Better Learning through Technology

– a report from the SchoolsTech Conversation run by Naace and ALT between January and March 2012

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Executive Summary

Introduction and background

From January through March 2012, ALT and Naace — two membership organisations associations with members in the field of ICT and learning — ran an online discussion, prompted by the Department for Education, about how technology could transform education in schools. This report analyses and summarises the discussion in an attempt to distil coherent outcomes.

There were over 150 contributions to the discussion. The majority were made by people active in the learning technology field, but the discussion was open to parents, teachers, researchers and others.

Secretary of State for Education Michael Gove made reference to the SchoolsTech conversation in his speech at BETT on 11 January, and the Department for Education provided support to the discussion in the form of publicity to attract participants, and a series of Stimulus Questions that were used to focus discussion on different topics over several weeks.

The report aims to distil wide-ranging discussions, identifying areas of shared and conflicting opinion. Commentary from the authors is limited to a few areas where we synthesise discussions with evidence and analysis from elsewhere.

The role of technology in learning

Views of technology in the discussion were multi-faceted. While it can be seen as an independent force and a ‘given’ to be applied to education, some articulate alternatives whereby technology is adapted, created or reinvented in forms that are ‘native’ to the sector. Many are not satisfied with the fit between technology and educational aims and practices. This is expressed as a failure of the market to deliver education's needs, though this is politics with a small 'p' — down to procurement and budget-holding arrangements — rather than anything more ideological.

Technology is seen as an accelerator of change, not a driver. Its power as a medium for connection means that access and digital literacy are important issues.

Teaching practice

Teachers and school leaders mediate the use of technology in schools. Mixed in with ample amounts of respect and sympathy for the profession is an element of frustration. While many innovative practices do make the most of technology within and beyond the classroom, the spread of such activities has remained patchy for many years.

The relationship between teaching, technology, quality and productivity in schools is complex. Lines of argument in this area tend to talk past each other, with some maintaining that good teaching is independent of technology, while others feel this misses the point that technology can augment and extend good teaching, as well as supporting independent learning. A number of examples were given to back this up, and they are referenced in the report.

Young people

While some participants have witnessed young learners taking control of their own learning through technology in unprecedented ways, many warned against seeing this generation's digital skills and literacy for granted. Although they are adept at using technology for common social and media consumption purposes, their ability to engage deeply and critically with technology is perceived as limited. Developing competence in Computer Science and programming is part of the solution to this, but there remains a need for a broader concept of digital literacy relevant to those who will never write programs.

Interventions

A number measures were put forward to improve the use of technology in learning. General examples include

- providing authentic, meaningful learning experiences by embedding technology in teaching and learning activities;
- creating frameworks that encourage responsible but liberal use of new technologies (the view that prohibition of online services and mobile devices is unsustainable was not contested in discussions);
- encourage formal (CPD framework) and informal (peer guidance, self-organising "TeachMeets", even student-led instruction) initiatives to help teaching staff develop their use of learning technologies;
- new partnerships between schools, teachers, industry and volunteers to make the educational technology marketplace work better;
- new forms of assessment tailored to technology enhanced curriculum and teaching.

Further suggestions are made for actions at different levels - sector, school, teacher/classroom level, and working with third parties.

Introduction

1.1 Brief overview of process

In late 2011 ALT (the Association for Learning Technology) and Naace (the ICT Association for advancing education through the appropriate use of technology) discussed with the Department for Education how Naace and ALT could encourage a public conversation about future prospects and opportunities for using educational technology in schools.

In his keynote speech to the BETT show in January 2012[1], the Secretary of State for Education, Michael Gove, said:

> *I'd also like to welcome the online discussion launched today at schoolstech.org.uk and using the twitter hashtag #schoolstech. We need a serious, intelligent conversation about how technology will transform education – and I look forward to finding out what everyone has to say.*

ALT and Naace prepared a simple website at schoolstech.org.uk, which was based around five sets of "Stimulus Questions" These questions are included in Appendix A as well as being available in their published context at http://schoolstech.org.uk. This site also shows the timetable and history of discussion, along with all the comments (excluding those made via Twitter), between January and March 2012.

Aside from the Secretary of State's speech, and the reporting thereof, awareness of the SchoolsTech conversation was raised by the Department for Education, Naace and ALT, using their online communication channels (email and Twitter). In the nature of social media, many professionals in the community then opted to pass these messages on to their contacts and followers (indeed, by far the majority of Tweets about SchoolsTech were simply exhortations to visit, and contribute comments to, the website conversation[2]).

This means of inviting contributions to the conversation, combined with a 'light touch' approach to moderation (no contributor had their comments blocked), clearly relinquishes significant control over the composition of the audience and participants. It was made clear that contributions were welcome not just from those with a professional interest in learning through technology, but also from parents, teachers, unions, researchers, the IT industry and other interested parties. However, this exercise was never designed to be a survey of a representative sample of opinion from one or more of those parties. The means by which it was carried out and promoted led us to expect that participation was skewed towards those who are (a) already regular contributors to open public discussion in the field of schools and technology and (b) confident and competent in online discussions. By and large, such people were therefore relatively well-informed about technology-enabled teaching and learning practices in schools.

