has since been passed after a long struggle. This will free schools from the externally imposed expectations and restrictions that negated new models of learning and teaching. However, there is still much work to be done to clarify and develop the processes to ensure that schools have greater input and ownership of the new assessment models, practices and evidencing processes.

The new Curriculum Bill is now in consultation for pre-legislative scrutiny, following the addition of new amendments to the original paper. In it the case for a new, flexible curriculum foregrounding key critical skills development through content and knowledge creation activities is further supported by the new additions that foreground learning activities emphasising social, cultural and environmental imperatives. It was felt that given the decline of the previous market-focussed economic order, and the clear and damaging consequences of its operations, that there is a need to explore new and more sustainable approaches. Education should be a cornerstone, not in learning about what has gone before, but in actively creating new approaches and developing the skills in learners so that they can change, innovate and adapt to any similar, yet unexpected challenges that may present themselves.

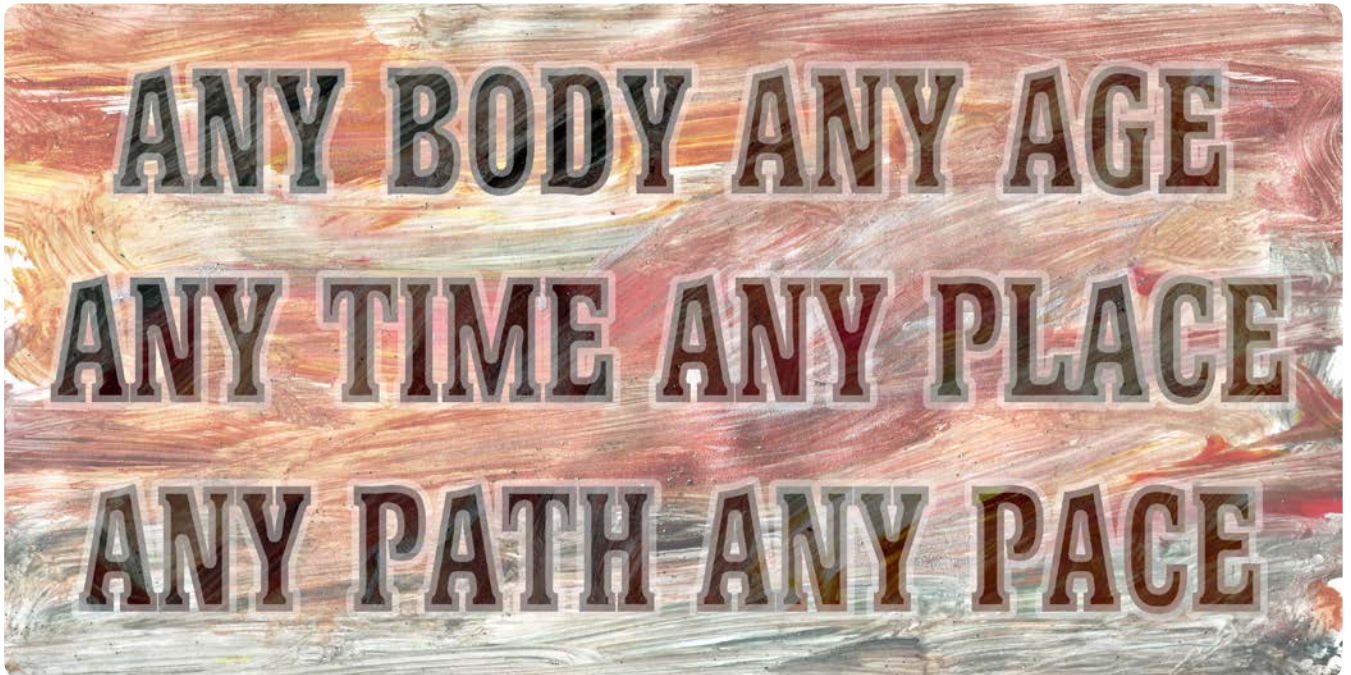
A new and extended programme of collaborative practitioner professional development has been sanctioned and funded. This will seek to extend the existing activity but also enable more teachers to find appropriate time and space to participate. In order to ensure this occurs, there is now a specific school leaders programme so that each headteacher embodies the wider vision and sees the value of participation as a professional development activity. We are also developing the social networking interface to incorporate better meta-tagging and retrieval, instant reporting and feedback for the various communities. We are also investigating the best ways of utilising the data generated across the profession nationally, and also internationally, to ensure that we have the biggest possible global effect on learning, and on the wider outcomes and consequences of learning.

