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Introduction

Each year, CORE Education’s experienced staff of researchers, educators, and digital technology experts pool their expertise and share their understandings to identify the trends and influences that are expected to make a growing impact upon education in New Zealand in the coming year.

In 2018 we see two significant themes impacting the nature of these trends and the specific examples identified. The first is the notion of exponential change that we are experiencing in every sphere. Our traditional approaches to coping with and responding to change are no longer sufficient to meet the demands of such exponential change, and thus the trends identified will require new ways of thinking about and responding to this change. The second is the concept of digital disruption, which emphasises the ways that digital technologies are disrupting rather than simply augmenting or adding to what we currently do. Together, these things are driving the transformation that is occurring in all facets of our lives — including education.

The trends are focused on five key themes that are referred to in much of the future-focused literature, with two specific examples identified in each theme for more in-depth discussion and exploration. One of the examples illustrates a trend that has immediate implications for schools and educators, while the other looks at a more ‘disruptive’ example, something to watch as it develops into the future, but which requires us to be thinking about and preparing ourselves for now.

For each of these sections we pose questions that invite you to consider how these trends interact with education, both in terms of the effect they might have on education, and also the effect education might have on the trends. Through this, we want to encourage debate and an active engagement in thinking through and responding to the issues and opportunities these trends present us with. We aren’t advocating a blind acceptance and adoption of what is emerging, but neither are we supportive of an approach that regards what happens in schools as being somehow separate or ‘insulated’ from these things.

Our intention is to promote informed discussion within and among schools and educators, so that we, as a profession, are equipped with the knowledge and understandings that we can then use to make wise choices and decisions in our schools. This will effect how we may adopt or embrace these things, and how we design the curriculum and programmes of learning to ensure our young people are equipped with the knowledge and skills to make similar decisions in their own lives and into their future.
Technology

The pace of change driven by new technologies and technological advances looks set to continue and even accelerate, meaning that existing skills in the teaching workforce will need to be frequently upgraded.

In every part of our lives, technology is reshaping expectations and enabling new possibilities. The emerging technologies are very different to what we have experienced in the past, requiring us to find new ways to adapt to digital change in more sustainable ways.

The important thing here is the pervasive nature of change that occurs when a new technology is introduced, because technological change is not additive, it is ecological. When you add a new technology, you don’t simply change something, you change everything.

Equitable access — including Bring your own device (BYOD), home access, leases, libraries, public spaces, Open educational resource (OER) and the digital divide.

Identity and access management — being able to establish and prove the identity of individuals online has become of critical importance as online services grow and are used more widely. A good example of this in education is the context of online exams, where validating the identity of the person sitting the exam is a perpetual concern for providers.

System integration — as the suite of tools and applications used by individuals and organisations grows, so too does the need for these to ‘talk’ to one another and to exchange data. As more and more services migrate to the cloud, the ideal of system integration is becoming achievable — consider the benefits of being able to share student data among schools in a cluster, to allow data to follow a student through their learning journey, regardless of which school they attend.

Mobile and ‘touch’ technologies — the concept of a ‘computer’ has changed markedly over the past decade or so, with mobility being a key factor, along with the touch interface these devices afford. This trend continues to pose a significant challenge for educators who are seeking to support various forms of BYOD approaches in schools.
Big data and analytics — the concept of processing vast amounts of data from many disparate sources to derive vital insights. For schools, the benefits are obvious — everything from enabling the development of truly learner-centred pathways with next steps in learning identified through the data to making decisions at a school/cluster or whole-system level based on clear understandings of what is needed and where it will help. One significant issue: Far too many organisations are awash in insights they are not structured or resourced to respond to.

3D printing — the complexities and immaturity of the 3D printing industry often obscures its true promise: The ultimate ability to mass customise and conveniently produce just-in-time virtually all of the objects we need to operate our businesses.

Digital engagement — wanting to understand better how to engage your students and your community online? Email and online forums are old hat. Messaging is the new platform, and involves a lot more than simply short messages sent over mobile networks. It includes developments in using natural language processes, text/voice interaction, and agent-based artificial intelligence (AI).

Virtual and mixed reality platforms — creating a powerful combination of immersive user experience, both virtual reality (VR) and augmented reality (AR) are now being used in many gaming platforms. The promise of these technologies has yet to be realised in education, but it is clear that advances in these areas will see them become a major part of the future of user experience.

2018 special focus examples:

The Cloud — includes moving all aspects of the technology service into the cloud, including software as a service, infrastructure as a service, platform as a service etcetera.

Blockchain — the blockchain represents one of the key emerging technologies likely to have a significant impact on all facets of our future lives. By allowing digital information to be distributed but not copied, blockchain technology is creating the backbone of a new type of internet.

1 Victoria University of Wellington report — See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/311646783
Structural trends affecting schools/kura that have emerged over recent years include:

**Networked communities** — the rising importance of Communities of Schools, Communities of Learning | Kāhui Ako, Investing in Educational Success (IES), with new roles for teachers and leaders.

**Community focus** — strategies for engaging parents, using portfolios, two-way interactions, and effective community participation in schools.

**Charter schools** — independently run public schools granted greater flexibility in their operations in return for greater accountability for performance.

**Private public partnerships** — where a private sector body designs, builds, finances,
and maintains the school property over a long term contract, allowing the board of trustees and school leadership to no longer have to worry about maintaining school property and, instead, focus on teaching and learning and improving educational outcomes for learners.