ALT's and Naace's effort on the SchoolsTech initiative was internally rather than externally funded.

[1] http://www.education.gov.uk/inthenews/speeches/a00201868/michael-gove-speech-at-the-bett-show-2012

[2] The Twitter waters were muddied slightly by the fact that the #schoolstech hashtag was also used in discussions of the more headline-grabbing part of the Secretary of State's speech about reforming computer science teaching in schools.

1.2 Overview of report aim and structure

This report aims to "serve as a contribution to helping us come to a shared understanding of the role of technology in teaching and learning in the schools sector." It represents ALT and Naace's conclusions, drawing on the discussion, which included 160 comments, made by around 100 people on the SchoolsTech website, plus nearly 600 tweets[3].

As the discussion was not directed or actively moderated, participants took the Stimulus Questions literally as a stimulus to contribute, but were not exclusively focused on providing rigorous answers. This report focuses on communicating the range of the conversation, highlighting areas of consensus and disagreement, and distilling important ideas for follow-up or noting. (It should also be noted that references in the report to particular products or services derive from comments made by participants in the conversation.) In general the report aims to give an impartial account of the discussion, summarising shared opinions without glossing over differences. Where views were robustly or starkly expressed, the report tries to capture this, either with direct quotations or words that capture the spirit of the original. Except where indicated, the opinions in the report *should not* be taken as those of Naace, ALT, their officers or members.

Thus **Section 2** analyses how the contributors portrayed three central elements in the discussion:

- technology, and its role in educational change;
- teachers and teaching;
- learners and learning.

It focuses on which of these has agency and power, and what are their prevailing 'leanings' and biases. This approach stakes out the range of positions that are taken in a discussion (and sometimes, in the process, to highlight possible blind spots, such as positions that are discounted or left unmentioned by everyone). Section 2 maps out the terrain of debate and identifies which parts of the terrain are occupied as well as the relationships between these parts.

Section 3 outlines the main themes of the conversations within this terrain. First it covers the context for action, which includes the importance of 'digital literacy', its relationship to teaching, and the broader picture of developments in learning technology. Then it describes the range of interventions proposed for optimising the role of technology in teaching and learning in the schools sector. We have divided these into:

- system/sector level interventions;
- school level;
- teacher/classroom level;
- interventions and contributions by third parties.

Section 4 contains a brief conclusion with the some suggestions for next steps.

[3] We tracked 590 tweets, but, in the nature of Twitter, the vast majority of these were mainly concerned with encouraging people to follow links to websites (principally the schoolstech.org.uk website) rather than directly making comments. The figure of 45 comprises the direct comments and the links to original material (blog posts, media releases etc) that related directly to the SchoolsTech discussion.

2. Perceptions of technology, teaching and learning

2.1 Technology, and its role in educational change

The Department for Education helped in the initial framing of the discussion through the Stimulus Questions (SQs) that it provided (see Appendix for the full questions). As framed in the SQs:

- technology has "developments", "trends", a "cutting edge";
- it is "increasingly pervasive" and has its own largely unstoppable logic of advance;
- this advance originates outside education, rather than within it, so education has to "keep up to date" and "respond to opportunities";
- these opportunities include democratising access to information, changing the way education is delivered;
- this takes place in a wider context of technology changing the way we work and play, and learners' expectations and behaviours.

This perspective was echoed by some respondents who referred to technology as something to adapt to, leaving schools and teachers almost beleaguered by external change, and always playing catch-up - while noting also that this makes it difficult to anticipate the correct skills that education should focus on.

Others saw technology not as an independent force but as something that emerges from market interactions and commercial pressures. One strand of the discourse constructed arguments for why the technology marketplace is not functioning properly, placing the blame variously

- on education being a marginal area within the technology market, so providers don't take it into account;
- on education not working like a proper market because purchasers aren't spending and risking their own money, so feedback disciplines of the market fail;
- on sales people focusing on budget holders not end-users (and the budget holders in education tend not to be close to end-users);
- or, in more starkly caricatured terms, on teachers being anti-business, Becta manipulating the market, and/or and alliance of zealots, gurus and industry hype.

Other contributions emphasised different aspects of technology:

- **a tool**: something that educators may or may not accept as useful for their purposes (for example, mobile technologies were initially not accepted though this may now be changing);
- **a medium and a connector**: for learners to make connections with peers and the world beyond the classroom; "Use of technology across the curriculum gives a real life, purposeful context for learning in many cases. Writing for an audience can be achieved for real through web based communication (blogging, wikis). Themed project work can be brought together and broadcast through children's own and class websites. Design and technology teaching, even at primary level, is no longer authentic without the use of software and technology can introduce learners to making music in a way that is inclusive and engaging."
- **an access issue**: ripe for government intervention as with the example of the Indian government providing low cost tablets;
- **an accelerator not a driver**: making the case that to focus on technology per se puts the cart before the horse when we should be finding or developing pedagogies that take advantage of the affordances of new technology.

