

Education and Health Standing Committee Inquiry into Digital Innovation in Secondary Education

Department of Education submission

Purpose and rationale for Digital Innovation in Secondary Education

The Department of Education is committed to ensuring students are confident and adaptive users of technology to prepare them for the learning, social and employment opportunities of the future. This includes developing in students skills for emerging industries and technologies including teamwork, problem solving, creativity, independent thinking, critical analysis, initiative and communication.

Digital systems are everywhere. Mobile and desktop devices and networks are transforming learning, recreational activities, home life and work. Digital innovation supports new ways of collaborating and communicating, requiring new skills such as computational and systems thinking. Technology is changing the way students learn, connect and interact every day.

Digital innovation mindsets enhance student learning and improve the educational experiences of students. This includes drawing on Information and Communication Technology (ICT) to:

1. improve student access to educational content, regardless of their physical location;
2. address engagement and retention;
3. support equity of opportunity for all students; and
4. cater for students with different learning styles.

Teachers draw on a body of professional knowledge and research to respond to the needs of their students within their education contexts. They use ICT to contextualise and expand curriculum learning opportunities.

School leaders play a critical role in driving high-level teaching practice among their teachers. The Department is supporting schools to develop a culture of meaningful digital innovation and online learning, recognising that young people need to be highly skilled in the use of ICT.

How digital innovation can assist secondary students to learn anything, anywhere, anytime.

One of the most powerful benefits of digital innovation in secondary education is the opportunity to expand student access to education, regardless of the physical location of their teacher. ICT creates opportunities for both synchronous and asynchronous learning, which was previously inaccessible because of distance. This can include access to a dynamic range of resources, including video lectures and virtual classrooms, linking students with mentors, teachers and peers all over the world.

Connect, Office365 and WebEx provide an integrated online environment to all public schools. They enable online communication, collaboration and learning for students and parents. Through the Department's online teaching and learning platform, Connect, students can engage in learning anytime, anywhere and on any device. In Term 1, 2019, approximately 34 000 online classes were activated, providing online learning opportunities for over 81 000 students.

Regardless of location, teachers can provide students with access to learning content, assessments, feedback and class notifications, and students can collaborate with their peers through online classes. Parents also have secure access to their child's online classes and additional system information, including attendance, assessment outlines and student reports.

Schools have indicated that, through learning management systems such as Connect, many students, particularly in senior school, contact their teachers, peers and other experts outside the school day seeking feedback and support with their work. Students are also encouraged to share their learning digitally, which can improve metacognition and critical self-awareness.

The School of Isolated and Distance Education (SIDE) is the Government provider of distance education in Western Australia, offering a comprehensive curriculum for Kindergarten to Year 12 students. Online delivery through SIDE is the primary and preferred medium for students and occurs in two forms:

- asynchronous, 24/7 access through a web-based portal to deliver curriculum materials and facilitate student and staff collaboration online; and
- synchronous, via the Department's WebEx web-conferencing platform.

With guidance from SIDE teachers, students are enrolled in relevant courses and coached through eLearning resources and live lessons. They also upload their work to be marked by their teachers.

Technology has the capacity to create opportunities to connect students globally. An example of this global connection through digital technology is Merredin College, where students have access to virtual reality headsets, which enables virtual access to classrooms, video resources and virtual excursions anywhere in the world; for example, the school links with NASA. Through the Western Australian Curriculum, students can use digital technologies to explore examples of technological and infrastructural advances from across countries like China, Korea and Japan.

Students are supported to learn anything, anywhere, anytime through the Bring your Own Device (BYOD) approach. Schools can choose to implement a BYOD approach after consultation with their school community. The choice of device, contribution model and management of the devices is at the school's discretion. BYOD approaches are complemented by access to school-owned devices, particularly for students whose family may not be able to afford a device. To maximise the outcomes of the BYOD model, schools develop and plan strategies to encourage staff to meaningfully integrate technology into their teaching and learning programs. The Department has made a range of resources and guidance documents available online to assist schools to make informed decisions around the adoption, implementation and support of a BYOD model. Currently, approximately 194 schools have reported having a BYOD model in place or planned.

An example of the BYOD model in action is Butler College, an integrated site school with mainstream students and those with special educational needs. This integration has made it possible for the teachers and students to access a wide range of online resources and present content in diverse and engaging ways. Butler College has a BYOD program and the school has a defined focus on the use of ICT integration and online Connect classrooms. Students are constantly encouraged to use their devices both in and out of the classroom to enrich learning.

The role of digital technology in addressing secondary student engagement and retention.

The Department prioritises student engagement and retention in all Western Australian public schools and maintains high expectations of success for every student. There is a growing body of research suggesting that the use of ICT in classrooms can enhance student motivation and engagement in learning.

Many students have online identities and enhanced digital skills that can be leveraged by teachers in program, unit and lesson design. This may lead to improved engagement and retention. For example, ICT has been harnessed in Butler College's STEM program. ICT integration has provided access to a wide range of online STEM resources, including videos, interactive surveys and quizzes. Teaching staff have commented on how student engagement has improved through their gamified projects.

