

# Ideas on how to leverage technologies across the Victorian curriculum

By

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# Digital technologies supporting improvement of outcomes for all students

## SCIENCE



- Students can use screen casting software to represent their problem solving processes/share their thinking strategies of arriving at a solution to others (Science, **Critical and creative thinking, Personal and Social**)
- Specialised learning resources for extension and revision e.g. MIT opensourceware, HowStuffWorks, Khan Academy, YouTube.edu
- Use of sensors to monitor/track/analyse movement, measure heat (thermal cameras)/light/ sound/pressure/humidity (science, **Critical and creative thinking**)
- GPS tracking to calculate animal population densities / sustainable conservation practices (**Science**)
- Use of graphs, macros and formulas in Excel to calculate, automate functions to present scientific data (Science)
- Use of simulations to understand natural phenomena e.g. Earthquakes, volcano activity
- Use of web/video conferencing to link to industry, experts, cultural organisations and external partners e.g. universities, parents (Science, **Personal and Social**) e.g. Link to NASA
- Use of blogging/wiki/websites to collaboratively investigate a scientific concept/phenomena (Science, **Personal and Social**)
- Webinars/podcasts/live forums and online conferences - Allows students to engage with live experts, gain perspective of others through hearing others/reading comments left on back channels/social media (**Personal and Social**) e.g. live forum with a scientist
- Students working on global projects collaboratively using shared platforms e.g. google docs, blogs, Office365, wikis, global projects/classrooms (**Personal and Social, intercultural, Critical and creative thinking**)
- Students viewing or representing concepts in different ways e.g. timeline apps, infographic programs, presentation software e.g. Prezi, PPT, Keynote, student made films/podcasts (**Cross curriculum, Critical and creative thinking**)
- Use of STEM enhancing technologies that add authenticity to learning e.g. robotics, data loggers, microcomputers/sensors, simulations (SixMaps, Mathematica), real time data (Livecams, weather, animal tracking, economics etc) (**Cross curriculum, Critical and creative thinking**)
- Use of robotics/ programming to enhance science e.g. automation of processes
- Use time lapse/slow motions to understand how things work/evolve/function (Science, CCT)
- Study wearable technologies e.g. heat/movement sensors
- Study industry technologies e.g. gene splicing, laser cutters
- Use of drones to monitor landscapes, explore remote areas
- Use of internet of all things e.g. sensors that turn cameras on when an animal walks by
- Use social networks to share science data/research ideas, investigate ethical issues e.g. Twitter
- Use of electronic microscopes to capture images of nature, materials, foods etc.
- Learn new scientific concepts on MOOCs, videos (YouTube), online journals, slideshare presentations
- Get involved in a global collaborative science project - e.g. <http://mathforum.org/workshops/sum96/data.collections/datalibrary/lesson.ideas.html>