**Alternative forms of assessment** — thinking about new ways of formally acknowledging learning that has taken place and the assessments that are used to validate this. Includes what’s happening around online assessment, ‘just in time’ assessments, digital badges etcetera.

**Learning record stores** — with the increased emphasis on learner-centred approaches, and the shifts in ownership of learning, the need for secure, well-managed places where a student’s record of learning can be maintained will grow in importance. This includes a maturity in the thinking about digital portfolios — who owns them, where they are stored, how they are managed and sustained etcetera.

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**2018 special focus examples:**

**Communities of Learning | Kāhui Ako** — introducing a new structural way of thinking about our system, based on the idea of following the pathway a learner takes through the system — plus, leveraging the skills and expertise across the cluster.

**Virtual learning** — recognising the increasing role of online learning in our education system, allowing learners to access specialist knowledge from where ever and whenever they need it. Also recognising the ‘borderless’ nature of schools and education generally in this sort of world. This is seen particularly in the proposal to legislate for COOLs (Communities of Online Learning) opening up opportunities for a wider range of providers, and allowing learners greater choice regarding the subjects they want to take.
Process

In business terms, process is a collection of related, structured activities or tasks that produce a specific outcome. Simply put, process may be understood as, ‘the way we do things’.

Educational institutions are generally very process-driven, from enrolment, to curriculum, to the approaches to teaching, to assessment and graduation. Each of these is characterised by the process used to determine how things are done.

Process trends affecting schools/kura that have emerged over recent years include:

Change leadership — to lead change in schools, educational leaders need knowledge and insight into the complex processes of change and the key drivers that make for successful change. More significantly, they will require understanding of and experience in change leadership strategies and digital leadership models².

Design thinking — the emphasis on innovation, creativity, and the use of design thinking in education transformation.

Gamification — is the idea of adding game elements to a nongame situation. Classroom incentives and reward programs are a simple example of this. At a more sophisticated level, gamification has becomes integrated in a more authentic manner as classrooms have become a living, breathing game.

Deep learning — amid the growing concern that we’re becoming too narrowly focused on the outcomes we aspire to for our learners, with a curriculum that touches a lot of things

² From Dion Hinchcliffe: https://dionhinchcliffe.com/
lightly, there is call for an emphasis on Deep Learning. The essence of deep learning is understanding — true knowing. Deep learning occurs when learners participate in experiences that build on their strengths and needs, where they create new knowledge using real-life problem solving, and contribute using their talents, purpose, and passion.

**Inclusive education** — the underpinning idea here involves moving from thinking of education as a linear process representing a ‘factory’ model of production, to a process that accommodates and caters for the widely different sets of needs and abilities represented by any cohort of learners. Key concepts include learner-centred design (as distinct from teacher-centred and curriculum-centred) and Universal Design for Learning (UDL) which is a research-based framework that helps teachers plan learning to meet the diverse and variable needs of all students.

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**Special themes for 2018:**

**Collaboration** — collaborative practice is becoming the ‘new norm’ in schools, occurring at all levels, including students, teachers, and leadership.

**Data science** — an emerging field involving multidisciplinary blend of data inference, algorithm development, and technology in order to solve analytically complex problems. The global supply of people who can work effectively with data in this way is limited.
Economic

The way we generate wealth and the skill sets required to contribute to this are key elements in any economy. In the past, economic activity was determined by the combination of natural resources, labour, and capital. This view is now challenged by consideration of the value of things such as technology and creativity, giving rise to alternative views such as the concept of a knowledge economy.

Economic trends affecting schools/kura that have emerged over recent years include:

Computational thinking — the impact of STEM (Science, Technology, Engineering and Maths) on curriculum, coding, the drive for skills for employment versus holistic education outcomes for all, and play-based curriculum.

Future workforce — it’s well established that the days of leaving school to take up a job for life have now past. We’re often confronted with predictions of today’s learners facing seven career changes in their lifetime, and of young people holding a portfolio of work rather than a single job. Our understandings of what work might look like, what jobs there will be, and what patterns of work future workers will engage in must be considered and accounted for in our programmes for learners. Responses to these questions may require significant change to our current way of thinking about curriculum, assessment, subjects, and pedagogy.

Sustainability — after decades of thinking about growth, expansion, and embracing new technology at any cost, there is a growing concern now about focusing on approaches that are sustainable — ecologically, environmentally, culturally.

“Open-ness” — traditional models of operating emphasise the notion of private ‘ownership’ (of ideas and material things). This paradigm is being challenged by a greater level of open-ness and sharing, and the establishment of new ways of defining ownership such as the Creative Commons licensing of ideas and material goods.
2018 special focus examples:

**STEM** — there’s currently a surge of interest in programmes targeting Science, Technology, Engineering, and Maths, focusing on educators and others looking at where the jobs are right now and trying to make education fit — but, who knows what other skills might be necessary in 20 years from now? The drivers behind STEM are a significant contributor to the development, in New Zealand, of the recently announced **Digital Technologies Curriculum**, and the steady rise in interest and participation in things such as the **Maker Movement** and **CodeClub** etcetera.

**Automation** — the steady rise in automation of tasks that are repetitive or routine has been occurring since the start of the industrial revolution. Only recently, as technical sophistication combined with advances in artificial intelligence has grown exponentially, have we seen tasks previously considered unable to be automated now being taken over by robots with a wide range of ‘pseudo-human’ characteristics. In education, this includes a potential growth in human-machine interfaces that are capable of providing much more personalised, accurate, and timely responses than a teacher with a class of 20-plus learners.
Cultural

The culture of an educational organisation is the product of the beliefs, perceptions, relationships, attitudes, and written and unwritten rules that shape and influence every aspect of how the school/kura functions. School culture also encompasses more concrete issues such as the physical and emotional safety of students, the orderliness of classrooms and public spaces, or the degree to which a school embraces and celebrates racial, ethnic, linguistic, or cultural diversity. Influences that change or alter any aspect of this mix will likely have an impact on the overall culture of a school/kura or organisation.

