Remote Learning & The Cloud

Introduction

At the time of writing (September 2020) schools around the world are grappling with the COVID-19 pandemic and what this means for teaching in a "socially distanced" world. Over the last six months schools have been closed, teachers have worked hard to continue to educate their students, provide limited "on-site" teaching for the children of key workers, and plan to re-open fully and safely. It is very likely that this academic year will continue to see major disruption in schools. We may see, for example, smaller class sizes, part-time schooling, local closures in the wake of COVID-19 outbreaks, etc.

Remote learning provision will be critical for schools if they are to offer a full curriculum to their students despite these challenges. The DfE guidance (02/07/2020) on school planning for their full re-opening in September 2020 explicitly refers to the need for remote learning to support those pupils who cannot come to school or where there are local closures.

In any case the existing trend from local to "Cloud based" systems is likely to accelerate. As businesses consider making much greater use of home working, remote access, and video-conferencing schools will, inevitably, place much greater reliance on technology to enable students to learn at home when they are not in school.

Even before COVID-19 the trend towards greater use of digital education platforms and other online tools was clear. Many schools use either Google's **G-Suite** or Microsoft's **Office365** to manage (at least in part) their pupils' learning. Both these packages offer a range of standard software as well as tools for managing and tracking the attainment of groups of pupils in "classrooms". They also provide methods for other packages to be integrated into the overall user experience.

Greater use of these online tools has already had an impact on the data profile of school broadband connections. While, a few years ago, pupils accessed the internet sporadically (e.g. to watch a specific video, or search for information online) the tendency now is for students to be almost permanently connected to their schools' digital education platform where they use tools online that, previously, were installed on a local server or on their computer. The increasing popularity of Chromebooks has exacerbated the issue. Schools and Local Authorities are, in the main, aware of this and regularly increase their bandwidth to cope with the growing demand.

What is more concerning is how a rapid increase in remote learning will impact on pupil's ability to continue their education remotely. Children in better off families will often have

good broadband at home and their own laptop, but many in poorer households will not. This has been recognised by government in their scheme to provide disadvantaged pupils with laptops and 4G routers (see here). However, if the definition of "disadvantaged" is eligibility for the Pupil Premium, then many children, who may have very limited access to the internet, will be unable to benefit from this scheme. The availability of a suitable device - be it a desktop, laptop or tablet - at home with good broadband is crucial in order to participate fully in online activities.

This guidance offers explanation, advice, and pointers to further information, support, and resources for schools preparing to move further into remote learning (and cloud computing more generally) but does not attempt to address the wider societal implications of a far greater use of *remote* learning (as opposed to just *online/cloud-based* learning).

See also: https://nen.gov.uk/advice/remote-learning-a-beginners-guide/

What is "The Cloud?"

There are multiple definitions and flavours of "The Cloud" (Public, Private, Hybrid (see here)), but Cloud services can be divided into two major areas, **Software Services** and **Hardware Services,** each with the following features:

- (Self Service) The customer signs up online, activates, and uses the hardware and software from start to finish without phoning a provider to set up an account. Of course, tech support is available if necessary.

- (Scalability) Additional servers can be quickly configured to process more data or to handle a larger, temporary workload.

- (Speed) Major cloud providers are connected to the Internet via multiple Tier 1 backbones for fast response times and fault tolerance.   (From PC Magazine)

For the individual school (as opposed to a Local Authority or large school Trust) the major advantage of the Cloud comes from utilising Software Services. As much of the configuration and update management will be undertaken by the provider, moving software to the Cloud will, usually, reduce both the number of servers in the school and associated support costs.

More of the critical services used by schools are being delivered via the cloud where applications and services are hosted remotely and accessed over a broadband connection rather than being installed, managed and run locally. Hosted services and data can be accessed "anytime, anywhere" and from any device.

Services provided via the Cloud range from simple file storage (e.g. Dropbox), to educational course delivery (e.g. Moodle), school management systems (e.g. SIMS) and what can loosely be described as user services including Office365, web-based email and GoogleApps. In this context "available online" and "in the Cloud" can be considered to be synonymous.