# Digital technologies supporting improvement of outcomes for all students

## CRITICAL & CREATIVE THINKING



### Technologies that can ..

1. Assist students to **develop questioning** e.g. voice recorders/interviews, video & digital image provocations, class polls/student response systems e.g. VERSO, Kahoot, Padlet
2. **Increase students' perspectives/discussion skills (non-judgment)/empathy** - e.g. role playing games, virtual reality, recording videos from different viewpoints/interrogating different characters
3. Enable students to **visualise thinking** e.g. mind maps, timelines, concept maps
4. Allow students to **reflect on learning** e.g. blogs, video reflections, digital portfolios
5. Enable students to **represent thinking in different ways** e.g. mind maps, PowerPoint/Prezi, movies, charts, design software e.g. Tinkercad/ Autocad, gaming e.g. Minecraft, building interactives e.g. Powtoon
6. Allow students to **interrogate/understand processes & functions** e.g. simulations, slow motion/time lapse videos, advanced internet searches, specialised videos, motion trackers
7. Facilitates the students ability to **predict future trends** e.g. data monitoring, tracking devices
8. Enables students to **recognise patterns** - text analysers, word clouds, advanced word/excel commands e.g. 'colour red if >100'
9. Supports students to **organise information logically** - e.g. databases, excel spreadsheets, timelines, websites, algorithms/process maps
10. Provides opportunities to **compare and contrast** e.g. compare a film to an e-book, 2 digital images, compare language structures in a bilingual book
11. Supports students to **summarise/annotate** - e.g. e-books, word processors (comment function), Presentation packages e.g. PowerPoint, Prezi
12. Enables students to **explain thinking processes/share learning strategies** e.g. screen casting, vodcasting, podcasts
13. Facilitates students being **provoked (challenged) by experts/seek authentic feedback** e.g. web conferencing, blogs, social media
14. Assists students to **develop logic (computational thinking)** - algorithms/logic maps, coding software, robotics, film creation/digital stories/stop motion animation
15. Supports learners to **discern/identify appropriateness of information** e.g. advanced internet searches, access to online journals, plagiarism checkers
16. **Builds social connections / collaborative learning** (social learning plays an important role in cognition - Vygotsky 1978 i.e. viewing how others think/strategize, leveraging expertise, understanding perspectives etc.) e.g. online learning communities, shared docs/wikis, social media.
17. Supports **evidence-based decision making** - e.g. decision support systems i.e. interactive maps, medical diagnosis, emergency management etc.
18. Use formative assessment tools e.g. rubric apps to understand learning (**build metacognition**) and **self-regulation**

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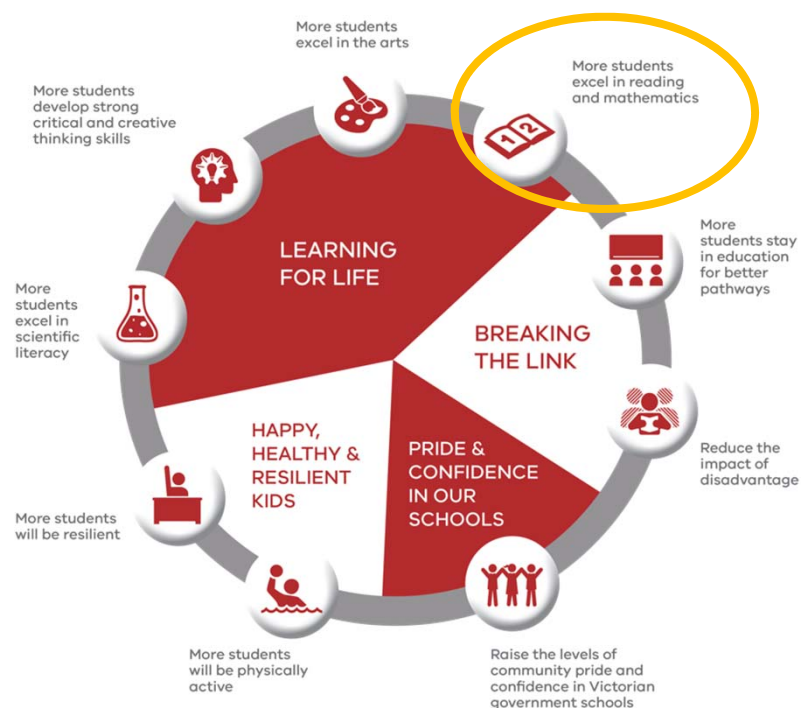
## THE ARTS