Trends affecting the culture of schools/kura that have emerged over recent years include:

**Diversity** — recognising the increased diversity of learners in our classrooms, and the pedagogies that cater for diverse learners and groups of learners, UDL, different belief systems, and multiple languages in schools.

**Digital fluency** — driven by personal responsibility, online identity, digital literacies and citizenship, cyber security, access, and equity of opportunity.

**Digital citizenship** — understanding what it means to live respectfully and responsibly in a world where digital technologies are changing the ways we connect, communicate, and relate to one another.

**Identity and privacy** — understanding who we are in the digital world and what we need to do in order to protect the things we want to keep private — and how we need to do this for others as well.

**Cyber bullying** — understanding the impact of this sort of behaviour in the context of schools and society, and the long term and lasting impact of such behaviours.

**Global connectedness** — understanding the impact and implications of what it means to live in a more globally-connected world, including understandings of and respect for the language, culture, and identity of others.
De-privatised practice — understanding the emergence of practice in schools where teachers and students now operate in more open environments, where the sharing of strengths and knowledge is valued and encouraged. This includes the shift in regarding teachers as the sole authority within their own classroom, to seeing them work as a part of a team where their work with learners is always ‘in view’ of their colleagues.

2018 special focus examples:

The shift in ownership of learning — understanding what happens in a learning environment where the learners are given greater responsibility and increased agency over their learning.

Artificial intelligence — understanding the significant ways in which our human interactions and decision making are being impacted by ‘machine thinking’.
CORE’s 2018 Ten Trends

1. Artificial Intelligence
2. Blockchain
3. Communities of Learning (Kāhui Ako)
4. The Cloud
5. Learner Agency
6. Virtual Learning
7. Collaboration
8. Automation
9. Data Science
10. STEM
Technology

The Cloud

The moving of all aspects of the technology service into the cloud, including software as a service, infrastructure as a service, platform as a service.

What’s it about?

What is ‘the cloud’ and ‘a cloud-based service’?

Where we once considered the size of a computer’s hard drive on which our programs and data could be stored a critical part of any purchase decision, those things are increasingly delivered from “the cloud”.

The term ‘cloud’ originates from the symbol used by network engineers when they needed to represent the Internet. It has now become synonymous with the Internet itself. A cloud-based service is anything that is made available to a device with an internet connection, delivered by somebody else’s computing resource. We typically think of devices such as smartphones and computers connecting to cloud services, but, increasingly, devices ranging from watches and other wearables through to appliances from light bulbs to cars and a raft of sensors like cameras will be cloud-connected to form the ‘Internet of Things’.

Giant companies such as Amazon, Apple, Microsoft, Facebook, and Google have the majority of the cloud market and have the scale to build colossal data centres. An increasing range of smaller, specialised providers deliver services built on their own or on these companies’ platforms. Services are delivered for free in some cases, or, more commonly, as a paid subscription.

SaaS or IaaS?

Software as a Service (SaaS), in which software applications are run from data centres rather than on individual computers or servers, has become the dominant model of using the cloud to deliver services to schools. Examples include Google’s G Suite, Microsoft’s Office 365, student management systems like eTap and Edge, and Xero’s accounting system. Merely using somebody else’s infrastructure to run the same services that used to be on a school’s server — known as Infrastructure as a Service (IAAS) — does not leverage enough of the benefits of cloud computing to make it worthwhile for most schools, because there is still too much technical expertise required to implement and maintain IAAS solutions. SaaS will inevitably render school servers redundant.
What’s driving this?

Some common ways that the cloud can directly or indirectly enable and support learning include:

**Connectedness:** Learners can accomplish tasks and interact with up-to-date resources, people, and knowledge regardless of location, time of day, or device.

Before the cloud, access to resources was limited to what a school might be able to provide, for example, in terms of books, TV or radio broadcasts or guest speakers. The cloud has radically changed this and will continue to do so as local and global connectivity increases to enable all learners to participate in an increasing range of learning activities online.

**Performance:** Improved communication, collaboration, flexibility, productivity, and creativity.

The ability for multiple people to collaborate online, for example, will continue to have clear benefits for staff and students as we shift from a focus on individual to team performance. Administrative headaches like remembering to back up or hit the save button have been alleviated.

**Economics:** Reduced costs with improved technical capabilities, reliability and security.

The ‘utility model’ of procuring and consuming cloud services as a subscription means services can more readily be added or dropped, making schools more agile to meet the changing needs of their teachers and students in a rapidly changing society. Schools can subscribe to multiple cloud services. Budgeting becomes more about managing a list of subscriptions and less about trying to predict when hardware and software will need to be replaced, and grappling with big-impact decisions about what to replace them with.
What examples of this can I see?

Schools are embracing using the cloud because it enables them to care less about keeping technology running but instead to focus on what can be done with the technology to benefit learners. But, to continue growing the uptake of the cloud, there are some challenges to overcome:

**Performance** — how can more demanding tasks such as multimedia production, data manipulation and graphic design be made possible without expensive end-user devices running specialist software?