This last point was elaborated through a range of explanations and examples of how technology and educational change are related, such as:

- technology affects change when embedded in new practices such as Bring Your Own Device;
- the technologies that offer new models of teaching are those that are truly portable, allowing use in a variety of places that offer different kinds of learning opportunities;
- technology affects change when learners are "open to experience and want to know more";
- technology has enabled change in other fields of human activity, but not much in education, yet.

2.2 Teachers and teaching

One axis of the discussion of teachers runs between seeing them as "put-upon salt-of-the-earth" on the one hand and "closed-mind closed-shop" on the other. In the former camp, there were a set of comments about teachers' inspirational role (they "know best how to inspire learners"), but being, harassed, short on time, frequently dumped on and faced with impossible challenges. More specifically, there were suggestions that teachers are victims of past mistakes in the National Curriculum and (separately) are now at risk of having the curriculum increasingly influenced by publishers.

In the other camp were suggestions that teachers are parochial and not natural collaborators, that they are never going to be the drivers of innovation and may even need to be forced to become competent in the use of technology in their subjects. Slightly more sympathetic was the argument that teachers have limited freedom to use their own discretion and creativity, for example through free software and services (if, indeed, they're permitted to install these).

There were a number of suggestions for approaches to bridge the gap between these extremes, making the case that teachers should be role models for lifelong learning and could teach themselves about technology "in public" along with students. It was observed that, through agile, self-organised means such as TeachMeets, some teachers are already doing this. While the case was made that it's better to invest in teachers than technology, these teachers will need to get up to speed with managing online networks.

- "Teachers will have to orchestrate their collaborations using networking and tech far more wisely."
- "Teachers will also have to have much higher insight into procurement of the right tools for the jobs and the inherent risks and benefits of using web 2.0 and other distributed services."
- They need to be savvy about a large array of tech-related issues, such as e-safety, copyright, data protection, relying on cloud services that may disappear overnight.

Where views about teachers as a group tend to be polarised, the discussion of relationships between teaching, technology, quality and productivity are much more nuanced and sophisticated.

- One line of argument is that teaching is independent of technology, quoting Sir Ken Robinson ("You do not become a great teacher by using great technology") while good teachers are good regardless of the technology they use.
- Contra to this, others make the case that technology has improved productivity in most other sectors, but not yet in education and that technology-assisted productivity often goes hand in hand with decline in craft skills: "Being a better or worse teacher misses the point – what counts is the amount of learning being done by the student."
- "In order to be a professional teacher today you need to understand how new technology impacts on your subject discipline and on pedagogy, and you need to be able to operate relevant technology. So – yes being able to use technology effectively is part of what it means to be a professional teacher."

- "If the technology is to be fully integrated into learning then it has to become invisible, it has to become a natural part of learning rather than an add-on. For this to happen, there has to be a culture of risk, experiment and involvement. Allow teachers to make mistakes, make it part of their performance management!"

Finally, there were again some responses that questioned the assumptions behind the Department's Stimulus Questions: "Not sure these are the right questions to be asking. Think we need to consider the traditional concept of schools. Who was it who said it's like trying to fit an engine into a horse?"

2.3 Learners and learning

One pattern that is immediately evident in the discussion of learning is that many participants referred to teaching and learning as though they were synonymous, or at least two sides of the same transaction, so "teaching-and-learning" becomes a compound noun with the two elements being inseparable from each other. At the same time, others discussed instances that decouple these elements, including, for example,

- game-based learning;
- possible uses of the Raspberry Pi for learning;
- exploratory learning in digital spaces, freed in time (online, 24/7) and space (mobile);
- creative, enquiry-led learning (citing Sugata Mitra's "hole in the wall" learning experiments).

The Stimulus Questions asked about young people's enthusiasm for, and informal learning about and through, technology. There was a consensus in the response to this that students' competences with technology tend to be patchy.

- "The area that students are likely to need most help with is the 'non-technical' digital skills. For example, the ability to be able to search for and evaluate information; an understanding of online identity & personal data; the ability to write for a particular audience and so on."
- "They are very good at surfing the net but very poor at selecting relevant information."
- "They're good at office skills, photos, audio, social networking, e-mail, searching the web. Not so much with programming and working with data, or, surprisingly, video editing."
- "Kids are not as ICT literate as is made out. The vast majority of kids use the Internet for browsing, social networking and gaming and that's it. They can use iPods and USB sticks and cameras and other simple technical equipment, but ask them to turn a collection of photographs and mp3 files on this memory stick into a small file-sized video fit for a mobile phone and they would struggle to know where to start – nor would most have the independence to research the net to find out."