- The use of specialised software to develop art skills e.g. music composition/notation e.g. Sibelius, design software e.g. Adobe creative suite etc.
- **Virtual sessions/tours** enable young people to have direct involvement with artists / exhibitions and learn about the history of art e.g. The Art Zone: [nga.gov/kids/zone/zone.htm](http://nga.gov/kids/zone/zone.htm), Museum of Modern Art in NYC: [moma.org/interactives/destination/#](http://moma.org/interactives/destination/#), Google Art Project, [Artstor.org/index.shtml](http://Artstor.org/index.shtml), [Metmuseum.org/collection/the-collection-online](http://Metmuseum.org/collection/the-collection-online)
- **Filming** assists with drama which in turn develops higher order language and literacy skills as students act out historical or literary figures/scenes, then reassess their performance/reflect on its accuracy and seek feedback from audiences e.g. iMovie, Teachertube.com, YouTube.com, Vimeo.com, Animoto.com
- **Digital Photography and Photo Editing**
- **Specialised software** to refine specific skill sets e.g. music composition, tuning instruments, design e.g. [SketchUp7](http://SketchUp7), Autocad, creative/image manipulation e.g. Adobe creative suite, music editing e.g. [JamStudio](http://JamStudio) (online)
- **Games e.g. teaching music theory /playing** e.g. [Dallas Symphony Orchestra Kid's Site](http://DallasSymphonyOrchestraKid'sSite), creating/co-creating worlds/structures e.g. Minecraft for Education, [Gamestarmechanic.com](http://Gamestarmechanic.com), [BrainPop.com](http://BrainPop.com), [Artsology.com/games.php](http://Artsology.com/games.php)
- **Web resources for creating** without the financial outlay on materials e.g. play virtual instruments - Music, paint with virtual brushes such as chalk, pencils, charcoal, oil paint, felt markers, crayons, airbrushes, acrylic, sponges, and pastels e.g. [ArtWeaver](http://ArtWeaver)
- **Global projects** e.g. [Rock Our World](http://RockOurWorld) - an online international project connects students from all over the globe to compose music, make movies and interact with each other in live video conferences.
- **Digital portfolios** - are a collection of work of an individual for sharing and reflecting on growth e.g. [Carbonmade.com](http://Carbonmade.com), [Coroflot.com](http://Coroflot.com), [DeviantART.com](http://DeviantART.com)
- **Blogs** - encourage students to engage in meaningful writing targeted to a specific audience that is published in a public forum e.g. Global2 or for students to interrogate existing blogs for tips/ problem solving/ inspiration
- **Online mind maps** allow multiple students to work on maps together and visualise/organise their thinking e.g.
- **Learning management system** - LMS can be used to store course materials and curriculum. Educators can store electronic worksheets, website links for reference for students and teacher, quizzes, tests, photo albums, external tools, discussions, and much more. Educators can also manage class lists, grades, attendance, and analytics in many different forms of LMS.e.g. [Edmodo.com](http://Edmodo.com), [Schoolology.com](http://Schoolology.com), [Moodle.net](http://Moodle.net)
- **Animation** - for creativity and presenting information in more engaging ways- [Anim8or](http://Anim8or.com/index.html): <http://www.anim8or.com/index.html>, [GoAnimate for Schools](http://GoAnimate.com), [Doink.com](http://Doink.com), [Fluxtime.com](http://Fluxtime.com), [Goanimate.com](http://Goanimate.com), [KerProof.com](http://KerProof.com), [Sketchstar.com](http://Sketchstar.com)
- **Screen casting** - ways for students to explain their choices/artwork/techniques e.g. [Screencastomatic.com](http://Screencastomatic.com), [Techsmith.com](http://Techsmith.com), [Explain everything](http://Explain everything)
- **Social Media** - explore art issues/ opinions, connect, organise events e.g. Twitter.com (13+ yo), [Instagram.com](http://Instagram.com) (13+ yo), [Facebook.com](http://Facebook.com) (13+ yo)