**Identity** — how can staff and students have fewer usernames and passwords to gain access to cloud services whilst more surely verifying their identity?

**Security** — can schools trust cloud service providers to secure their data? Are schools following best practices themselves when it comes to security of cloud services?

**Ubiquity** — can the devices and connectivity needed to access cloud services be provided with the quantity, ease, reliability, capability and price that makes them available to all?

**Privacy** — can we be confident that our privacy is being respected as data is transferred and stored in the cloud?

**Portability** — how can we ensure data is able to flow as students and teachers transition between schools or as formats and technologies shift?

**Technical support** — can technical support change from being focused on configuring and maintaining infrastructure to being focused on integrating cloud services so that technicians are tasked with bringing together discrete services rather than trying to create a whole ecosystem?

How might we respond?

Some questions to act as a stimulus with your colleagues include:

- What cloud-based applications are currently used by teachers and students in your organisation?
- What issues are you currently experiencing in your school’s technology set up that could be addressed by moving services to the cloud?
- How can the use of cloud-based services support student learning at your school? What examples of this come to mind?
- How could the use of cloud-based services support the administrative tasks at your school? What benefits could there be at a cluster level if you are participating in a Community of Learning | Kāhui Ako?
- Are you considering the risks associated with the cloud services you already use? Do you have contingencies in place if the cloud becomes unavailable due to an outage?
- In what ways are you preparing students to move beyond being consumers of the cloud, to become creators of future cloud services?
- How do you think the challenges outlined above are being addressed in your school?
The Cloud readings

The Ministry of Education is supporting schools to make greater use of cloud services through the Cloud Transformation Project.
http://services.education.govt.nz/cloud/

The Ministry of Education is undertaking the Integrated Education Data (iEd) initiative which aims to gather up scattered parts of student data and information and pull them together into a meaningful form by leveraging the connectivity of the cloud. The first part of iEd is the Student Information Sharing Initiative (SISI). When SISI is implemented, all educators will have accurate and reliable information so they can better support student learning and wellbeing.

The Connected Learning Advisory has a guide to planning for a cloud migration https://connectedlearning.zendesk.com/hc/en-us/articles/212728206-Planning-for-a-Cloud-Migration

Articles:
5 Experts Predict Cloud Computing Trends for 2017

K-12-Cloud-Possibilities

Research:
The Potentials of Using Cloud Computing in Schools: A Systematic Literature Review
Hartmann, Simon Birk; Braae, Lotte Qulleq Nygaard; Pedersen, Sine; Khalid, Md. Saifuddin
Turkish Online Journal of Educational Technology - TOJET, v16 n1 p190-202 Jan 2017
https://eric.ed.gov/?id=EJ1124903


Professional Learning:
Digitech Roadshow
http://www.core-ed.org/events/digitech-roadshow/
Blockchain

By allowing digital information to be distributed but not copied, blockchain technology is creating the backbone of a new type of internet.

What’s it about?

By allowing digital information to be distributed but not copied, blockchain technology is creating the backbone of a new type of internet.

Imagine a future where a student’s record of learning is held in a form that travels with them throughout their life, in a form that they can manage and make accessible to others as required for, say, a job application or evidence of achievement towards a Master’s degree. This is not a new idea. Similar dreams have driven the development of e-portfolios in the past, however the limitations around privacy and longevity of such technologies have always been an issue. This is one example of where the blockchain may emerge as something to watch for into the future.

While the blockchain itself may not be as commonly known, it is the ‘engine’ that drives the ‘bitcoin’, a type of digital currency in which encryption techniques are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a central bank. It is the use of these encryption techniques together with the way it operates as a distributed database that makes the Blockchain a potential disruptor in education.

What’s driving this?

Across a range of areas in our education system, issues associated with the management of information, including identity and access management, security and sustainable access are areas of concern to policy makers, teachers and school leaders alike.

For example, finding a solution that enables individual learners to manage their own learning and the accumulation of evidence that demonstrates achievement has become something of a ‘holy grail’ in education, as we have made the shift to the self-directed, personalised learning paradigm. The challenge of finding ways of verifying the authenticity of a student sitting an exam or completing an assessment task online is another example of where our current approaches are limited.

Because the Blockchain exists in multiple copies across multiple computers that form a peer-to-peer network it means that there is no single, centralized
database or server. Rather the blockchain database exists across a decentralized network of machines, each acting as a node on that network. A blockchain database preserves the history of every change ever made, is fault tolerant, encrypted, and immutable.

This is where it may become useful as a means of enabling individual students and educators to maintain records of their own learning. Because each transaction on the blockchain is signed digitally, using public key cryptography, it is impossible to ‘crack’, thus ensuring both security and sustainable access.

**What examples of this can I see?**

In addition to the examples of support for personalised learning and validating assessments mentioned above, other ways the secure database provided by the blockchain may be of benefit to education include:

**Student transcript/degree/test score/record validation and transfer**

Student mobility between schools and institutions is an issue for schools in NZ, and can be compounded when considering international students interested in studying in NZ (or NZ students interested in studying abroad).

**Teacher registration**

This will be of significance to organisations such as the Education Council as they put in place processes to give effect to their teacher standards and teacher registration, including recognition of teachers coming to NZ from overseas.

**Management and tracking of school assets**

Keeping track of school assets has never been easy, but use of the blockchain creates opportunities to not only track assets but also look at managing things like the insurance of these things through smart contracts.

**Identity management and parental access**

Based on how identity is managed on the blockchain, it is conceivable that such a system could provide parents and students with much more fine-grained control of who their information is shared with and under what circumstances.