This last quote represents one end of a spectrum of views about learners' confidence and competence in independent learning. Others were more positive about learners' independence and control of their learning, saying that it is a good thing and on the rise, while qualifying this assessment by arguing that it comes with risks and would benefit from guidance (that is, presumably, by being slightly less independent). These quotes give a flavour of this end of the spectrum:

- "I see every day as an LA [Local Authority] advisor that students are taking control of their own learning. It is an unprecedented change. My worry is that we miss out the crucial elements of e-safety."
- "On the whole they're confident that they'll be able to acquire any skills which they're missing, and are willing to experiment and figure much new stuff out for themselves".

Suggestions for building on this included making sure that education builds on learners' areas of skill and interest rather than working against them (e.g. in the area of mobile technology) and stressing the importance of learner ownership.

3. Key discussion themes

3.1 Context

3.1.1 Digital literacy

Digital literacy is a central concept to most discussions of technology and learning, and correspondingly there are several different definitions of its scope. This is not the place to explore debate over definitions at length, but to note briefly that there was no direct dispute of the term in the SchoolsTech conversations, and that participants used it partly out of their concern that a focus on skills can be too narrow. They suggested that digital literacy should be defined broadly to include learners:

- understanding how 'information technologies' (also broadly defined to include books, internet, TV) have an impact on society (e.g. culture, ways of knowing, meaning making, ways of interacting);
- being able to safely develop and maintain an effective Personal Learning Network (PLN) — again defined broadly, including face-to-face as well as technology-mediated information exchange/knowledge building;
- being able to effectively investigate an issue using their PLN, bringing in search and critical appraisal skills;
- being able to create a balanced multi-media report on an issue that they have investigated, for an intelligent and digitally literate audience.

Participants referred to digital literacy being important in a range of contexts for diverse purposes.

- Many forms of technology-enhanced learning depend on learners themselves already possessing a degree of digital literacy and fluency. While a growing number of students now develop basic skill in using smartphones, tablets and computers outside school, there is still some way to go before broad-based competence can be taken for granted. It is becoming increasingly important for learners to learn how to learn in technology-supported ways from the start, and then to be stretched to make more challenging and developing uses of technology-supported learning as they progress.
- While the emphasis on computer science and programming has been welcomed in many quarters, there remains a strong school of opinion that this should be placed within a wider concept of digital literacy that should be at the heart of ICT in schools. Digital literacy recognises that it is impossible to predict what specific ICT skills pupils will need in the future. So, rather than focusing on specialist applications (e.g. CAD/CAM), digital literacy embraces broader areas of competence in the digital domain, such as problem solving, effective searching, crowdsourcing, online collaboration, and critical thinking (including being critical about ICT tools).
- Activities that support students in producing, publishing (e.g. blogging), communicating and collaborating — which can be included in many parts of the curriculum beyond ICT — are a very effective way to develop digital literacy.

As noted above (Section 2.3) the notion that all young people are 'digital natives' is widely rejected as fiction. While pupils may pick up technical (button pushing) skills from their peers they need support in developing the 'non-technical' competences such as being able to search for and evaluate

information; an understanding of online identity and personal data; the ability to write for a particular audience, and so on.

3.1.2 Embedded technology

Authenticity makes learning more meaningful. Some participants in the discussion argued that use of technology across the curriculum can supply authenticity by providing a real life, purposeful context for learning. This might involve writing for an audience using a blog, analysing vast amounts of real historical data, or using simulations to carry out experiments that it would be too expensive, dangerous or time consuming to do 'for real'. This assumes that new technologies are being embedded across the curriculum.

Furthermore embedded technology may play a critical role in developing digital literacy, and thus ensuring that pupils become effective members of society.

While embedding ICT is recognised as being important (e.g. Ofsted 2011 quoted as recognising the crucial role of 3D modelling and simulations in science), it is not universally implemented, or mandated. Indeed ICT as a subject has been criticised in part because of the lack of 'real world' relevance in ICT teaching. It would appear that this criticism of ICT in schools has been taken as a criticism of the Programmes of Study (PoS), though in reality it is a criticism of the narrow way in which the PoS have been interpreted/implemented (particularly in KS3/4).

3.1.3 Bring Your Own Device

In the last year or so there has been a shift in a few quarters towards relaxing the hitherto prohibitive attitudes towards students using their own ICT devices (principally smartphones, tablets or netbook PCs) in schools. Faced with a 'tipping point' in ownership of such devices, some teaching staff seek to turn this from a threat to an opportunity. Clearly this represents a major shift from the status quo where schools provide hardware and determine what is used, when and how. The Bring Your Own Device movement brings with it several implications and trends:

- schools may need to cope with diverse student-owned devices, develop strategies for this and employ staff who can help;
- a possible shift to less interventionist pedagogies or 'minimally invasive education' (a term linked to Self-Organised Learning Environments, discussed below);
- all teaching staff need to develop knowledge of a range of common devices and understand their capabilities and limitations;
- a shift away from the Becta/local authority model of provision;
- a requirement for social based networks for teachers in all disciplines.