Recently, we have also seen the first of the new corporate-social-governmental-responsibility business models. To date, we have four major and two medium size enterprises that are providing support and investment to develop nationally-owned start ups in exchange for partial rights for tools, resources, products and services that are scaled-up as a result. These will provide employment opportunities and ensure that new digital content, software and hardware is designed specifically with our wider and longer term educational goals in mind, and are developed alongside leading educators and researchers.

In summary

It's been an exciting and interesting journey but one borne out of the necessity reflecting the reality of our experiences and surroundings, brought about by unpredictable and drastic changes in economy and in the environment. There were those that suggested that the response to the crisis of, and crisis caused by, the prevalent form of capitalism in the first few years of the century, would be to make the prevailing system more 'efficient'. That would have entailed a return to a more 'traditional' educational system based on rigorous rote learning, knowledge transmission and regurgitation, and utilising proxy measures to promote greater competition based on individualised notions of learning. Who knows where such a decision would have led us, however it is very likely that we'd have:

- a greater and more mercenary set of private influences motivated primarily by profit;
- far less innovative and engaging learning that couldn't cater for the wider range of needs, experiences, contexts;
- much more limited, rigid and shallow measures of learning progress measures than we currently offer;
- a far less motivated and de-professionalised set of educators;
- and far fewer learners whose learning actively focuses on issues of wider social, cultural and environmental importance.



Scenario 7 Rethinking Learning and Lives 2040: Educational Technologies and Personalised Learning Landscapes

Peter Humphreys

The old views of education, economy and society started to self-destruct in the 2020s and then began a slow process, which moved us toward a more democratic, personalised, digital and networked learning society. It was recognised that the traditional hierarchies, institutions, teacher-centric professional inertia and gate-keeping had led to stagnation and overbearing social control. Such structures and processes had become stiflingly rigid, bearing little relation to the changing flexible, hyper-personalised, digital habitat and economy around them. Schools and universities had become inefficient, overinflated exam factories with fetish-like adherence to a veneer of proxy indicators of an education. The social elevator had disappeared and their key accomplishment was to replicate the unequal, unsustainable consumption-driven world from whence they derived. Learning systems, from nursery to higher and further education were found wanting, unable to meet basic requirements of a democratic, sustainable, healthy and peaceful society. Learners became **over-schooled but under-educated**. Inequalities in wealth, access and status amplified disaffection, social exclusion and the digital divide. Instability and threats to social cohesion grew.

Technology was an important site of the struggle and a disruptive influence. Despite the rhetoric of **educational technology** in the first quarter of the 21st century, it remained firmly entrenched in the hands of teachers, and the **dominant instructional mode pervaded schools**. Children and young people continued to **'power down'** at the school gate and were denied access to the real, social, connected and digital world they inhabited beyond the formal setting. The volatility

and variance in the wider economic context and stranglehold of the existing power elites ensured the human and social cost was no longer sustainable socially or politically.

If educational technologies and broader digital worlds were to be directed toward the greater social good, something entirely more **democratic, self-determined, personalised, flexible and firmly learner-centric was required**. Some promising signposts were already available. There had always been families and learners adopting a different educational view travelling their own unique pathways. They had taken a more holistic approach to life, family and education, freed from the constraints of state schooling prescriptions and pre-packaged progressions of learning and assessment. They drew on the **autonomous philosophy of education, centring on learner-managed learning, invitational settings, catalogue and natural versions of the curriculum, invited rather than uninvited teaching and assessment at the learners request**.

These pioneers tended to recognise the existence of an **educational landscape** through which learners should be able to navigate at their **own pace, personalised** to their needs. Rather than being hostage to a linear model of conventional schooling they explored a range of settings, some conventionally educational, some not. Essentially their mantra was **'alternatives for everybody, all the time'** and they worked to the principle of **'anybody, any age, any pace, any pathway'**. This meant learning could be drawn from the whole **catalogue curriculum of formal and non-formal curricula**. Alternatively, they could pursue the passions and interests of a learner's own **natural curriculum** (i.e. that which interests them, including the informal). Here the learner could choose to follow learning or create learning as they saw fit, without the constraints of traditional subject boundaries and progressions. **Readiness** and not age underpinned when and if they sought assessment and accreditation. Their experience was **flexible, agile and efficient** in full contrast to the ponderous, uninvited institutional silos and practices.