**Distribution and payment of student loans**

This could include support for various repayment options.
How might we respond?

The use of the blockchain within education has the potential to significantly disrupt many of the things we currently do and the ways we currently do them in our schools and our education system generally. The best way to prepare ourselves for this change is to spend time thinking about which of these may be usefully impacted by the use of the blockchain, and to pro-actively plan for how such a transition may occur when that time comes. Some questions to act as a stimulus with your colleagues include:

• What do I/we know about the blockchain? How would I/we explain it to a colleague/ (The list of readings below provides a useful start point).

• How do we currently address the challenge of identity, security and access when it comes to student information? Where are the pinch-points? How do these limit our ability to provide a truly learner-centred approach to our educational provision?

• How do we currently cater for the needs of staff and students who may wish to have their information stored securely and remain available to them at some future date? Is this a valid need? Should it be the school’s responsibility?

Blockchain readings

Intro to blockchain (Slideshow)
http://www.slideshare.net/JordanHarris31/introduction-to-blockchain?qid=4dc43579-6a4f-49e6-8081-9ec97354e06d&v=&b=&from_search=7

10 ways Blockchain could be used in education

MIT Blockchain for education credentials

Schools using blockchain to track student data
http://www.cnbc.com/2016/05/09/schools-are-recording-students-results-on-the-blockchain.html

A Blockchain for education
http://hackeducation.com/2016/04/07/blockchain-education-guide

Blockchain education network
https://blockchainedu.org/
Blockchain based credentials may catapult credentialing movement

What blockchain means for higher education

How Blockchain will disrupt higher education transcripts
https://campustechnology.com/articles/2016/05/16/how-blockchain-will-disrupt-the-higher-education-transcript.aspx

Getting serious about Blockchain

What next for the Blockchain
http://www.mckinsey.com/industries/high-tech/our-insights/what-next-for-blockchain

Microcredentials:

Connecting Credentials: A beta Credentials framework. A development that focuses on the recognition of learning and achievement through a credentials framework. Worth a look and possibly the next stage in microcredentialing.

Digital Badging in the MOOC Space: For those of you who are following the trend for issuing badges (microcredentials), this is an interesting article on the current and future use of badges in a number of MOOCs. Might give you a few ideas.
Communities of Learning | Kāhui Ako

Communities of Learning | Kāhui Ako represent a new structural way of thinking about the New Zealand education system, placing the learner at the centre of design decisions, and connecting all the settings that make up their educational pathway.

What’s it about?

Communities of Learning | Kāhui Ako represent a new structural way of thinking about the New Zealand education system, placing the learner at the centre of design decisions, and connecting all the settings that make up their educational pathway. In addition, they enable the leveraging of resources, skills and expertise that exist within individual schools, kura and early years settings across the cluster, to better meet the needs of all learners.

Internationally, there is a move towards understanding organisations as entities that operate within networks. This is a part of an evolution in social organisation, considered by many as the ‘post-industrial’ way of operating.

Schools have operated for a long time within a bureaucracy that is largely hierarchical (industrial), where decisions are passed down through the structural layers of the system. New Zealand broke away from the highly centralised view of this sort of system in 1989, when schools became autonomous, self-managing entities, but continued to operate within the mindset of a hierarchy, both locally and nationally.

A key characteristic of this was the increased level of competition between schools for both staff and students.

Becoming a networked community of learning involves understanding the principles upon which a network operates — as a series of nodes, linked by connections and relationships, kept active by the activity across these links designed to help the network grow and flourish. By implication this requires schools to consider the focus of their activity (i.e. student learning) and to understand that they are but one of the many nodes in a complex series of relationships that contribute to a child’s learning over time.

Of course networks on their own don’t change much. Thus the structural change to a Community of Learning | Kāhui Ako by itself is unlikely to change much, especially for students. To realise the potential of these, school leaders, teachers and communities must learn about and work to achieve the following:

Learner at the centre — not as the ‘target’ to be served, but as an empowered, agentic individual with a voice.
Distributed leadership — shifting the culture of schools from hierarchies to recognising that anyone at any level of the system is capable of demonstrating leadership.

Collaborative inquiry — the engine of change — built on understanding that the solutions we seek exist within the network, and will emerge through working jointly to challenge thinking and practice.

Knowledge building — being able to work with what is known (i.e. the knowledge from theory, research and best practice) and what the schools know (i.e. what the practitioners know) to create new knowledge (i.e. the new knowledge created through collaborative endeavour).

Data driven decision making — knowing how to access and use data to make the decisions that matter for learners. This data will come from a range of sources, both inside and outside the school/cluster.

To realise their potential, Communities of Learning | Kāhui Ako will need to provide additional value to the work of the individual settings that belong to them. This requires a strategic, purposeful and focused approach to determine what the network can do that:

- is more effective and efficient than a single school, kura or early childhood setting
- leverages the collaboration to extend and enhance the school/kura/ECE-based learning programmes, teacher practice and young people’s learning.

What’s driving this?

Like many system innovations, the Communities of Learning | Kāhui Ako development has a number of drivers, including:

Sociological driver — recognising that hierarchies and bureaucracies no longer enable the flourishing of individuals and organisations in the modern world. The metaphor has shifted from an industrial/structural one to an ecological model.

Outcomes driver — while educators would argue a focus on individual learner achievement has always been at the heart of our system view, our record of success shows we still have a “long tail” of underachievement in New Zealand. The key thinking here is to address the ‘lumpiness’ in the experience of so many learners as they progress from early years through primary schooling and on to secondary, by providing a more ‘joined-up’ approach at all levels.