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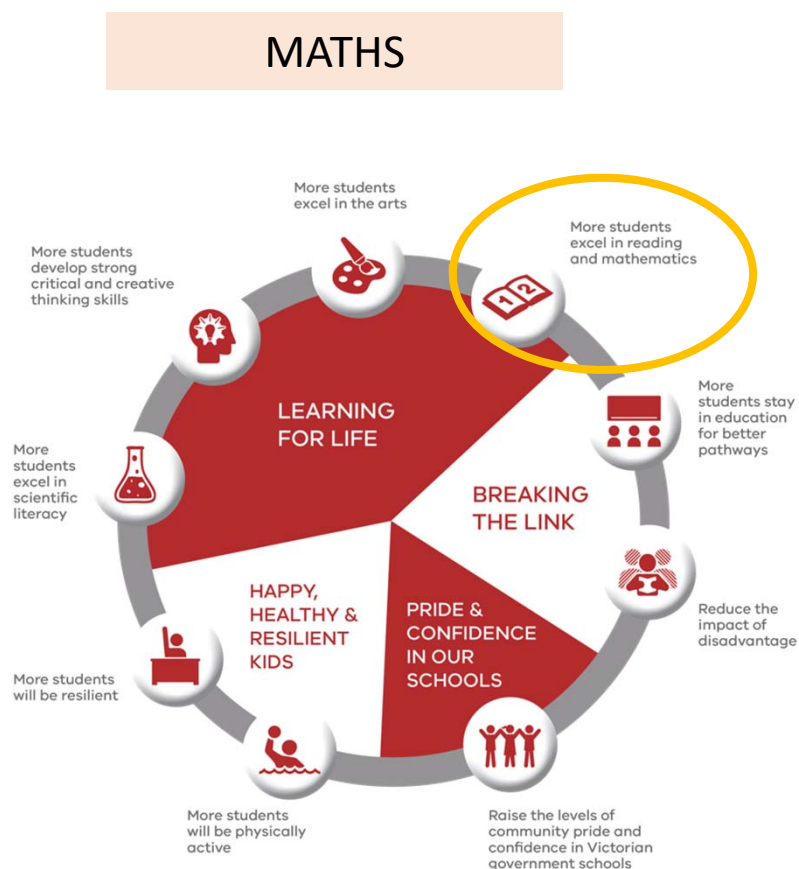
## ENGLISH



### ENGLISH

- Use of **web/video conferencing** to link to industry, experts, cultural organisations and external partners e.g. universities, parents (English/Maths, **Personal and Social**) e.g. **YABBA**
- How to write considered posts/comments on blogs or **discussion boards/social media** (English)
- Use of **blogs/wikis/websites** to collaboratively develop writing skills (English, **Personal and Social**)
- **Videos and digital images/dialogues** used for discussion provocations (English, P&S, CCT, Intercultural, Ethical)
- **E-books** allow students to annotate texts, bookmark, take notes, adjust text size, search for themes, look up a dictionary (English)
- **Webinars/podcasts/live forums and online conferences** - Allows students to engage with live experts, gain perspective of others through hearing others/reading comments left on back channels/social media (**Personal and Social**) e.g. live forum with a book author
- Use of **story creators** to structure narratives & share (English, CCT, P&S)
- **Text analysers** e.g. word clouds, ATLAS.ti, MS word compare functions) for students to determine word repetition, patterns, themes, compare and contrast texts e.g. English - How do news articles compare to speeches? (English, CCT)
- Use of **subtitles** to develop reading/spelling (English)
- Comparing language structures in **bilingual books/translators** develops understanding of language (English)
- Students co-creating context/problem solving collaboratively using **shared platforms** e.g. google docs, blogs, Office365, wikis, global projects/classrooms (**Personal and Social, intercultural, Critical and creative thinking**)
- Students viewing or representing concepts in different ways e.g. timeline apps, infographic programs, presentation software e.g. Prezi, PPT, Keynote, student made films/podcasts (**Cross curriculum, Critical and creative thinking**)
- **Role playing games** to gain perspectives of different characters/investigate different plots (Literacy, P&S)
- Interviews (**videos/audio recorders**) to develop conversation skills/questioning (English, P&S, CCT)
- Use **advanced internet searches** e.g. google scholar, advanced google search terms e.g. identify a historical event from multiple perspectives/sources (English, CCT)
- **Student response systems/class polling apps** - Students collaboratively posing questions and possibilities and incorporating perspectives/feedback e.g. mindmaps, VERSO, Socrative, Kahoot, Padlet (**Personal and Social, Critical and creative thinking, ethical**)
- Online testing to adjust student learning based on student progress e.g. NAPLAN online, Insight platform
- Assist students to develop questioning e.g. voice recorders/interviews, video & digital image provocations, class polls/student response systems e.g. VERSO, Kahoot
- Increase students' perspectives/discussion skills/empathy - e.g. role playing games, virtual reality, recording videos from different viewpoints/interrogating different characters