They were used to co-creating these learning pathways and experiences with the support and challenge of family, friends, networks and educators. Some followed more autonomous, 'bespoke' **natural curricula** models; others veered more towards traditional 'packages' but in reality, most followed a **mixture of educational journeys and episodes** across the whole range. At all times they were in control and **learning and assessment was always invited** by them. Underpinning their learning journeys was the ability to use whatever digital technology and tools they thought appropriate, and to engage in networks and online communities that supported their learning needs, rather than being set within the boundaries of institutional hierarchies and conventions. They were amongst the first digital natives and early adopters consistently making choices on the basis of **fitness for purpose**.

Great sacrifices were often made in order to follow this philosophy, however, the outcomes spoke for themselves. Whatever the family contexts, talents or dispositions, the learners overwhelmingly matured into independent, self-motivated, flexible, passionate young people. They were well-placed for existing workplaces and careers but also endlessly adaptable and creative in responding to the constantly shifting fields of social and technological development. Characteristically, they followed their interests and aspirations, learned deeply and rapidly. They accessed competency-based and research qualifications and

experience (academic, practical, vocational) when and as needed for the next part of their educational and life journey. **Just in time (JIT)** learning featured strongly avoiding endless, inefficient and unwanted packages of teaching. **Work experience placements** were negotiated at **any stage** and were important in helping young people connect learning to working lives and societal contributions. This was essentially invitational learning. It was **'I did it my way – though often in cooperation with others.'**

During the 2020s a confusing, if not unsurprising period ensued as the old educational world view confronted the new. The government, traditional institutions and gatekeepers tried desperately to maintain they held the **'gold standard' education, metrics and status**. As regards technologies they struggled to make any fundamental shifts in practice, in access or to transfer the locus of control away from the teacher. With few exceptions educational and the broader digital **technologies replicated and reinforced the existing structures**.

Commercial providers entered the arena **mashing up** the offer somewhat. They pitched and sold online course content, often partnering with existing providers, creating **blended learning opportunities**. Early on, **Google, Amazon** and the like had learned our preferences and customised our experiences. On entering the **digital educational landscape** they quickly followed suit developing **apps and tools to assist hyper-personalisation and guidance**. Joined by others like **Microsoft, Virgin** and **Sky Education**, they competed to sell their commoditised, consumer-packaged versions of content, micro-charging and monetising along the way. The power and influence then moved into the commercial sector and particularly huge global corporations.

Despite coupling the educational and personal technologies with their products, they emerged as the latest gatekeepers. Inequalities remained on the basis of affordability, control of content, and limitations on technology and tools choices. Others entered the fray acting as **learning travel agents: eBay, the School of Everything** and others created tools that powerfully linked learners with experts and courses, offering guidance, suggested packages or support with bespoke learning pathways. Despite serious issues these new offers introduced endless flexibility and provided proof of concept in addition to practical routes for those looking to break free from the old. They developed considerably and became able to respond to some the learner's needs and desires. Learners soon began to develop their digital portfolios containing all their learning experiences, outcomes and accreditations they secured along the way.

Institutional walls and professional monopolies further weakened and blurred. Scaled operations made much online material very cheap, such that they were far more attractive than, expensive traditional time-framed course structures. The growth of **Open Source Education (OSE)**, (see **Danish Interaction Design Education**), the **Wikisphere** and **Open Educational Resources (OER)** provided no-cost alternatives. Global reach universities, colleges and eventually clusters of schools added to the **Massive Online Open Courses (MOOCs)** providing the open access and free versions. They believed this would lead to the learner **purchasing other content, assessment and accreditation**. There was some opportunity then, for those with ownership of basic educational technology to have **access to a broader catalogue of formal learning and more control over when, where, how and at what pace they would learn**.

More and more people began to appreciate the chasm between schooling / higher / further education and an **education**. Increasing numbers **by-passed existing linear institutions**, and used the ubiquitous availability of content, information and growing support options to their advantage. For the younger age groups, they either did this independently as home-based educators, and some mixed and matched as **flexischoolers**. Others chose **alternative democratic schools or learning centre settings**, where they were free from age-stage restrictions and the inflexible, anti-learning barriers of school time, terms, lessons and the like. They found to their delight that this meant families could consider very different lifestyles and life-plans, more balanced and sustainable. The push for flexibility and creativity grew stronger across society.