3.1.4 Technology-supported learning (TSL) methods

New forms of learning that run counter, or orthogonal, to traditional classroom methods have emerged, supported by technology.

Perhaps most striking among these is Professor Sugata Mitra's work on Self-organised Learning Environments — best known through his 'Hole in the Wall' learning experiments and associated support for children in the developing world using the 'granny cloud'[4] — which may run counter to what many perceive as 'good' or acceptable teaching and learning methods

[4] Sugata Mitra, Ritu Dangwal, Shiffon Chatterjee, Swati Jha, Ravinder Bisht, Preeti Kapur. (2005). Acquisition of computing literacy on shared public computers: Children and the "hole in the wall". *Australasian Journal of Educational Technology*, 21 (3) 407-426.

TSL-based tutoring systems like My Maths, SAM learning and School of One are growing in relevance and acceptance[5].

Online distance learning may remain marginal to mainstream school-age learning, but the margins where it is useful are increasingly clearly understood. It provides

- a way of keeping hard-to-reach learners engaged, for example using the "NotSchool" model;
- a way to reach over the heads of the existing teaching workforce to ensure that "shortage subjects" can be covered;
- a way to train and develop the existing workforce in shortage subjects;
- a way to organise substantial aspects of provision in its entirety when done in the manner of a "virtual school".

3.1.5 General technology developments and trends for schools

The discussion identified a large number of developments that have a significant bearing on teaching and learning practices.

- **Mobile to access information** — linked to Bring Your Own Device (above), where learners' have mobile devices they could be encouraged, rather than banned, to use them for learning. The implications of ubiquitous information include:
  - schools need to get better at coping with diverse information available to pupils and develop strategies for this and employing staff who could help;
  - a possible shift to less authoritative and more enquiring teaching styles;
  - the need to understand what was available and develop early concepts of provenance and reliability of information.
- **Learner-generated content** — with implications for exercises and assessments, formal and otherwise, and for teachers staying ahead in this game.
- **Open source and the open movement** — with potential to reduce some costs dramatically and tilt some cost-benefit models. Schools' approach to resources would need to change and to exploit and accommodate this, and leadership in openness throughout the community will be important.
- **Cloud computing** — seen as underpinning many of the changes above and making them cost effective.
- **Social media and social networking** — meaning that schools need to get better at linking with other schools and entities, and use the pupils as a resource to help them so do. Schools and teachers could make full use to improve their knowledge and teaching through communities of practice, as well as to strengthen links between learners, teachers, parents and the outside world.

Predictably, perhaps, a large number of other developments were mentioned in this part of the conversations, including ebooks, HTML5, CMIS, Web 2.0, Web 3.0, open source webservers (using the Moodle VLE, Elgg social networking, drupal content management and so on), filter technology, plagiarism detection, Raspberry Pi, lecture capture, netiquette developments, 3D printing, augmented reality, virtual presence technology, gesture based computing, personalisation such as culturally aware/ software, object orientation, lifelong ePortfolio technology, eSafety developments, and measurement technologies that allow one to collect and process more analytics about pupils and their performances and use in a predictive fashion and identify interventions that were necessary on an individual basis.

[5] 4.5 million people each year use Pearson's My Math Lab – see 15.33-15.36 during Rod Bristow's presentation at the launch of the Ufi Charitable Trust: http://goo.gl/t5ay0

3.2 Interventions

3.2.1 System/sector level

In reviewing the online discussion, some of the Naace/ALT contributors to this report felt that the discussion reflected issues surrounding general reform of the curriculum to make it fit for purpose, with the right pedagogical approaches. To dovetail with this, some argue that a new approach to assessment will be needed that is better tailored to a technology enhanced curriculum and pedagogy.

Likewise, some contributors felt that:

- while technology can make a significant beneficial contribution to the environment for learning, technology is not routinely used as a central component of either formative or summative assessment. Without major changes to the assessment regimes the use of technology to support learning will tend always to take a back seat.
- the schools sector should work in partnership with industry, exam boards and universities to come up with a new policy document for reconceptualising educational assessment and its relationship to the curriculum.

New technologies potentially challenge the underpinning structure of current education systems — for example in shifting the power relationships between teachers and pupils and breaking down some of the barriers between school/home and formal/informal.

Ultimately such challenges may raise questions about the extent to which our current education system is fit for purpose.

The potential for change is reflected, for example, in the different strands within the UNESCO ICT Competency Framework, which challenges a 'skills based approach'[6]. Indeed, a clear message is that focusing mainly on skills is itself problematic — we need to understand impacts on society, changes to disciplines, extensions to pedagogy, and competence in making decisions about all the above in light of emerging technologies.

Many of the school-level and teacher-level interventions discussed below are also likely to require sector-level incentives and coordination.

3.2.2 School level

Professional updating and exploitation of technology

There was almost universal agreement that individual schools in isolation could not hope to keep up with all the latest developments in technology. However there was also agreement that they do not need to.