In addition to these "traditional" Cloud services, there are new ones appearing which have previously been core local network services: for example firewalls, anti-malware and anti-virus software, and web-filtering.

Services currently delivered locally (e.g. local file servers, Moodle installations, SIMS, etc.) can often be migrated to the Cloud: the decision on whether to do so in any particular case will depend on the answers to a few key questions:

- is my data secure?

- is the provider stable (i.e. is it likely to survive in the long term)?

- can I extract my data to move to another provider (i.e. will I be "locked in" to this provider)?

- what is the cost/benefit of using, or moving to, a Cloud based system?

- are the facilities identical in both the local and online versions?

As part of the cost/benefit analysis it should be remembered that Cloud services can place a significant load on a school's broadband connection, both downstream and upstream. This is particularly the case in larger schools where many pupils and members of staff are likely to require concurrent access with a stable connection. Connection reliability is paramount as losing the broadband connection means that you have no access to any Cloud services - and teaching time lost can never be regained.

The COVID-19 crisis adds a further consideration when moving to remote learning - the availability of good broadband access and appropriate devices in students' homes. Without these students will be unable (or, at the very least, less able) to take full advantage of any online materials provided.

Cloud Computing

PROS ✓

Flexibility - anytime, anywhere, any device.

Disaster recovery - sophisticated backup and data distribution reduces risk of loss of data.

Automatic software updates - all software kept up to date by service provider.

No Capital expenditure - subscription is most common payment model

Increased collaboration - pupils can collaborate with others in the school.

Work from anywhere - work at home, in school, on holiday!

Cyber Security - suppliers will employ a high level of security

Document control - most systems have document revision control.

Compliance with local data laws (GDPR) - providers should be compliant with the data privacy laws.

"Zero-knowledge" - encryption of all data stored.

Environmentally friendly - limited number of efficiently managed data-centres "greener" than every school having its own.

CONS ✗

Data Security - Data is not under the complete control of the customer.

Provider stability - if a provider fails or shuts down the service data may be lost.

Internet connection - critical service. Any failure will prevent staff and students from working.

Home Broadband - the quality of Home broadband is critical

Provider "lock-in" - it may not be possible to move data from one provider to another.

School Management

Managing a school is a complex undertaking generating a large amount of sensitive data which is, in the majority of cases, stored in an MIS (Management Information System). The most common MIS within UK schools is Capita's SIMS software but others do exist and have a similar range of functionality.

Not every school uses a single, monolithic MIS. Some choose to use a range of providers offering various elements of the school's management requirements. For example, an attendance registration system may be a separate product which integrates with the central MIS.

For the purposes of this guidance we will use the term "MIS" to cover both single-supplier systems and a collection of independent systems which, together, provide the school's management tools.

Data stored in the MIS is both critical to the running of the school and confidential. It will include, among other things, financial data, parent details, pupil data (possibly including photographs and medical records), timetable, free-school meal eligibility, exam results, academic progress, etc. All this information must be kept secure and confidential.

As the performance and reliability of schools' broadband connections has increased over the years supplying MIS software as a remote, secure, encrypted, service has become possible. Schools can now access their data from a Cloud based server just as easily and securely as from one located in the school itself. This has the benefit of taking a complex, and critical, piece of software/hardware out of the school and into a secure data centre where it can be maintained and backed up. Clearly, this will reduce the overall IT technical support burden on a school, trust, or LA.

As noted above there are *cons* and well as *pros* but, overall, moving the MIS to the Cloud is likely to be a net benefit.

Teaching and Learning

Many of the same advantages of the Cloud for school management also apply when considering teaching and learning. Schools with a suitable broadband connection (see the NEN Guidance on broadband purchasing and requirements here) can use the wide, and ever increasing, variety of Cloud based applications and services.

Indeed, many schools will already be using some Cloud based services like, for example, Dropbox for sharing files, or saving videos on Vimeo or YouTube, using Zoom for video conferencing, or sharing music files on SoundCloud. These are all services developed originally for the general public or business users which provide very specific, narrowly focussed, services.