Learners like these were **adaptable**, well used to **connecting and coming together across communities** for designing **collaborative learning episodes and projects**. They had also gathered **face-to-face and online in communities of interest** with specific agreed aims in mind. In this ultra-connected, networked world the possibilities multiplied. **Some autonomous learners** navigated across a range of **virtual learning communities (rhizomatic)** without being institutionalised by them (**WikiQual / Sqolars**). They selected and supported a **diverse range of tools and technologies based on learner preferences**. Others recreated **new alternative institutions** with the express purpose of developing learning in a **'community of practice'** to meet a specific employment outcome (see **The Alternative University CROS**). Here the choice of tools and technologies were more purposefully chosen so that learners and facilitators could work together in a more straightforward manner.

The landscape opened up exponentially, and rigid boundaries between the approaches and pedagogies of sectors from early years to adult learning blurred, and they were valued at any stage by learners on a **fitness for purpose** and context basis. Some elements were clearly for the better but whether these shifts were sufficient to support the wider social good appeared problematic as regards educational technologies, services and support for the most vulnerable, disaffected and challenged groups in society. Where developments were primarily content / course / curricular driven they still gave an over-emphasis to **traditional epistemological subject classifications of knowledge and pedagogy** whilst underplaying the importance **new knowledge development** and links, and of **user generated content**. The balance therefore needed some redress.

A number of developments proved catalytic and moved the landscape and technologies forward. Some were to be found at the **macro socio-political level**. This was about an emerging understanding that the whole world, physical, human and virtual was a learning space that could become predisposed in the way it worked to providing endless opportunities for learning. This meant embracing the **information highway and digital habitats** as a **utility**. They were as important as water, gas, electricity and roads. They were basics, fundamentals underpinning a comprehensive, life-long learning landscape. It also reflected a real commitment to bridge inequalities and access to technology gaps.

After **experimentation with education loan grants, personal learning credits, and technology loans**, the simpler, less bureaucratic and cost effective route was to look at a **life-long commitment to provision of access to learning and**

technology. By joining the dots people began to recognise the continuous gains for society throughout a lifetime far outweighed this commitment. People power applied upward pressure and it was agreed to finance this pledge **via taxation** and growth of the **fourth sector / Economy 3.0** with its wider social benefits and focus on the common good. These trends reduced the impact of global corporations and their endless drive to control and commoditise education and information, whilst promoting greater social ownership, active participation, citizenship and greater democracy. The government conceded to an enhanced **Scandinavian-type social contract** involving **free education and training throughout life.** Furthermore, and very significantly to ensure equality, the notion of **digital utility** was further **extended to each and every citizen** who had **entitlement to basic personal devices**, informatics and continuous access the information highway and cloud services.

As the learning, lives and communities of those following the new educational pathways blossomed and was positively shared, government grew more comfortable in loosening its remaining grip, promoting and **encouraging innovation.** As a consequence, confidence grew and the educational landscape transformed at a greater pace, rapidly **expanding to provide a range of services, tools, intelligent and smart machines to support the learner in making his or her choices** and to permit virtual access to content and teaching from anywhere. **Artefact and landscape embedded technologies; ambient cities (by design)** helped to shift the content control from the politicians and teachers into the **OER** arena. The availability of ubiquitous technologies and the new active and collaborative learners generated a huge expansion in communities of interest and practice. The scale of growth in user generated content soon allowed for rapid moderation of quality and usefulness. Innovative educators called **pedagogues**, emerged. They laid stake to a new professionalism, new roles and methodologies, **co-creating learning pathways, and supporting learning and assessment.** More and more learners reclaimed their birthright to follow their interests, direct their own lives autonomously, as **co-creators and content creators and learning navigators.**

Debates as to the merits of particular technologies and tools were soon replaced with a realisation that most had a place in time and an acceptance that they evolved or disappeared rapidly anyway. Critically, a new set of educational and societal values were emerging. **Technologies were orientated towards serving the greater good... individual and community wellbeing and mutual sustainability of the planet and its people.**

Technology could never claim to be the whole answer but it accelerated change and did provide a key **disruptive space** in which creative thinking and new answers could be generated. The infrastructure of physical educational settings remained of utmost significance. Schools and colleges were recycled and rebuilt into imaginative **invitational, all-age Community Learning Centres (CLCs) open 24/7/360.** They all maintain services for learning, extensive libraries, study, sporting and leisure facilities for the whole community and learners of any age. They are built around a multi-media and digital technology resource hub where technologies can be used onsite or distributed for citizens' use. Some additionally have specialisms and residential accommodation for visiting learners.