Economic driver — the provision of public education costs money, and ensuring this is spent efficiently and effectively is a concern of any government. There is a lot to be gained, and efficiencies to be made, from the sharing of resources within and between schools, including services, staffing and governance expertise and curriculum resources.

Professional driver — offering alternative pathways for professional growth and development to the traditional hierarchical positions — and thereby building a strong body of professionals who are leaders in classroom practice.
What examples of this can I see?

You don’t have to look far to see examples of networked communities of learning in the recent history of New Zealand education. Over the last forty years, the Ministry of Education have provided funds and/or resources and levels of accountability for a number of different types of networks each with a different purpose. All initiatives have focused on sharing what works and strengthening infrastructure to sustain new systems, processes and practices. Over time there has been the gradual shift in focus from schools and teachers to students and their learning, in what is now captured in the current strategy known as Communities of Learning | Kāhui Ako.

Key national initiatives were:

ICT PLD — a part of the 1989 ICT strategy for schools was self-identified clusters of schools supported to collaboratively develop teachers’ ICT skills and capabilities.

Extending High Standards Across Schools (EHSAS) initiative — groups of primary and/or secondary schools presented proposals for improving teacher practice and student achievement, particularly in literacy and numeracy, boys’ achievement, Māori achievement and developing the potential of gifted and talented children. Clusters were funded for the enactments of the proposals. Manaiakalani was initially an EHSAS project. It began in Tamaki and now has outreach clusters in the Far North, Auckland, West Coast and Christchurch. The focus remains on raising student achievement through supporting learners to be digital citizens and engaging families in the process. This initiative is now funded by the Manaiakalani Education Trust, drawing on resources from philanthropy, the New Zealand Government and national and local businesses.

Schooling Improvement Projects — clusters of schools (generally based around pathways of primary to secondary schools) in regions that had high underachievement and high unemployment were supported to increase participation and engagement and accelerate progress (especially in reading, writing and mathematics) by strengthening governance, management, leadership and teaching. The Learning and Change Networks initiative followed, with an emphasis on teachers learning across and within clusters.

Virtual Learning Network Community (VLNC) — regional clusters of schools are supported with an online space to host their learning exchange and to share resources, conversations, and calendars. Both teachers and students use the site. While this continues, there are now many more groups of teachers and leaders making most of the affordances of the online site for conversations and sharing resources.
How might we respond?

As an externally imposed model, the Communities of Learning | Kāhui Ako strategy has not been without its detractors — and many would argue for good reason. Aside from the politics of this, there remains however a number of very good reasons why schools should be exploring working more closely together in order to provide the very best educational service to learners.

Some questions to act as a stimulus with your colleagues include:

- What can our Community of Learning | Kāhui Ako do more effectively than a single school/early years setting?
- Are there particular community groups and organisations e.g. iwi and regional government, that we could engage with in a partnership to support our community vision for young people?
- Can we develop ways of describing, analysing and responding to data and information that is consistent across our settings, so there is no doubling up of processes?
- How can our Community of Learning | Kāhui Ako leverage the collaboration to extend and enhance learning?
- Can we collectively describe what our young people are entitled to by critical transition points in their learning pathway, so we know what we are responsible for and what we are preparing learners for?
- Can we distribute leadership in ways that we can learn together?
- Can we be strategic in what we inquire into, so that what we learn can be shared with others in our Community of Learning | Kāhui Ako?
Communities of Learning | Kāhui Ako readings

Networks and learning:

Tribes, institutions, markets, networks: A framework about societal evolutions
– David Rondfeldt
https://www.rand.org/content/dam/rand/pubs/papers/2005/P7967.pdf

Building and connecting learning communities: the power of networks for school improvement (book)

The NZ policy context:

Investing in Educational Success

Communities of Learning | Kāhui Ako (Ministry of Education site)

NZEI Joint Initiative
http://www.nzei.org.nz/COL/The_Joint_Initiative/COL/info.aspx

Achievement Challenges

Data gathering:

Learning Maps – Infinitylearn.org
http://infinitylearn.org/infinity-maps-2/

Educational Position System
http://eps.core-ed.org/

Leadership:

Implications for leadership
http://www.uacel.ac.nz/publications/articletype/articleview/articleid/344/communities-of-learners-what-are-the-implications-for-leadership-development#.WVrBgtOGMUE
Examples in action:

ICT PD cluster programme evaluation
https://www.educationcounts.govt.nz/publications/series/5819

Extending High Standards Across Schools (ESHAS)
http://www.edgazette.govt.nz/Articles/Article.aspx?ArticleId=7559

LCO (Learning Communities Online) Handbook
http://www.vln.school.nz/groups/profile/2644/lco-handbook

Learning and Change Networks (Auckland University)

Manaiakalani Project
http://www.manaiakalani.org/our-schools
Virtual Learning

Virtual learning is access to education that doesn’t require attendance at a physical place called school or other learning institution.

What’s it about?

Simply put, virtual learning is access to education that doesn’t require attendance at a physical place called school or other learning institution. It utilizes the affordances of online technologies to connect learners with the source of instruction and with each other, and can occur at any time, any place and at any pace.

