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# A Summary for Busy Heads

*“Other sectors have moved faster than education”*



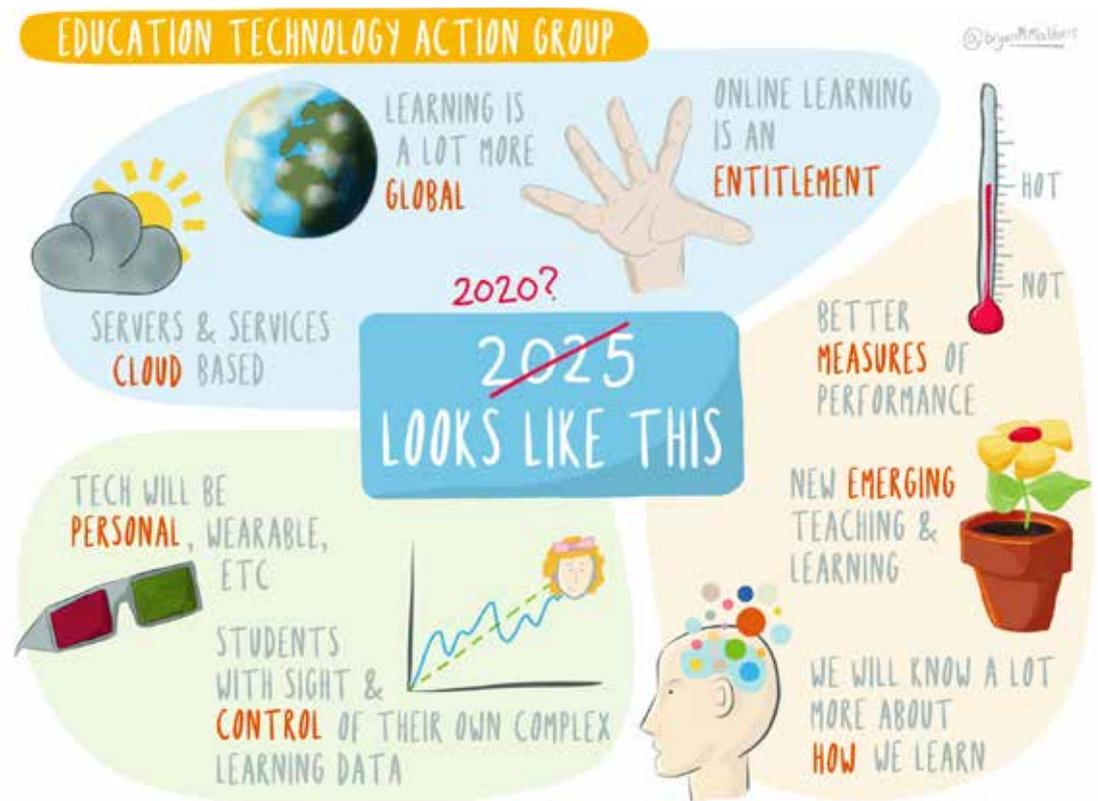
## “There are significant gaps in most schools’ data systems...”

### **Education is moving into a remarkable decade, 2015 - 2025:**

- > A combination of new technologies, better understanding of the learning process and shared global innovation in education mean that we face the certainty of uncertainty with a constancy of change, going forwards. Tomorrow certainly doesn't look like today.
- > Making the best of the fresh opportunities, whilst manoeuvring around newly emergent dangers, needs much, much better data and creative algorithms.
- > As with health, sport and much more in our lives, the ownership of that data, and the way we respond to it, lies increasingly with the individual - whilst institutions need to consider aggregates and trends - the vectors and velocities of change.
- > Management Information is for everyone.
- > There are significant gaps in most schools' data systems - the schools that address the gaps, empower their learners with their data, and harness that data to make learning better, will be the ones who progress most effectively.
- > This is not scary, it is exciting, but you can't ignore it.

## Data Elsewhere

“When we have it (information), we often don’t use it”



### Data Elsewhere

Some other sectors have moved faster than education in harnessing data. In the last century visiting a doctor was often rather mysterious. They would assess and analyse your various indicators of wellbeing before offering a reflection: “it’s not good I’m afraid”, or “have you been like this for long?” Of course the poor patient only had a single point on a curve, had little sense of the steepness, or rate of movement, of the curve. They were simply informed by an opinion, or sometimes a second opinion. **Today things are very different - patient data transparency empowers them to make the right health and care choices themselves, day by day.** The 2015 NHS strategy paper “Personalised Health and Care 2020: Using Data and Technology to Transform Outcomes for Patients and Citizens” embraces this, suggesting a series of new data proposals that: “can give patients and citizens more control over their health and wellbeing, empower carers, reduce the administrative burden for care professionals, and support”. The NHS is currently committed to giving citizens “full access to their care records and access to an expanding set of NHS accredited health and care apps” to enable this still further.