These **CLC** are the **physical bases** for the **pedagogues**. Learners aside, **pedagogues** are one of the most important features of the new educational landscape. These are a cadre of the very finest educators, confident with digital technologies and tools, driven by their calling and amongst the most highly regarded people within society. **Often polymaths**, these **experienced professionals** and **learning travel agents**, act across a range of roles: **guide, mentor, coach, tutor, teacher, and assessor**. But principally they help the learner **co-create their learning journeys and experiences, offering inspiration and challenge**. These educators are available physically and virtually through ubiquitous access to and development of tele-presence and the wider technology-embedded landscape. Although learners can work with as many as they like, some maintain a relationship throughout their formative years and beyond. In addition the **pedagogues**, the CLCs are augmented by a **range of teachers, instructors and mentors** who can be **invited** to support with any **catalogue curricula courses**, learning, or areas of wellbeing. The professionals also run a range of more traditional 'packaged' courses from the **catalogue curriculum**. More informally, any learner can still access as required any family, peers or experts they feel could support them. The **CLCs** have a wide variety **of onsite volunteers and expertise** in all manner of areas of learning and maintain **extensive open access databases** of whom and what is available in the locality. Aside from other centres and settings in the physical landscape, the **CLCs** additionally **provide face-to-face venues** for various **interest networks** and **communities of practice**. Importantly, where home and personal contexts are challenging or where there is a lack of resources, the **CLCs** offer **access to key technologies and tools**. They also provide some **accommodation** specifically for those who require or would benefit from being away from the home environment to focus on their learning experiences, projects and pathways.

Some families and learners **needed time** to come to terms with new choices and possibilities in their lives and learning. These were always accommodated and they continued to access linear, onsite packages from the catalogue. But as the generations moved on less and less persuasion was required. Unsurprisingly, those who faced the greatest challenge in identifying the need for change were those who had gained most from the traditional systems. Whilst at first they felt the previous system had served them well personally, as the wider possibilities began to emerge, they began to realise the structural limitations that had been placed on their own progress. Society as a whole was forced to examine its core beliefs about children and young people, about education, learning and life. An unstoppable **critical mass** transformed lives and learning. Once alternative and marginal, navigating personalised learning journeys and experiences now became the new mainstream. Digital and educational technologies were assigned their rightful place as a utility for all. People engaged in life-long learning and citizenship, now much more in control, more fulfilled and adjusted for the world around them. This was a saner, more participatory and democratic, sustainable society that the majority yearned for. The hyper-networked, distributed and highly personalised landscape had reclaimed education from schooling. In its wake great advances had been made in removing inequalities to learning, content, learning tools and processes. Limitations of place and age-stage thinking were removed. Everyone has the opportunity to navigate through their own purposeful educational journeys and episodes at anytime of their lives: **'any body, any age, any time and place, any pathway, any pace'**.

Scenario 7a

Vignettes

Peter Humphreys

Learning in 2040 is characterised by learners navigating their way through the educational landscape experiencing personalised journeys and experiences at a pace that suits them and their lives. This process is not about collecting SATs scores, GCSEs, degrees and so on. This is about helping life-long learners locate those dispositions, qualities and gifts and that they can contribute to the wider society. It's purposeful, engaging, intergenerational, authentic, productive, highly efficient and very effective. It's a learning landscape that reflects a growing, active, participative, sustainable and more equal democracy.

Sophie

Sophie had a pretty common start to her learning journey experiencing **home-based learning, playgroups, and kindergarden** within the community and the local **CLC**. Whilst at kindergarden the children went on a series of outdoor challenges, one of these was a trip to the sea. She was immediately hooked and developed a fascination with water, sealife and sailing boats. Driven by her engagement with this **natural curriculum** Sophie invited her family, **CLC pedagogues** and **instructors** to help develop her reading and basic numeracy. Her first forays into the sciences looked into the physical science of water, marine biology and water's importance to the human body. She looked at global access to safe, clean, drinking water.