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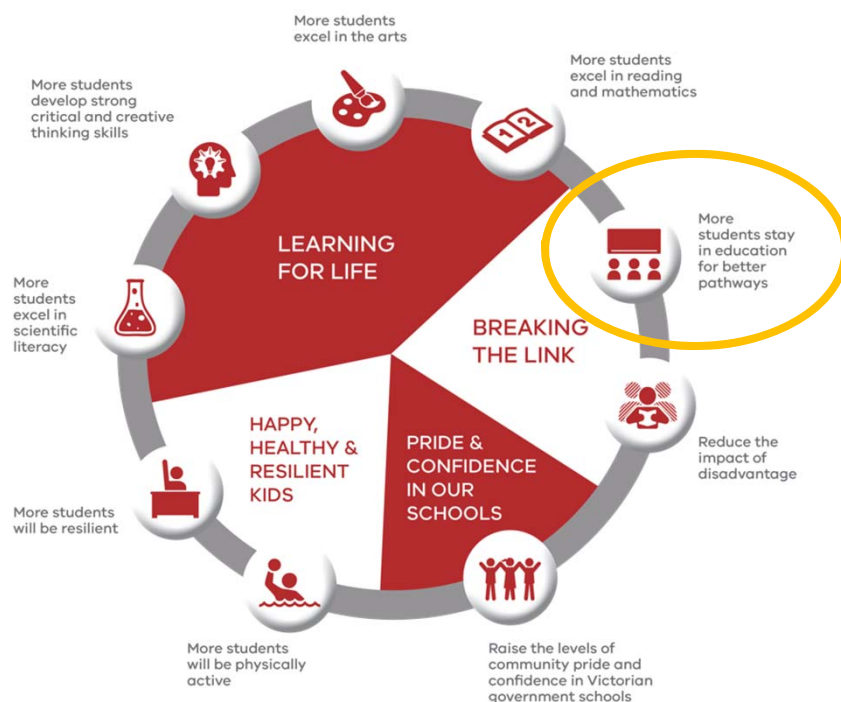


## MATHS

- Students can use **screen casting** software to **represent their mathematical problem solving processes/share their thinking strategies** of arriving at a solution to others e.g. ShowMe, Explain Anything (Mathematics, **Critical and creative thinking, Personal and Social**)
- Use of **online maths learning resources** for **extension and revision** at your own pace/ability e.g. IXL maths, Khan academy, Mathletics, Edrolo (VCE), [V Math Live](#) , FREE Rice, Maths Playground
- Sensors** to **monitor/track/analyse data i.e** movement, measure temperature/ light/ sound/ humidity (Maths, science)(**Critical and creative thinking**)
- GPS tracking devices to **calculate** area/population densities (Maths)
- Use of **graphs, macros and formulas** in Excel to calculate, automate functions, (Maths)
- Use of **simulations** to understand mathematical functions e.g. Mathematica (Maths)/Wolfram alpha, [Geometer's Sketchpad](#) - a visualization tool with mathematical notation and graphing functions suitable for geometry, algebra, trigonometry, and calculus.
- Use of online maths manipulatives - [National Library of Virtual Manipulatives](#)
- Use of **interactive games** to **re-enforce/learn new maths concepts** e.g. Motion Maths, [Descartes'](#) [Cove](#) exploratory game for grades 6 to 8 math students, [Enriched Math](#) is a strategic game designed to get students in grades 5 through 8 talking about math , Academics.com, [Globaloria](#)
- Using **design software** e.g. Tinkercad/ Autocad to design spaces/structures to scale
- Online graphic calculator e.g. Desmos for working in higher math classes like Trigonometry or Calculus
- Follow mathematicians on **twitter**, get maths tips and lesson ideas e.g. #MTBoS) or math-related **blogs** e.g. [Mathmatics.com](#)
- Tap into **real time data sources** e.g. bureau of meteorology, live cams, stock markets etc. and visualise the data using **data visualisation software** e.g. Tableau, Raw, Exhibit (open source interactive maps)
- Use **digital cameras** for early mathematics concepts of students representing their understanding of shapes, fractions etc.
- Use **electronic scales** for young learners to gain an understanding of place value and measurement e.g. weight/converting between metric and imperial systems
- Try **maths web quests** from [Best WebQuests](#) or for math students in [K-2](#), [3-5](#), [6-8](#), and [9-12](#)
- Join a maths **collaborative community/global project** to problem solve together e.g. Mathsrepublic, <http://mathforum.org/workshops/sum96/data.collections/datalibrary/lesson.ideas.html> or pose your own problem to a math discussion/help group
- Take on an **online math challenge** e.g. Premiers math challenge, <http://www.collaborativemathematics.org/> , [A+ Click](#)
- Listen to maths related **podcasts** e.g. [Inspired by Math](#)
- Use **web/video conferencing** to take an extension class through Emerging sciences Victoria (Year 10s) or a math specialist subject if not offered in your school through DECV or VVLN.
- Use **google maps** to calculate areas of cities/parks, lengths of trips e.g. journey to school etc.
- Use geocaching to explore mathematics outside the classroom/develop math treasure hunts
- Learn maths vocabulary - [Studygeek](#)
- Explore examples of Maths in the real world - <http://www.thirteen.org/get-the-math/> e.g. maths in special effects/fashion/video games/ basketball / restaurant etc.