At Meekatharra District High School, a previously disused Design and Technology workshop has re-opened due to the accessibility of live video conferencing tools. A teacher from SIDE in Leederville is now able to conduct the class and converse with the students in real time, with supervision being provided on-site by the school. Previously disengaged students demonstrate consistent attendance and are developing hands-on skills.

Project-based learning, incorporating the outcomes and strategies from the Digital Technologies curriculum, has been adopted by a number of schools and gives students a sense of purpose. Students who are able to devise their own unique solutions to problems through exploration are more likely to be actively engaged in a task. They are more likely to explore their own strengths and weaknesses, and those of the group.

In addition, digital learning portfolios are a useful tool to record student learning and progress. These are particularly useful where students move between schools. Similarly, digital learning portfolios provide a useful evidence base for students who leave secondary school without any other formal qualification.

How digital innovation can increase equity of opportunity in secondary education.

Many students with disability are able to achieve educational standards commensurate with their peers, as long as the necessary adjustments are made to the way in which they are taught and to the means through which they demonstrate their learning. ICT can often be an important tool for students with disability or special learning needs.

For example, through the Schools of Special Educational Needs, tailored equipment may be provided to identified students with a high level of functional educational need due to their disability. The School of Special Educational Needs: Sensory (SSEN: S) supports a range of assistive technologies for students with vision impairment, including screen reading and screen magnification software, braille computers and video magnifiers. Additionally, SSEN: S is investigating the software available to support real-time captioning in classrooms to enhance access to the curriculum for students with hearing loss. Consulting teachers also support students and teachers to use and troubleshoot with technology, for example Office 365.

In addition, professional learning is facilitated through the School of Special Educational Needs: Disability for teachers in the use of a range of tools to support literacy and numeracy (WordQ 5, WordShark 5, Co-Writer, Clicker, Snaptyping Pro and NumberShark); and communication (Pragmatic Organisation Dynamic Display books, gaze, speech devices with switching systems, C-Reader pens and iPads with inbuilt universal design aspects and accessibility options such as screen readers, predictive text and reading view).

All students need the skills required to embrace a technological future. As part of the State STEM Strategy, the Department is providing STEM professional learning and mentoring to low socio-economic public schools. This initiative breaks down barriers to ensure that everyone has the opportunity to participate in a STEM future.

Technology increasingly helps overcome distance and isolation. Whether studying through SIDE or one of the Schools of the Air, students have access to the same learning opportunities, and follow the same Western Australian curriculum, as those attending full-time school. Staff in these settings are skilled in providing tailored learning programs to cater for individual learning needs.

The potential for digital technology to cater to the needs of high performers and at-risk learners in secondary education.

Teaching and learning with technologies provides educators with additional opportunities to stimulate learning for students with different learning styles. For example, Connect classes give teachers access to an online suite of multimodal resources they can pass on to students to use at their own pace.

Virtual learning environments, mobile technologies, online games, simulations and virtual worlds are seen to offer students and teachers the capacity to personalise students' learning opportunities beyond those offered in the traditional classroom and to put students in control of the pace of their learning. Schools use rich multimedia resources to gain access to interactive educational materials that allow students to form a deeper understanding of content. For example, the Minecraft for Education application provides a virtual platform where a range of concepts can be explored, taught and experienced in a gamified manner.

Students can also use digital content to learn in a more personalised format that allows them to focus on their individual ability and learn at their own pace. Adaptive learning allows for the delivery of custom learning experiences that address the unique needs of students through 'just in time' feedback, pathways and resources. This prevents students becoming disengaged with content that is not suitable to their level of understanding. Blended learning programs are used by teachers Australia-wide to allow students to learn independently or competitively, with instant feedback reports given to teachers for accessible use.

To cater for primary-aged students on individual education plans, Cloverdale Education Support Centre has developed cross-curricular lesson plans, which fully integrate digital technology into science and mathematics. The lesson plans cater for all students, regardless of their strengths, focusing in particular on engagement. By introducing students to a range of digital technologies across a variety of contexts, staff avoid teaching technology as a discrete and abstract subject.

Students at educational risk may struggle with traditional learning methods and may lack motivation. These students may have a passion or skill that sits outside the traditional style of learning. Technology can be a catalyst to emphasise or pique their interest by activating their mind in a different way. It is not unusual for niche learners with unique personal passions to go on to be successful entrepreneurs. In the near future, the Department will be releasing a series of illustrations of practice that highlight the success of technologies in helping to achieve this.