That the vast majority of technology provided remains unknown and unexploited is not unique to schools, but also true of the home and the workplace, as well as in education. Most facilities in sat nav or modern exercise equipment, a Virtual Learning Environment, spreadsheet or Enterprise Risk Management system remain unused and unknown by most users. Schools will be no different unless there is work put into this. At the moment this is not the case and the sense we got from the conversation is that most teachers expect support staff or teachers of ICT or media to come and solve even elementary technical problems.

Past research indicates that uptake of new technology occurs more easily through changing people than through changing practice with the same people. This has implications because the teaching workforce is currently moving to having less churn than, say, three years ago.

[6] The UNESCO publication is at http://is.gd/ES2eaT. Also related is Prensky's notion of 'digital wisdom' (http://is.gd/yQpip6).

The other answer is education. Initial teacher education needs to be overhauled so that all teachers understand the issues and are well connected to sources of reliable information to help them make informed choices. Regular CPD on technology relevant to a subject and generically is also essential and needs reinforcement within the school management structure (as with ICT, numeracy and Computing).

Schools and teachers could forge (and in some instance are forging) partnerships with industry and others to allow them to keep up to date and understand issues and solutions (see below for partnerships and industry links). Collaboration is the key to exploiting technology and collaborators need to be reached using the technology. The influential role of the monolithic Local Authority is dwindling and a more agile set of alliances and collaborations needs to take its place.

Time has to be devoted by schools, teachers and support staff to thinking about the technology to be used. They need to be convinced of the case that participating in relevant communities of practice — by following blogs, reading articles and knowing which educators to follow on social networks — will ultimately save more time than it takes.

Partnerships

As described in Sections 2.1 and 2.2, there is a widely-perceived problem in the ICT procurement marketplace, characterised by mistrust between suppliers and teachers. In what is obviously a caricature, suppliers tend to be seen as hype-merchants and snake oil salesmen who exploit opportunities in schools procurement processes to go over the heads of teachers and ignore the real demands of teaching — while teachers tend to be seen as anti-business, naïve stick-in-the-muds. The mistrust between industry and schools must be broken down. There were several suggestions for steps towards this.

- **Encourage and incentivise volunteering** to support schools and especially CPD for teachers as part of a (Big Society?) "volunteering culture" . At the moment there are too many artificial barriers. Consultants doing *pro bono* work to help educational establishments should be seen by all as beneficial for learners.
- **Encourage regular liaison with appropriate industry and schools**, for example through "hacking days". Schools can take a participative role in product design and at early marketing stages.
- **Establish flexible robust partnerships** tackling the need for substantial attitudinal changes. Other countries seem better at it. In Australia the school is often a centre for FE as well as HE and such partnerships do not have to be confined to a single educational type or sector.

3.2.3 Teacher level

CPD and professional communities of practice

As professionals, teachers need to maintain their competence to practice. Traditionally this competence fell into two overlapping areas, both of which may be affected by learning technology:

- **Subject discipline** (e.g. history, chemistry) — ICT changes the nature of disciplines: whether you are an athlete, mathematician, geographer, artist or scientist in the world outside school what you do and how you do it has changed as a result of new technologies;
- **Pedagogy:** ICT provides additional strategies for supporting learning.

While there are pockets of professional practice in which teachers are sharing their expertise — through their personal learning networks and initiatives like TeachMeets[7] — the majority of teachers lack competence with ICT and are not engaging with the issues that it raises. The majority

[7] "A TeachMeet is an organised but informal meeting… for teachers to share good practice, practical innovations and personal insights in teaching with technology. These events are often organised to coincide with other educational events like the Scottish Learning Festival and BETT." Source: http://en.wikipedia.org/wiki/TeachMeet

of schools, Senior Leadership Teams and teachers are thus not able to harness the potential of ICT effectively. Consequently the most common response to the potential of ICT is to lock down the system and protect the status quo, rather than engaging with change. This is reflected, in our view, in using filters to block access to web content and banning the use of pupil owned devices such as mobile phones[8].

Participants in the SchoolsTech discussions offered several possible solutions to enhance teacher competence.

- **Teaching schools** are seen as being important in providing leadership and support for professional learning. However, there is a concern that they themselves lack the necessary expertise. Similarly, concerns were raised about Ofsted's ability to make valid judgements about the use of ICT in schools, and thus their ability to help move this agenda forward.
- **Support for teachers sharing their expertise** is important, for example, to amplify the emerging sharing practices of PLNs, TeachMeets, the Vital service[9], Naace free CPD and Award scheme [10], practitioner research and collaboration across schools/affiliations.
- **Capitalise on the expertise of pupils** — including, for example, the Digital Leaders model for supporting professional learning and extending practice in schools[11].
- **A systematic programme of CPD for all teachers**, linked to practice as well as potential qualifications and external knowledge dissemination, could be implemented.

Responding to new opportunities

Participants made a number of suggestions for how the behaviour of teaching staff at all levels could adapt to take fuller advantage of the opportunities offered by new technology.