**And in parallel to this top down liberation of data, technology providers are already offering real-time data from wearable devices to support it bottom up.** Apple’s 2015 watch features some 24/7 health monitoring for example with more to come in subsequent versions.

It is, of course possible to substitute an education context for the health one. This is what will certainly happen rapidly. Students knowing where they are in their learning relative to others, making the right choices themselves, schools enhancing public trust through transparency, complex real time personal data, better data generating better research and expanding our understanding... and so on. **Education has been slow to move on the information front,** perhaps because



# What we don't know that we know

we have been wrestling to attain just a very few naive targets for inspection and tables. **This is changing rapidly; be ready for it.**

The Education Technology Action Group, ETAG, set up in February 2014 by the then Ministers Gove, Willetts and Hancock in February 2014 produced a swathe of sensible policy recommendations for schools, universities, colleges and business (<http://etag.report> - do find a moment to read its detail) but began with an agreed starting point gleaned from a lot of white papers, horizon scanning and good experience: the starting point was the clear view that **by 2025, or perhaps even 2020, three significant changes would impact on schools, colleges, universities and corporate learning**, which would then guide everyone's policy going forwards; it has enjoyed broad cross-party support. Those three things are illustrated above.

In particular, in the context of this paper, the consensus that **we will have better emerging measures, whilst at the same time the technology itself will largely be owned by the students** rather than by the institutions, both stand out as significant to schools' data futures.

## What we don't know that we know

Learning is hugely complex. The only place that most communities have substantial, post graduate qualified teams, is in our schools. **Schools are in every sense the beating intellectual heart of our communities.** So it is disappointing that our measures of

effectiveness, and our management data are both so poor in 2015. As a result, a lot of what we do in schools is simply convenient rather than optimal. **We don't yet have the information we need to do better.** When we have it, we often don't use it. Food is an interestingly indicative area to explore here: the timing of a school lunch break is generally fixed and bears no relationship at all to the individual learners' needs. We feed the students when the food is ready, rather than when they are ready to eat. Some will have enjoyed a substantial breakfast, or grazed on their way to school, others will have been distracted with hunger by mid morning having not eaten since the previous evening. Not only do individual needs vary, but they vary day to day too.

Consider the data surrounding nutrition and sport; an athlete in any sport would have a precise understanding of their nutritional requirement and the impact of various meal options on their performance. Contrast that with the complete lack of current research on the ideal food to precede an examination. What pre-exam breakfast would optimise recollection? resilience? concentration? confidence? What diet would be optimal to each individual in the exam and test season? Education doesn't know (yet), but sport would know precisely what was needed before a major event. Data drives that knowledge.

Another example: Students in many schools (for some countries it would be in all schools) are bringing their personal devices - phones,

*"We can quickly learn from what others discover"*

*"We can certainly build better learning with (our children)"*



# What we don't know that we don't know

*"Better data takes the politics out of funding"*



tablets, wearables - to school and using them to learn. Those devices clearly also know the route and pace of every child's journey to school. Elsewhere, apps take advantage of this to map and evaluate runs, cycle routes, ski adventure and more. Yet we are not currently able to aggregate that school journey data or to use it to make better learning.

If a school declares that Wednesday will be a Discovery Day, a day of immersion and of project based, mixed age work, and on that day the children come to school faster and stay longer, we would have learned something important about engagement. We will value and harness this kind of data soon and the children will see their own data against others, worldwide. They will have their own individual algorithms of good learning of course; each child is unique. When, as part of a research project, we asked students for indicators that their learning on a particular day was exceptional; one said "that would be how fast I eat my dinner" because **he knew that on a really good learning day he would eat fast to get back to work!**

## **What we don't know that we don't know**

Alongside the data that we have, but haven't yet been able to access (like the journey to school data mentioned above) we also have important data that we simply didn't know mattered.