The majority of her learning was based around these themes and developing the skills and tools she needed to investigate the knowledge she desired. She eagerly adopted the **researcher model** and conducted a series of **focused interest-led projects** all before the age of nine, using a variety of media for her outcomes including print, still and moving image and animation. At eight she began to spend all her available time learning to sail at a local inland sailing club. With the support of experienced members of the club and their contacts, Sophie began to gather an extensive experience on a variety of sailing boats large and small. She joined the **Sea Scouts** which could now be accessed throughout the day (not just an after school bolt-on). Sophie loved the early opportunity to share her passion with like-minded young people and began to build up a wide range of **competency based qualifications and awards accessed online and with practical learning**. She engaged in the **wider communities of interest** surrounding sailing and set up her own **website and blog**. She enjoyed a **rich and varied social life** with young and older people alike.

At 13 Sophie sat down with her parents and a specialist **pedagogue** and developed a short-medium term **Personal Learning Plan** leading towards **Royal Yachting Association qualifications in skippering and yacht mastering**. These would be the portal to a career at sea. Hyper-personalisation and guidance tools were used to look at potential gaps in Sophie's learning experience and the possibilities to address these. At 14 Sophie won a scholarship as an **intern on tall sailing ship**. She sailed the world, built up further competency qualifications, added to her log of sailing hours. She **studied Spanish, French, Portuguese, took scuba diving qualifications and enjoyed marine photography**. She continued to **write and**



publish her photography on her website and blog. Returning to the UK Sophie continued her own **self-directed studies** whilst joining flotilla sailing companies whenever she could as an **apprentice skipper**. At 18 she was sufficiently skilled and competent to skipper herself. She currently spends her **time skippering on charter boats and researching and photographing the marine ecology of coastal UK.**

Aleksandar

Aleksandar was born with a predisposition for **music, art and drama (MAD)** and performing to whoever would watch. He enjoyed nothing better than being with his peers preferring to **learn socially, and cooperatively**. From the earliest age he accessed a range of **MAD programmes** from the **available catalogue** in various **CLCs** with a **specialist MAD focus**, and was a regular member of **local amateur dramatic companies**. His early literacy was developed rapidly, with guidance from parents and **CLC instructors**, by his desire to read and perform plays.

Later Aleksander, with some of his like-minded peers, **sought the assistance of a specialist pedagogue** to help them develop all **the knowledge and skills required to produce, direct, perform and market a play**. This turned into a **year long collaborative and co-created project** leading into a run of performances in the local region. As part of the learning the group **invited assessment and gained accreditation for their work**. The following year the same group of peers repeated the process autonomously and raised funds for local charities. Aleksander developed a love of scriptwriting and took on some **online courses and worked with communities of interest both virtually and physically**. Gaining confidence he **self-published** a series of plays to some success and set up a **website for aspiring playwrights to network and publish their own work**.

Continuous involvement in a wide range drama companies ensured Aleksander was very comfortable with members of all ages and he matured rapidly. **Work experience for local and national theatres, TV and radio** followed as he expanded his experience and repertoire. In his spare time he **taught himself music and to play guitar and piano** picking up **tuition, assessments and gradings when ready**. Aleksander used **video technology extensively** throughout his learning often for developing and evidencing his work. He has since **written and developed a series of online coaching videos**. Aleksander supplements income with **part-time work as an instructor in his local CLC** and has developed a love of working with youngsters with special needs.

Asia

Following in her grandmother's and mother's footsteps, Asia knew she wanted to be involved in health and medicine from the earliest age. She was precociously talented and impatient to get there. **Entry pathways into medicine were well mapped** and comprehensive options were available within the **available catalogue curricula**. Asia was able to combine a number of these routes and follow them at her **own accelerated pace**. She worked work through a vast range the biological and human/life sciences **inviting the support of family, instructors and pedagogues** as required.

Asia had long standing associations with **St John's Ambulance and Red Cross Societies**, completing all of their **accreditations and qualifications** as soon as she was ready. She served as a **young volunteer and later as a leader / instructor** in both organisations. Asia worked with **expert pedagogues** on her own **extensive**





research project into basic public health care across the world. She accessed a range of **content from various MOOCs and from OER**. In her early teens she travelled around UK taking part in **peer-led health related teaching projects** for young people. Subsequently, she went abroad with **the Red Cross** delivering similar programmes. Whenever possible Asia explored various aspects of surgery with **freely available immersive and gaming-like technologies**. At fifteen she was skilled at cardio by-pass and cataract surgery in these digital environments.