There is also a range of tools - Learning Management Systems, or LMSs - for developing and managing the delivery or courses to students. Some are purely Cloud based while some, like the popular Moodle LMS, can be also be installed locally or in the Cloud. See here for one view of the best LMSs of 2020.

It is possible to pull these services together into a single, overarching **Digital Education Platform** - the most popular being Google's **G-Suite** and Microsoft's **Office365 -** which can provide a single point of entry to a range of third party tools. This allows schools to retain the ones staff and students are familiar with, while still moving to a fully integrated Digital Education Platform with a single interface.

In addition to providing their standard range of online software (i.e. MS Office, GoogleApps) both G-Suite and Office365 have tools for managing students' learning and interaction with staff, and attempt to digitally replicate the classroom.

As part of the DfE's response to the COVID-19 pandemic funds are being made available for schools who want to move to either G-Suite or Office365. For more details about these platforms and how to apply for funds go to COVID-19 tab on the *TheKey for school leaders* website. There is a particularly useful page here which sets out a feature by feature comparison between the two platforms which should help in decision making.

Remote Learning

The COVID-19 pandemic has forced schools to think more about the role remote learning could play in their educational mix. The term *blended learning* is generally applied to this combination of face-to-face and remote, computer mediated learning. While the term has come into common usage there is no agreed definition. Wikipedia offer this definition which is quite unwieldy. Two other, less verbose, definitions perhaps more accurately characterize it in the current, COVID-19 influenced, context:

Blended learning (also known as hybrid learning) is when traditional classroom teaching is combined with online learning and independent study, allowing the student to have more control over the time, pace and style of their learning. (Source: University of Leicester)

and

Blended learning provides a combination of face-to-face learning and dynamic digital activities and content that facilitate anytime/anyplace learning. (Source: JISC)

Many schools will be doing elements of blended learning already within the school, often with the teacher in a supervisory/mentor, role. Remote learning is about taking this one step further and setting the expectation that students will do a far larger proportion of their learning at home without direct teacher intervention.

As noted above the two major Digital Learning Platform (Google's **G-suite** and Microsoft's **Office365**) offer a range of tools for the management and delivery of online, educational content. They are designed for school use and integrate with the school's authentication system so that users are still within their "class" whether they are in school or at home.

In addition to the financial and installation help from government noted above the [Guidance for full opening](#) in September 2020 (released 02/06/2020) acknowledges the important of remote provision in both in *Section 3: Curriculum, behaviour and pastoral support* and *Section 5: Contingency planning for outbreaks*. The general scientific consensus is that we will be living with COVID-19 for some considerable time and that sporadic outbreaks of COVID-19 are likely to occur requiring limited, local "lockdowns" and full or partial (e.g. a whole year-group or "bubble") school closures. Individuals will also continue to be infected and required to self-isolate for 14 days. In both these scenarios (school closure and personal quarantine) schools' ability to continue providing quality education will be crucial.

The DfE's guidance states that: "*Remote education may need to be an essential component in the delivery of the school curriculum for some pupils, alongside classroom teaching, or in the case of a local lockdown. All schools are therefore expected to plan to ensure any pupils educated at home for some of the time are given the support they need to master the curriculum and so make good progress.*" (Section 3).

When planning support for their pupils who are self-isolating, and how to cope with full or partial lockdowns the guidance has two key expectations:

"*For individuals or groups of self-isolating pupils, remote education plans should be in place. These **should meet the same expectations as those for any pupils who cannot yet attend school at all** due to coronavirus (COVID-19).*" (Section 5, our emphasis).

and

"*Where a class, group or small number of pupils need to self-isolate, or there is a local lockdown requiring pupils to remain at home, **we expect schools to have the capacity to offer immediate remote education**. Schools **are expected to consider how to continue to improve the quality of their existing offer and have a strong contingency plan in place for remote education provision by the end of September**. This planning will be particularly important to support a scenario in which the logistical challenges of remote provision are greatest, for example where large numbers of pupils are required to remain at home.*" (Section 5, Remote support, our emphasis).