As part of our Learnometer research project ([www.learnometer.net](http://www.learnometer.net)) we have been looking at the physical environment data from school buildings. Knowing that in office environments a minimum lux level for conversations would be around 250 lux, whilst for close work like typing and writing it would be above 450 lux we started

exploring. Similarly we had good research data on noise, on CO2 levels, on humidity and more. To our horror every examination / test room we have looked at so far has been profoundly sub-optimal. Light is damagingly low, CO2 builds throughout the examination / test, because doors are shut and there are a lot of children. Often a gym is chosen, but very few gymnasiums have good clear windows and they have very few doors or sound absorption either. **It seems a tragedy that colleagues work so hard to move grades up by quite small amounts, yet simply improving the environment is likely to have a significant gain immediately.**

In one school we explored two traditional classrooms that had disappointingly low light levels - because they had an interactive whiteboard which needed blinds - whilst the CO2 levels were damagingly high for proper concentration. The school immediately made changes, leaving the class doors open by default, they ventilated the room and abandoned the IWB and the blinds. It was a much better space for learning, but when they went back to the schools MIS data they saw that the two teachers who spent most time in the rooms had amongst the highest rates of staff absence, and most of the bottom decile group of children ranked by how well they hit or missed their incoming predicted grades, had spent the most time in that space. **The school had thought the children's performance had been linked to staff absence but in fact both variables had been worsened substantially by the physical environment.** That was quick and easy to fix.



# Correlations, Spurious Correlations and Big Data



costs, more employment reduces benefit costs, property values rise (worldwide the “good school” premium is around 40%) with gains for householders and local property tax revenues, litter and vandalism are diminished, internal training costs of local employers fall, businesses are drawn to the area. As time passes everything from parenting to employment improve and tax revenues step up still further.

But none of these financial gains yet return directly to education. The police don’t offer to fund a new school minibus with their reduced patrol car costs; householders selling their more valuable houses don’t post a contribution of a few thousands to the PTA fund, and so on. A significant part of the problem is that schools don’t have the data, yet, regarding their impact of the community around them, let alone of the broader economy. Without that data it is hard to track - or reward - education’s contribution. In 2015, a look across from schools to the university sector sees students focussing long and hard on future income streams, and weighing them against fees, looking at contrasting employment data from different

universities and generally making their own choices in a quite sophisticated way.

Better data takes the politics out of funding, and recognises real progress.

## Correlations, Spurious Correlations and Big Data

One of the surprises about Big Data in other sectors is that the hunt for causality seems to have diminished. There are many examples, of course, of Spurious Correlations. For example the website <http://www.tylervigen.com> offers an amusing but compelling graph showing the rates of divorce in Maine and margarine consumption tracking each other remarkably closely over almost 10 years. Often of course these are simply amusing coincidences: margarine does not cause divorce (hopefully). Or it may be that two unlikely variables moving together ignore a more important “lurking” variable. For example the relationship between hair length and excellent grades might be true because of the impact of gender on hair length. Growing your hair longer won’t improve your grades per-se.

## In conclusion



However, increasingly, when we have very large amounts of data, some authorities suggest that the causality doesn't matter so much if all you need is early warning. As we start to look in detail at the mass of data needed to build better learning, it may sometimes be simply enough to know that one variable is moving because, for whatever reason, the other variable seems to follow along behind and that helps us make decisions. Just looking at one variable tells us very little, as you will remember in the debate about GCSE English grades inflation / improvement recently: what if grades had increased because students were texting far more and auto-correction had cured their spelling and grammar errors? Or if the impact of youth unemployment meant that as a cohort they worked harder? **In short a lot more data is helpful**, sound numeracy in approaching it is helpful too.

### In conclusion

For schools it is clear that numeracy in the senior management team, with a good grasp of algorithmic thought, it is an important part of managing information and harnessing it to making learning better. And precisely the same sentence might apply to the students too.

It is also clear that good external MIS partners will provide the link to the complex detail of others' performances that we need to optimise our own.

We are entering a brave new world, but it is a world where learning might become substantially better, where we can justify (or improve!) our funding, and where **our children can go out into the world, armed with the capability to learn better, throughout their lives.**

This is set to be quite a decade!

## About Stephen Heppell



Stephen's "eyes on the horizon, feet on the ground" approach, coupled with a vast portfolio of effective large scale projects over three decades, have established him internationally as a widely and fondly recognized leader in the fields of learning, new media and technology. Formerly a school teacher, Stephen has worked, and is working, with governments around the world, with international agencies, Fortune 500 companies, with schools and communities, with his PhD students and with many influential trusts and organizations.



## About Advanced

Advanced provides management solutions, Facility and Progresso to schools around the world. By basing its solutions on the latest cloud technology and appreciating the ever-changing nature of education, it works with its customers to deliver systems which are primarily focused on learners and improving outcomes for them.

To get an insight into this approach and to learn more about the work Advanced is doing with some of the UK's leading schools, please contact us on 0330 060 2199 or [Advanced](mailto:hello@oneadvanced.com).  
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