However, she decided surgery was not for her. Asia went on to university to study to become a doctor. She became fully immersed into **communities of practice both physically and virtually**. Her prior qualifications and experience enabled her to take a **modified and personalised route** through this. Asia became interested in personalised medicine and how access to **big data** could help provide greater insights into this. She is currently involved in strategic work and how personal informatics and social media can contribute to, and harvest, big data in the medical field. She is also **working on her book** *The Human Body – An Owners Manual*.

Selina

Selina came from a pretty poor background, deprivations were extensive and a history of abuse led to very early depression and self-harm. In previous generations Selina would likely have ended up with addictions and be amongst the **NEET (Not in Employment, Education or Training)** population. Selina was directed towards specialist **counsellors, mentors and pedagogues** who were skilled in taking their time to allow her to confidently regain **control over her own life and learning**. She decided that periods away in some **CLCs with accommodation** would provide the best context to focus on rebuilding her life.

Her **personal learning plan**, constructed with those who supported her, allowed for her to have plentiful opportunities to **network virtually and face-to-face** with others who had come through similar issues. She learned about her conditions and how she could empower herself to manage them effectively. Throughout her early years through to beginning her teens, great care and nurturing was available to assist her in learning basic skills, in literacy and numeracy when she invited the teaching. Selina was able to **access technologies in the CLC but also take what she needed to interact, network and take part in the wider world off campus**.



By her mid-teens Selina grew in confidence to share and articulate her own experiences and journey. Slowly, she began to realise she had unique insights and important experience which was valued and could help others. She grasped opportunities and **teach peers** and others. She learned the **crafts of managing groups and facilitating workshops from CLC staff**. By the age of seventeen she had built up wide **theoretical and practical experience learning about educational technologies** and the various ways in which **artefacts, tools and social media could spread her work to a broader audience**. She located her learning in a myriad of places ... **some from formal courses in the CLCs, some with communities and interest and some with personal research**. As she approaches her nineteenth year she has already established a reputation **as a renowned communicator and continues her work the wider network of CLCs** and online tools and social media.

Paul

Paul's aspergers syndrome was accommodated with **expert support** to the family from **specialists** who were continuously **available virtually or physically**. Early **home-based education** and additional mentoring from the wider **aspergers communities** were interspersed with **outdoor learning programmes** in the **local CLC**. The balance of **formality, informality and physical experience** retained his and his family's sanity, and has given him the ability to follow his own interests. This has allowed his **family, pedagogues** and others to help him begin to come to terms with his conditions and **learn to self-manage**.

His interests were the gateway for Paul to **access his literacy and mathematical knowledge**. From the earliest age Paul had an obvious love of outdoors and an obsessive **passion for plants and particularly trees**. He was not disposed to academic learning and classroom-type situations as such, but learned practically, immersed in **observation, lists and identification guides**. He would spend hours at home and at the **CLC using computers to research his current interest**. Paul used **personal mobile technologies extensively**. **Smart phones and tablets** provided the opportunity to **photograph, identify and geo-locate specimen plants and trees**. He spent hours developing encyclopaedic knowledge of several plant and tree species and readily **shared his growing understanding** of how they grew and their contexts **with experts in natural history museums, horticultural and arboreal societies**. His reputation grew and he was invited to visit and join a **range of expert forums**.



Arising from one of these associations, and a visit to a tree nursery, Paul got hooked on plant breeding and nursery work. At fourteen he began a **regular internship / work experience work at a plant and tree research institute**. In his element, he co-created a personal learning plan with a **specialist pedagogue** that would lead him into this field as a career. He engaged in a **long-term research project** drawing on his **contacts and networks into plant and tree breeding**. At twenty this work continues and he has joined business partners in developing an arboreal nursery, and he acts as an advocate for re-foresting the UK.

- Peter Humphreys has worked as a Headteacher, Associate Local Authority Adviser, for BECTA with Strategic Leadership in ICT for Headteacher's, and as a Learning Researcher for Futurelab. He is currently Chair/Director of the Centre for Personalised Education – Personalised Education Now and works as Visiting Tutor at Birmingham City University with graduate and post-graduate teacher trainees.

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