- **More strategic** — It is necessary to identify the key indicators of progress towards goals, who is tracking them and how, what key decisions depend on it etc. Senior leadership attitudes matter and education is needed for many in this position. Just understanding the risks involved in using technology, using a standard tool would be a leap forward for many.
- **More scientific and analytical** — More effective and structured collection and analysis of data on products and choices will lead to better decisions. Teachers should have an evaluation model and guidelines for learner acceptance. There is a growing role for "Practitioner researchers" — those working in the field collecting data which forms part of a research study led elsewhere (e.g. in HE). This is good preparation for a more informed evidence driven approach to making technology decisions, which should build sustainability considerations into evaluations, make sure products acquired are well structured and will have ongoing support and need schools to be prepared to invest.
- **More collective** — Senior Leadership Teams should involve more people in making technology decisions including staff and learners as well as management and outside help (maybe from another school). They should work on getting buy-in from those who will have to make the technology work, make sure that cultural issues are considered and ensure that

[8] There was an implication in the discussion — as reflected in this paragraph — that the lack of competence evident in the majority of teachers and apparent resistance to change is 'teachers' fault'. While there may be a grain of truth in that, it may also be that the context in which teachers work means that there are too few incentives to engage with new technology. Indeed, teachers committed to engaging may face a significant struggle against 'the system' which resists their innovations. So the real challenge we perceive is how to change some of the systemic drivers which prevent teachers from engaging effectively with new technologies (e.g. accountability and assessment regimes, risk aversion, timetabling arrangements, etc). However, these issues were not directly addressed in the SchoolsTech discussion.

[9] www.vital.ac.uk

[10] www.ictcpd4free.co.uk and www.naace.co.uk/cpdaward

[11] https://www.ssatrust.org.uk/newtechnologies/pages/studentdigitalleaders.aspx

teachers with appropriate skills (ICT, media) are involved and that their involvement is recognised.

- **More collaborative —** Schools and teachers have a lot to learn from one another and should make sure that schools are well networked, know where comparators are and are in touch with the latter's decisions. Schools should be prepared to collaborate directly with another school in evaluating and purchasing if the fit is good. They should be prepared to work with others outside their sector/school type.
- **More education —** Schools should invest in education of the whole organisation in the area — teachers, managers, other staff and learners — aiming to ensure that knowledge is aligned. When introducing technology, teachers should consider changing what is done and how, including assessment techniques and content, activities, outcomes, networking, and involvement of parents.

Online resources for teachers

Just as technology opens up opportunities for more self-organised learning, beyond the classroom, for students, so it should for teachers as well. There is not one website or set of online resources that works in all contexts. The beauty of the web is the myriad tools and the potential for a teacher to be creative and choose a tool they think will enhance their teaching and/or personal learning, though

- it would be useful to have a simple and standard learning technology evaluation framework for teachers to use and make informed decisions with, and
- access can be an issue in schools where the web filter policy is strict, blocking access to forums and blogs or video streaming.

A large number of resources and sites with links to low cost tools for schools were mentioned[12]. By way of example, two websites were mentioned several times:

- Edmodo (http://www.edmodo.com) — allows teachers to post resources, videolinks and weblinks on to one site on which their students can ask/answer questions and communicate with teachers and other students (its user interface looks like Facebook, so students find it easy to use);
- PlannerLIVE (http://www.plannerlive.com) — allows teachers to set homework for each class which can be accessed by parents and students at home. It also provides a complete record of all homework activities teachers have set for every group and allows you to reuse activities with other groups or borrow activities set by other teachers.

As a caveat to enthusiasm for this approach, concerns were raised about issues associated with e-safety and intellectual property rights when using externally hosted services such as those identified above.

3.2.4 Third parties

Industry clearly could play a role in helping to make learning in schools more authentic, as well as helping with teachers' CPD. A number of different types of approaches to this were suggested.

- University Technical Colleges (UTCs) may be a good example of how industry and the public sector can provide learners with more authentic 'work' experiences.
- Make work experience more meaningful, for example through building websites for local employers and gaining recognised IT qualification in the process — linked to Getting European Business On-line (GEBOL http://gebol.org).

12 These include http://cooltoolsforschools.wikispaces.com/, http://drb.lifestreamcenter.net/cool_tools/index.htm, http://tools.e2bn.org/, http://www.northerngrid.org/index.php/component/content/article/40-news/834-edcoms-free-online-resources, https://www.o2learn.co.uk/, http://allisonxoutstream

- Extend outreach work, perhaps using video-conferencing to allow experts to engage with learners.

Industry could run competitions involving the development of solutions to real world problems, which could engage all learners. This theme of real world issues was echoed in several responses, and it was suggested that schools should focus on high profile initiatives which catch public imagination and generate large amounts of data (e.g. nationwide bird spotting). The key being that the data should be for real and meaningful purposes.

As well as industry, universities are also important stakeholders in schools education. Partnerships with representatives of both these stakeholder groups — taking Russell Group and Million+ with CBI, say — could be approached to generate the clout for public policy adoption. Naace and ALT could play a role in facilitating such partnerships.