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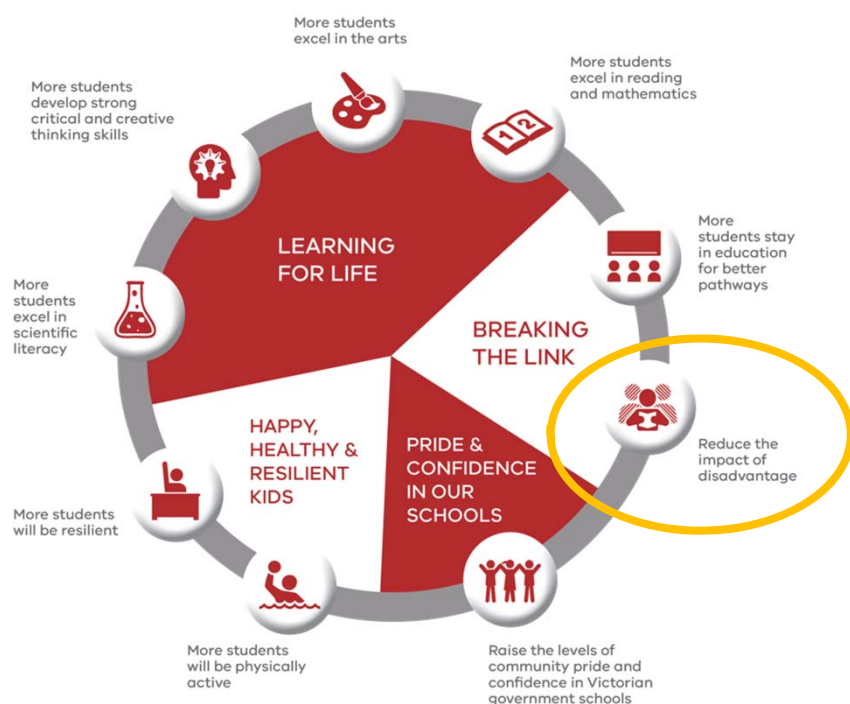
## BETTER PATHWAYS



- Virtual learning – increases subject choice esp. at upper secondary (high determinant of student retention), increase access to TAFE/University/workplace learning & develops online learning skills
- Increase student retention at school - through gaming, films, enquiry/collaboration projects e.g. global projects, virtual excursions
- Use of student portfolios – demonstrate capability to future education institutions/employers
- Developing specific vocation skill sets e.g. coding, film/music/image editing, data processing
- Offers supports e.g. AusLan, psychological, career counselling virtually to students in rural areas or small metro schools where these services may not be easily accessible
- School analytics software – can identify absenteeism patterns, identify earlier interventions in academic performance
- Support feedback – helps student understand how to achieve growth e.g. supports teacher-student communication, student metacognition e.g. self-correcting quizzes, peer reflections etc. & seek help earlier
- Self-regulation supports e.g. electronic diaries/reminders develops student to self-manage their learning, to avoid late submissions, organise their time (reduce stress) etc.
- Internet – identify pathways options e.g. VCAL, VET, University, explore career website e.g. Skills pathway website

# Digital technologies supporting improvement of outcomes for all students

## REDUCING DISADVANTAGE



Technologies can ..