In their 2008 book Disrupting Class: How Disrupting Innovation Will Change the Way the World Learns, Harvard business theorists Clayton Christensen, Michael Horn, and Curtis Johnson envision a future in which education is highly customised to each student’s learning style, relying heavily on special software and virtual courses. Their prediction that one-quarter of all high school courses (in the US) would be online by 2016 and one-half by 2019 was ambitious to say the least, however the steady growth in virtual learning in the US and other countries seems to support the basic principle: by empowering students and parents, individualized virtual learning is one promising path to incrementally improving modern education.

Virtual learning courses offered on-site at regular schools — referred to in some contexts as “blended education” — are also an increasingly popular option, allowing learners to access specialist knowledge from wherever they are and whenever they need to. The blended learning approach can also include the notion of ‘flipped learning’, where a student is engaged in the research and investigation elements of an inquiry outside of school, while using the opportunity in-school to work collaboratively in teams on projects.

A 2016 report from the World Economic Forum titled “Is online learning the future of education?” highlights this trend, focusing on the issue of access as a key driver for adoption of virtual learning, and recognising the ‘borderless’ nature of schools and education generally in our changing world.

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3 https://www.amazon.com/dp/0071592067?tag=the-new-atlantis-20&camp=0&creative=0&linkCode=as4&creativeASIN=0071592067&adid=05DJX3MS557DRQ8VAC49&
What’s driving this?

There are 3 key drivers behind the escalation of virtual learning in our schools and education system:

**Advances in technology.** The reach and reliability of online services is now at a point where the dream of ubiquitous access is becoming a reality. In addition, the interactive and immersive dimensions of emerging online learning environments provides a richer and more engaging experience for learners.

**Emphasis on learner agency and choice.** The issues of an ever widening curriculum, together with understandings about how learners learn, are increasingly challenging the structures of our traditional, face-to-face schooling system. Virtual learning approaches enable learners to exercise greater choice over *what* they learn, *how* they learn, *when* they learn, and *who* they learn with and from.

**Supply and demand issues.** Possibly the greatest challenge for education systems around the world is the crisis that exists as a result of there not being enough teachers available to fill subject specific roles in traditional schools. As long as we require a subject matter expert to be physically present in every school to work with classes of students, this is unlikely to be resolved. Additionally, many areas of the world are facing levels of demand for education that exceed their ability to build schools and provide teachers in the traditional way. This is the case even in New Zealand, in places like Auckland!

What examples of this can I see?

While virtual education may not be the answer to all of these issues, it is certainly going to be a part of the answer, incorporated into and alongside other forms of educational provision.

In New Zealand, like other parts of the world, students who are unable or unwilling to attend a conventional school have been catered for by distance education providers such as Te Aho o Te Kura Pounamu (The Correspondence School). Increasingly, virtual learning approaches are being used here instead of the traditional print-based materials and occasional email exchange.

The Virtual Learning Network (VLN) Community has been active in New Zealand for over a decade, and has its roots going back into the early 1990s with the CASAtech, TOSItech and KAWM programmes, designed to cater for learners in rural and remote schools by enabling teachers in one school to work with cohorts of students from a variety of other schools.

Both of these groups are likely to be taking advantage of the recently created provisions in the Education Act Update that legislates for the development of **COOLs** (Communities of Online Learning), opening up opportunities for a wider range of providers and allowing learners greater choice regarding the subjects they want to take, and greater professional opportunities for teachers.
Consortia of universities such as Coursera and Udacity are now offering courses online — many of which are free or requiring payment only if you wish to have your work recognised for a credential.

On a more pragmatic level, collaborative online tools such as Google Docs and Office365 provide learners and teachers with opportunities for engagement in learning beyond the classroom.

Further examples of the expansion of virtual learning can be seen in the widespread adoption of providers such as the Khan Academy, that provides ‘mini-lessons’ in video format that can be viewed and reviewed by learners.

In the New Zealand context, the LEARNZ team have been offering virtual field trips for students for nearly two decades, using online technologies to take students into experiences that would otherwise be out of their reach.

How might we respond?

The critical thing to consider in our response to this trend is to see virtual learning not as a threat to traditional education, but as an opportunity to more completely and appropriately meet the needs of our modern learners. Some questions to act as a stimulus with your colleagues include:

- What use are your staff and students currently making of online tools and resources to support their teaching and learning? How might this be encouraged further and considered more ‘mainstream’ in terms of your school’s curriculum provision?

- How might your staff and students benefit from a coordinated use of an online learning environment — be that a LMS of some sort, or Google Classroom or Microsoft Classroom? What benefits would this offer them?

- Are there areas of your current school curriculum that you struggle to meet? How might connecting to some form of virtual learning service benefit your students who might otherwise be denied that opportunity?

- How might your staff take advantage of virtual learning approaches to access the professional learning that they require or desire?
Virtual Learning readings

NZ Virtual Learning Network Community (VLN-C)

Supply and demand — the big issue facing schools in the future

Virtual School Meanderings — Michael Barbour’s blog
https://virtualschooling.wordpress.com/

Is online learning the future of education? (World Economic Forum)
https://www.weforum.org/agenda/2016/09/is-online-learning-the-future-of-education/

What is flipped learning? (PDF)

The Flipped Classroom — Education Aotearoa
http://www.ea.org.nz/1034/

Definition of Blended Learning — FlipThought

The case for blended learning (Video) Khan Academy

Khan Academy — free online courses, lessons and practice
https://www.khanacademy.org/

Coursera — online courses from top universities
https://www.coursera.org/

Udacity — free online courses and nano-degrees
https://www.udacity.com/

LEARNZ virtual field trips
http://learnz.org.nz/

Online Professional Learning (CORE Education)
http://www.core-ed.org/professional-learning-solutions/online/
BC LearnNow — free services that support student-centered learning for K-12 students and adult learners
https://www.learnnowbc.ca/

20 Best learning management systems (2017 update) eLearning Industry

Best learning management systems of 2017 (PC Magazine)

Case study of the CASAtech and TOSItech distance learning projects
https://ir.canterbury.ac.nz/handle/10092/2869

Evaluation of Kaupapa Ara Whakawhiti Mātauranga (KAWM) project
Collaboration

What’s it about?