This [NEN guidance](#) is a useful starter for those beginning their remote learning journey. There is also advice on [TheKey](#) (see [here](#), for example) and the [EdTech](#) websites, including case studies at both Primary and Secondary level.

Other Tools

G-suite and Office365 provide many online tools as standard components: office software (word processor, spreadsheet, graphics, presentation, etc.), file storage (GDrive, OneDrive), and Video Conferencing (Google Meet and MS Teams). However, schools may still want to use other online tools as well - some as alternatives to the standard ones, others that are not provided by these platforms. For example, Zoho offers an extensive suite of office software which integrates with both G-Suite and Office365.

As the speed and reliability of broadband provision in the UK (for home, business and education users) has improved there has been a burgeoning of online tools. Many of them in areas which previously needed software installed either on the PC itself or, sometimes, on a local server. While there are still some benefits from local software - mainly to do with performance when handling large files - the migration to cloud based software is a trend set to continue as broadband provision improves further.

When software moves online then so, of course, do the files. As COVID-19 forces the move to blended learning this is a major advantage as they are just as accessible from home as school.
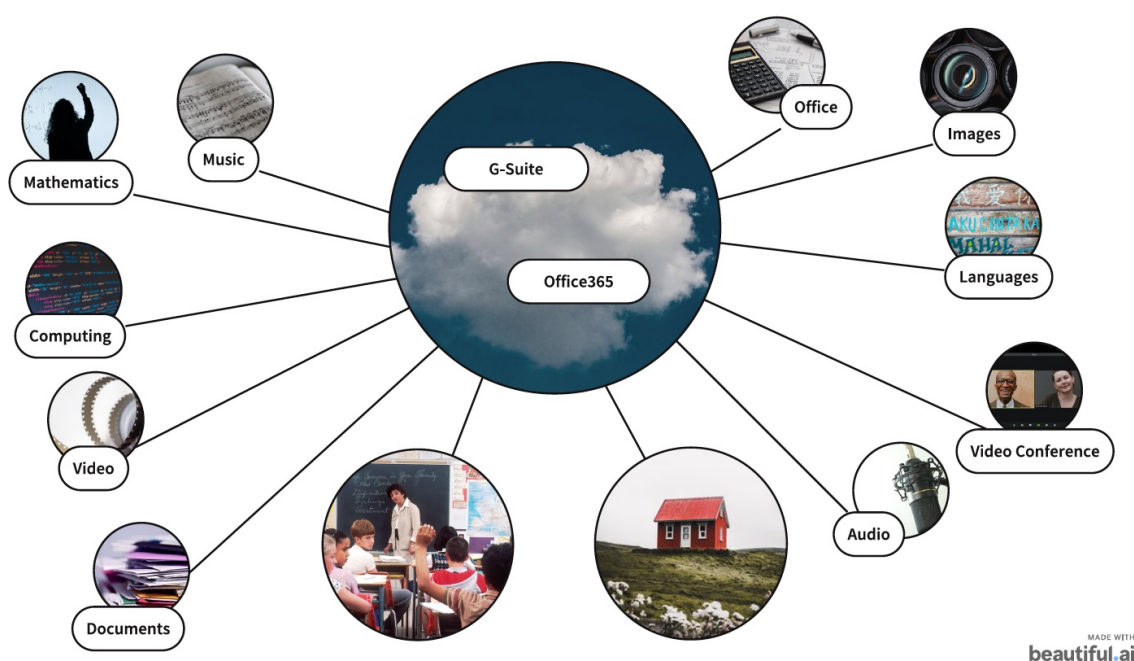
A Selection of Online Tools

This following selection is neither comprehensive nor a recommendation but gives some idea of the range of online tools available. Some are designed specifically for schools while others are general tools originally designed for business or the general public. It is almost certain that whatever subject you care to think of there will be tools available online that you will find useful for class or remote teaching.

Office Tools (writing, spreadsheets, presentations, etc.): the standard office tools are all available in G-Suite and Office365 but there are alternatives, including [Zoho](#).