1. **Improve access to education opportunities/schooling** e.g. Students esp. rural, disengaged, medical, sports, young adults, or whose (particularly VCE) subjects are not available in home schools can access educational opportunities by leveraging **virtual learning** (web/video conferencing) e.g. DECV, VSL, JMSS
2. Enable students to **access specialised online support via web/video conferencing** e.g. psychologists, career advisors, high ability courses, welfare programs
3. Use of computerised **adaptive testing for early intervention** esp. literacy/numeracy
4. **Virtual excursions** allow students who **cannot afford to travel/access** certain services a comparable experience
5. **Games in education** help with **increasing student engagement**, reducing truancy and class behavioural issues
6. **Specialised apps are available to support students with learning difficulties** – dyslexia, vision impairment (read text to learners, enlarge text), to assist with comprehension (apps that slow down reading speed to assist with comprehension, have built in dictionaries/translators), Asperger's/autism (social skill apps)
7. **Assistive devices & software for students with disabilities** e.g. alternative keyboards, voice recognition, BoardMaker for students with disabilities, captions, braille displays/printers, eye tracking, switches, head wands
8. **Adaptive software to cater for every learner** –students can work to their own ability/pace and to make progress. The software provides personalised reports to both teachers and students.





# Digital technologies supporting improvement of outcomes for all students

## RAISE COMMUNITY PRIDE AND CONFIDENCE IN SCHOOLS

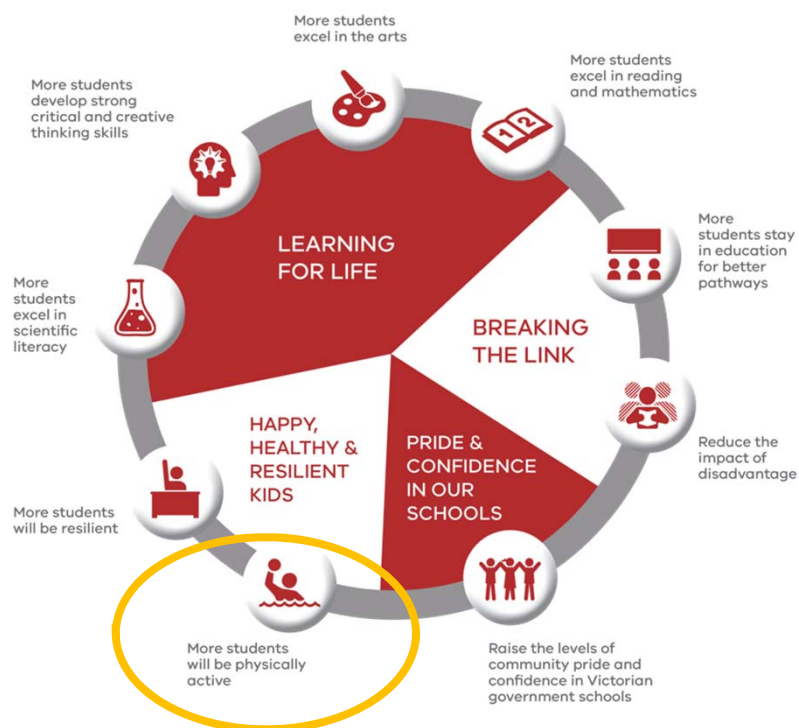


Technologies can assist with ..