Finally there is scope to engage educational technology publishers and providers, particularly where the proposals in this report align with their interests[13].

4. Conclusions

ALT and Naace found the SchoolsTech exercise an interesting and rewarding one. Both organisations are committed to enhancing learning through technology, and to representing their members' ideas and interests, including to government. We welcome opportunities, such as that provided by SchoolsTech, to work as catalysts and conduits in pooling the expertise and ideas for innovation in the communities that we serve.

We would further welcome the opportunity to take up some of the ideas in this report directly with schools, bodies representing and/or working with schools, or with the Department for Education, for example through:

- meeting(s) at management level to brainstorm options, and to convey our own organisations' respective perspectives on the issues addressed in this summary report;
- supporting the commissioning of work to develop selected ideas into practical initiatives;
- partnering in dissemination activities to build awareness of the discussion outcomes;
- helping broker partnerships, for example with researchers and suppliers, to take forward appropriate steps;
- highlighting the work that each organisation is doing to bring about improvements in the use of technology to support learning[14].

[13] For example, this kind of work could perhaps be linked to initiatives (like Pearson's) to change educational assessment and curriculum systems in the UK. See also section 3.2.1.

[14] Examples include the Naace 3rd Millenium Learning Award - http://www.naace.co.uk/thirdmillenniumlearningaward and ALT's Evidence-based Policy in Learning Technology report http://repository.alt.ac.uk/2213/

Appendix: Stimulus Questions provided by DFE to seed the discussion

Young people

- How is technology changing young people's expectations of teaching and education?
- How can we harness the skills and enthusiasm young people have for technology?
- How can we build on young people's informal learning through technology?
- How do we address the issue of pupils without good access to or skills in using technology?

Full introductory text at http://schoolstech.org.uk/stimulus-questions/theme1-young-people/ [archived at http://www.webcitation.org/67OIa6lYm]

Pace of technological change

- What are the most interesting recent technology developments and trends for schools?
- How can schools keep up to date with the latest technology developments?
- How can schools work with industry to offer pupils the best experience of cutting edge technologies?
- How do teachers and schools respond to new opportunities as they arise?

Full introductory text at http://schoolstech.org.uk/stimulus-questions/theme2-pace-of-technological-change/ [archived at http://www.webcitation.org/67OIcNNzE]

Teacher skills and role

- How does students having access to networked information and resources, specialist communities, and collaborative tools change the relationship between the student and teacher/school?
- Will the role of a teacher change as technology becomes more integrated into teaching and learning in schools?
- What new skills do teachers need to help children learn within a digitally-rich environment?
- What are the best ways for teachers to develop and share successful, up-to-date practice with technology?
- Will taking advantage of and adapting to changes in technology become part of what it means to be a professional?
- Do you feel worried about keeping up with the rapid pace of technology? Who / where do you turn to for help?
- Do you use a mobile device or any of your personal devices at school as well as in personal life?
- Do you ever feel out of date – or feel the need to look up what your pupils and students are talking about?
- What are the best free web tools, services and sites out there – what do you recommend to your students? Are there any problems with using these at school?
- How do you keep your knowledge and teaching fresh and up to date? Where do you go first to find answers to questions – colleagues, external experts, online?
- 'Digital natives' is a term widely used, but what ICT skills do your students already have, or learn themselves? And in what do they need help / formal teaching?
- Do you ever use external experts (programmers, designers etc) or business partners? What kind of role would you like to see experts or businesses play in the future?

Full introductory text at http://schoolstech.org.uk/stimulus-questions/theme3-teacher-skills-role-1/ [archived at http://www.webcitation.org/67OINYQRn] & http://schoolstech.org.uk/stimulus-questions/theme3-teacher-skills-role-2/ [archived at http://www.webcitation.org/67OIQ12R6]

New models of teaching and education supported by technology

- What new opportunities do digital technologies offer us to deliver education differently, and better?
- What role might online learning play in teaching and learning in the future?
- What will teaching look like in a 'mixed economy' of access to content and knowledge online, and face-to-face experience?

Full introductory text at http://schoolstech.org.uk/stimulus-questions/theme4-new-models-supported-by-technology/ [archived at http://www.webcitation.org/67OISwLms]

Authentic experiences

- What ICT skills do pupils need in order to prepare themselves for further learning and for the workplace?
- Are there particular uses of technology that need greater attention in schools to improve subject learning and routes into the professions?
- What are the best ways to use technology to deliver authentic learning experiences (for example, access to experts and environments which are not possible in school).
- How can industry and the public sector provide better opportunities for schools to use authentic experiences and information (e.g. access to genuine data)?
- How can schools work with industry to increase the offer in programming and other technical skills?

Full introductory text at http://schoolstech.org.uk/stimulus-questions/theme5-authentic-experiences/ [archived at http://www.webcitation.org/67OIWHZbn]