Video Conferencing/Webinars: two alternatives to Google's Meet and Microsoft's Teams are [Zoom](#) and [Zoho's Meeting](#).

Document storage: Some alternatives to GDrive and OneDrive are Dropbox and pCloud.

Image editing and storage: Select an image from their library, or upload your own, and edit online. Some editors are just for photographs, others include graphics as well. Two examples are https://www.online-image-editor.com/ and https://pixlr.com.

Video editing, storage, and streaming: create a video from a template, select from a library of online clips or upload your own. The browser based editor lets staff and students produce well constructed videos to share and download. Some also cater for live streaming. Examples: https://vimeo.com, https://spark.adobe.com, https://biteable.com

Audio editing, storage, streaming: audio files can be saved on any of the cloud storage services but [Soundcloud](#) is dedicated to the storage and streaming of audio files. Used by many musicians to promote their music is can also be used by schools to store and share their own audio files. For online recording and editing try https://twistedwave.com/online or the online version of [Audacity](#).

Programming/coding: there are any number of online sites for computing and IT, from computing forums (e.g. [https://stackoverflow.com/)](https://stackoverflow.com/) to documentation ([https://docs.python.org/),](https://docs.python.org/) technical tools (like [https://regex101.com/,](https://regex101.com/) [https://coding.tools/regex-tester)](https://coding.tools/regex-tester), and sites teaching coding (https://www.codecademy.com/, https://scratch.mit.edu/, https://www.sololearn.com/).

Mathematics: three popular and extensive mathematics sites for schools are [https://www.mymaths.co.uk/,](https://www.mymaths.co.uk/) [https://hegartymaths.com/,](https://hegartymaths.com/) and https://integralmaths.org/. Mathematical notation software (LaTeX) is also available online ([https://www.overleaf.com/,](https://www.overleaf.com/) for example). You can also share a Whiteboard with remote students using https://whiteboard.fi/.

Music Composing/Scoring: there is wealth of material online for teaching music from online instructional videos to music notation software. Both https://www.noteflight.com/learn and https://flat.io/en-GB provide online notation software suitable for all ages with sharing and classroom tools. Musescore (https://musescore.org) is a downloadable notation software package (OpenSource, free) which has community site for downloading and sharing scores.

Languages: another area with an array of popular online tools. Probably the most well-known for school use is www.rosettastone.co.uk/ but there are many others (often feee) that can be used on an individual basis by teachers or students including https://www.duolingo.com/, https://www.yabla.com/, https://languagesonline.org.uk/, and https://uk.babbel.com/. And, of course, there are both Google and Microsoft's various translator offerings.

Summary

The COVID-19 crisis has accelerated the trend towards online, cloud-based teaching and management. Schools already using digital education platforms, like G-Suite and Office365, have had to rely on them to provide education support for their students stranded at home. Many schools that had not previously embraced such tools found themselves with a steep learning curve as they installed and began to use them. Government support has been made available for schools to install and configure either G-Suite or Office365. For September 2020, when schools are expected to fully open, the DfE expects schools to be in a position to support any pupils noy physically in school and to "*plan to ensure any pupils educated at home for some of the time are given the support they need to master the curriculum and so make good progress*".

For some, the Video-conferencing solution Zoom suddenly became the only means of face-to-face contact with the majority of pupils while they built up their online resources.

This sudden emphasis on online, blended learning has proved difficult for many schools with both it's limitations and benefits. Schools with limited IT support, and many disadvantaged pupils (often with little home internet connectivity or suitable devices to access it), in particular, have found it very difficult to provide the support and education their students deserve. There is a limited government scheme to provide devices to disadvantaged pupils which will provide some help. With educational disruption likely to continue for time months yet, the advantages of Cloud based systems and remote leaning are clear if access limitations can be addressed.

Platforms like G-Suite and Office365 can provide a single interface to a range of software - both their own and third party's - and a rich environment for managing students' learning by, for example, tracking progress though a course.

Some examples of online tools in a variety of generic and subject specific areas is included: this is not a complete list nor does it imply any recommendation but does show the huge range of tools available for education at all levels.