Cecil Andrews College is an example of a school that caters for high performers and at-risk learners through digital technology. Programs provide differentiated curriculum catering for the most susceptible and vulnerable students to academic extension students. Digital innovation is achieved through:

- robotics programs introduced to 12 other schools including remote schools;
- a Vortals pilot program that includes virtual reality and augmented reality;
- global industry partnerships through P-TECH to deliver innovative curriculum to many schools;
- a drone pilot program;
- leading students into future pathways like the first Automation Pilot meeting new Australian qualifications with Rio Tinto, Government and South Metropolitan TAFE;
- entrepreneurial programs that are leading students to succeed in State and National competitions;
- the Curtin University e-Sports as part of the Consortium of Innovative Schools;
- developing a framework for all schools with Engineering Australia;
- Marine Industry Schools Pathways 4x4 and Subs in Schools; and
- the Two-way STEAM garden project.

Southern River College helps students develop creativity and collaboration using online platforms. The Inspire Academic Program draws on learning approaches from the STEM pedagogy to build understanding in maths, science and humanities using technology along with cooperative and inquiry-based learning. It provides students in the program opportunity to research and learn at their own pace.

To enrich student learning, schools are engaging with industry and community experts, including universities. For example, John Curtin College College of the Arts engages students with experts from Curtin University and The University of Western Australia in the areas of mechatronics, robotics, artificial intelligence and cyber security. The school is working with others internationally on augmented reality and virtual reality. This extends student learning beyond the curriculum and provides a challenging, rich and authentic learning experience.

Challenges to implementation, including provision of digital infrastructure, resources, and technical support.

It is acknowledged that there are factors that affect the success of a school's adoption of digital technology. These include adequate digital infrastructure, technical support and resources.

Schools are gradually moving toward increasing the number of digital devices, moving toward wireless internet usage and online environments. These rely on and affect internet speed and bandwidth capacity. Schools, particularly in certain locations, have raised concerns about slow and unreliable internet access, and the cost of maintaining devices and infrastructure.

The Department is constantly seeking to continue to improve both centrally provided capacity and school connectivity. At present, it has 97.1% of primary and schools on a fibre connection, with remaining schools using a satellite.

Just like classroom space, bandwidth is a finite resource. In some locations, the Department has exhausted available supply but is working with providers on alternative solutions. Availability and type of bandwidth is not uniformly distributed. It varies by location and is more difficult to source in outer metropolitan, regional and remote areas.

Local school decisions to allow, limit or prevent certain traffic and application use in the school can have a significant impact on bandwidth performance, eg the permission model for use of social media, video and audio streaming services (YouTube, Netflix, etc). The School Managed Internet program was launched, allowing schools to supplement centrally-supplied bandwidth which, at 6 August 2019, 239 schools had taken up. Between 2015 and 2018, the Department increased total fibre-connected bandwidth capacity by 66% (+36% metropolitan, +140% regional and remote).

In late 2019, the Department will commence a program of works in pursuit of a minimum target of 100Kbps/user across all schools (where possible). This program will see centrally provided bandwidth progressively updated for a minimum of 540 schools to at least triple their current allocation. This will represent a further increase in total available bandwidth capacity by 560% (+640% Metro, +450% regional and remote). A further program of works is nearing completion (three schools) which has seen remote, satellite-connected schools receive additional Skymuster connections.

With strategic planning, dynamic digital environments are being developed at many schools. For example, at Melville Senior High School, the environment includes:

- Department-provisioned software for administration, finance, teaching, learning, assessment and reporting;
- quality infrastructure that includes cabled local area network and Wi-Fi network;
- hardware to support administration and the teaching and learning programs; and
- School Managed Internet (NBN Connection) established in 2019 to enhance the Department-provisioned Primary link.

There is a range of Department support available to assist schools. The Department has a centralised ICT support function staffed by technical specialists to support more effective ICT integration across all schools in Western Australia and provide advice to school leaders.

The Department also provides targeted training on the tools provided to schools to effectively manage, with local decision capability, the core technology tools provided and has recently sought to expand the skills of support organisations that service schools through mandatory training in these areas.

Policy and best practice advice is provided to schools regarding the safe use of technology to support student learning. Support and training for Department provided services such as Connect, Office365 and WebEx is available in a range of formats including online webinars, enabling staff to access targeted assistance regardless of their location.

The Department has a number of initiatives that provide professional learning support for digital innovation in secondary education. These include: Teachers Can Code, Teacher Development Schools, DigiTech Schools, Innovation Partnership Schools, the STEM Learning Project and STEM Enterprise Schools as outlined in the Department's submission (questions on notice) to the Hearing into Digital Technology in Education.

The Teachers Can Code professional learning program is building the capacity and confidence of 110 lead teachers to deliver face-to-face and online professional learning to address the more challenging aspects of the Digital Technologies curriculum. Thirty-one of the 110 lead teachers are from secondary schools. This program has received positive feedback and has had a significant impact on building teacher capacity.

Two secondary DigiTech Schools, Cecil Andrews College and Hampton Senior High School, support schools by providing digital technologies workshops, classroom observations and mentoring, as well as providing advice and sharing resources. DigiTech Schools also deliver Teachers Can Code professional learning and respond to requests from schools across the state to provide digital technologies curriculum and ICT integration support and advice.

Through online Connect Communities, teachers and school leaders access teacher-developed resources and share effective teaching and learning strategies and professional learning opportunities.