- **Welcoming families into the school community** – school website, 360°C/virtual tours
- **Communicating with families effectively** –
  - Showcasing school achievements – animated PowerPoints/slides in foyer
  - School websites/ eNewsletters/ Social media - Facebook, Twitter,
  - Online school events calendar
  - Class blogs
  - Electronic parent surveys
  - Translation software – presenting information in different languages
  - Apps for reporting absenteeism to parent via SMS
- **Supporting student success at home**
  - Parent teacher interviews – online booking systems/virtual interviews
  - Webinars – parenting help e.g. dealing with exam anxiety
  - Parents regularly reviewing student progress e.g. LMS, portfolios, blogs
  - Learning resources for parents/students e.g. FUSE, ebooks, open source
  - Subscription based adaptive software e.g. reading comprehension, mathematics etc. for revision/extension
  - Access to EduSTAR software/MS Office licenses – word processing, data
  - Online supports e.g. counselling (careers, psychological etc.)
- **Parents as decision makers**
  - Sharing/inviting feedback on school policies online
- **Improved school operational efficiencies**
  - Online network meetings (reduce travel costs), online job interviews, logging calls/communications, taking/distributing minutes, printing/scanning, electronic banking
  - Tracking student progress – whole school data analytics
  - Operational software – timetabling, reporting, asset management, visitor registrations
  - Planning tools and templates e.g. ICT planning, AIP/strategic plans templates
  - Promote internal communication and sharing e.g. intranet, shared documents
  - Professionally developing staff – online courses, online journals/publications,
- **Improved teaching**
  - Sharing learning strategies with students using screen casting/podcasting
  - Using templates – lesson planning
  - Access new materials to enhance lessons/authenticity e.g. videos, data, experts
  - Facilitate student collaborative learning/communication e.g. Padlet, wikis
  - Personalise learning for every child e.g. adaptive software, choice of multimedia for presentation of understanding e.g. video, audio, graph, infographic etc.
  - Manage classrooms e.g. attendance, student submissions, behaviour records
  - Provide clear and timely feedback to students e.g. Student Response Systems, self-correcting tests
  - Promote inclusion/mitigate disadvantage – Koorie online resources, web/video conferencing for rural students, assistive devices for students with disabilities
  - Celebrate learning successes e.g. class blogs, online academic competitions
  - Varying delivery/increasing student engagement – gaming, films, interactives
  - Making thinking visible (see CCT section)
  - Identify early interventions – diagnostic tests e.g. PAT, English online
  - Make consistent and comparable judgments of student performance e.g. Shared docs/evernote etc.
  - Improve assessment – collect/tag evidence, interpret data, streamline reporting

# Digital technologies supporting improvement of outcomes for all students

## PHYSICALLY ACTIVE



- Slow motion video for analysis of movement/sequences e.g. skateboard tail whip, diving
- Video analysis/on screen annotations of sporting footage
- Pod/vodcast reflections justifying reason/decision for actions
- Activity monitors – to track movement, sleep patterns
- Wearable sensors - heart rates, calories burnt, temperature, VO2 and VO2 max, resting heart rate, caloric burn and recovery
- GPS/mapping – plan outdoor activities e.g. hiking, cross country runs
- Data processing - collect and graph data – e.g. sporting statistics
- Cyclops/hawk eye (computer/camera) to track ball trajectory e.g. tennis, cricket
- Data analytics software – monitor trends, world records, personal bests etc.
- Fitness apps / programs – training programs for all/certain muscle groups depending on fitness goal e.g. lose weight, gain muscle etc., tracking food intake
- Scoreboards
- Health monitoring equipment – e.g. electronic scales (weight, fat, bone mass, BMI), blood pressure, pulse rate, blood sugar
- Programmable exercise equipment e.g. computerised treadmills
- Indigestible sensors e.g. thermometer pills reduce death from heat exhaustion, blood oxygen
- Go-pro/action cameras for recording action video e.g. skiing, cycling
- 3D scanners – track body composition
- Biomechanical analysis suits – e.g. Xsens MVN suits
- Stop watches/timers – e.g. record speed, duration of physical activity
- Xray technology – identify bone fractures/breaks
- Music – promote activity e.g. dancing/calming – pre competitions
- Online personal trainers – motivate/encourage activity

# Digital technologies supporting improvement of outcomes for all students

## RESILIENCE



- Students can **protect themselves** and others e.g. understand cyber safety / act when technology is misused
- Students have **greater voice and agency in the classroom** e.g. class polling/shared discussions e.g. padlet, making student films, etc.
- Student **have better access to resources and opportunities** e.g. virtual learning increases access to subjects/excursions/resources/supports e.g. counsellors not offered at the home school
- Enable students to be **self-regulating / self-directed learning** e.g. learning management systems, adaptive software (work at own pace), rubrics apps (self-assess), podcasting/vodcasting (self-reflection)
- Ensure students have and **benefit from social connections and supports** e.g. social networking, web/video conferencing, collaborative writing tools e.g. blogs/wikis