As we move well into the 21st century, collaboration is widely embraced across all areas of our system, from what happens within classrooms between students, to what happens within schools among staff, to what happens between schools and other agencies.

Collaborative approaches are foundational to effective pedagogy in education, as well as in the way schools themselves function in an increasingly networked world. The ability to work effectively with others is a key element of employability and a key desirable outcome of a successful educational system. Those who are able to work in teams and who can use and promote a ‘collective intelligence’ are often sought after employees, as well as effective leaders in education and business settings. This means there is a real urgency to learn how to work collaboratively as well as collaborative practice underpinning effective education.

Collaboration is different to cooperation. Collaboration requires working with specific intent, agreement to a common purpose or goal, and to a common way of achieving that. Fullan (2013) describes the collaborative power of a group as social capital that along with the talent of individuals (human capital) and the wisdom and expertise to make sound judgments about learners that are cultivated over many years (decisional capital) are the anchor stone of professional capital — the capital that is found in countries that are more equal, higher-attaining, more healthy in just about every way that counts. Teachers in these countries are nation builders, as they build social cohesion, and social justice.

Collaboration is built on a foundation of mutual trust and respect. There is an underpinning expectation of vulnerability and exposing one’s own practice to critique and feedback. The focus is generally on improvement and often some form of critical reflection (formal or informal) supports the development of collective skill and expertise. Through working closely together and working towards a well understood and aligned vision, members of a team are able to maximise their efforts. There are explicit and implicit ways of working that value ‘positive abrasion’ and encourage diversity of thought and new ideas.

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4 http://www.educationalleaders.govt.nz/Leading-learning/Collaborative-cultures/Promoting-collaborative-learning-cultures
When working collaboratively individuals and whole organisations can more effectively:

- Learn from each other and from different parts of the organisation
- Innovate, prototype and embed change quickly
- Generalise effective practices and process quickly and effectively
- Avoid repeating errors and ineffective practice.

**What’s driving this?**

Our world is becoming more complex, requiring the collective intelligence of the many to address the ‘wicked problems’ we face on a day to day basis — most of which are beyond the capacity of any individual. We see this reflected in the way the modern workforce is organised — the work used to be the domain of an individual, now there are teams involved using their respective strengths and abilities, to achieve the common task.

Educational institutions are certainly not exempt. Embracing collaboration must be fundamental to the way these organisations actually work. It is not sustainable for individual teachers to assume responsibility for the wide range of tasks and roles expected of them in the past — ‘isolated’ in the way they operate with groups of students in individual classrooms. Individual schools cannot continue to operate in isolation, competing for resources, staff and students. Education into the future must be fundamentally more collaborative at every level.

A second significant driver from an educational point of view is our understanding of collective teacher efficacy (CTE) which refers to a staff’s shared belief that through their collective action, they can positively influence student outcomes. With an effect size of 1.57, CTE is ranked as the **number one factor** influencing student achievement (Hattie, 2016). According to the Visible Learning Research (Table 1), CTE is beyond three times more powerful and predictive of student achievement than socio-economic status. It is more than double the effect of prior achievement and more than triple the effect of home environment and parental involvement. It is greater than three times more likely to influence student achievement than student motivation and concentration, persistence, and engagement.

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What examples of this can I see?

Collaborative activity is growing in several areas of our education sector. Often they are organisations that reaching into schools as they see that through working together on local, national, and global issues there will be better outcomes for all.

Student-student collaboration
- **Passionfruit** — a curriculum integration project at secondary school
- **Language learning** — a collaborative approach supported by technology

Teacher-teacher collaboration
- **Strategic planning** — describing how the senior leadership team operates at Pakuranga College
- **Collaboration and PLD across the Katote Cluster**
- **Collaborative teaching in a year 5–6 innovative learning environment** (video)

School-school collaboration
- **Manaiakalani Project** — a collaborative education programme achieving significant improvement in student achievement outcomes for 12 mostly decile 1A schools in the Auckland suburbs of Glen Innes, Pt England and Panmure.

School-wide community collaboration
- **Grow Waitaha** — collaboration between schools, Ministry of Education, local iwi and professional learner providers that supports schools and learners through the process of change happening in Canterbury
- **Communities of learning/Kāhui Ako** — learning partnerships forging new collaborative arrangements that extend the reach of individual schools to community organisations.
- **Sticks and stones** — a student led collaboration focused on taking positive action online to stop both Bullying online or in person.
How might we respond?

The shift to a truly collaborative culture in schools presents significant challenges within a system that has been traditionally very hierarchical.

Some questions to act as a stimulus with your colleagues include:

- What examples of student-student collaboration can you identify are happening regularly in your school? Are the skills and dispositions that students need to collaborate successfully identified and explicitly addressed through the school?
- How are staff currently engaged in collaborative approaches to designing and implementing learning programmes in your school? Are they supported to develop the skills and dispositions to be successful in this, and to deal with the ‘creative abrasion’ that occurs? Is there a shared understanding of the goals being pursued, and of the protocols and processes for working collaboratively?
- If you are a part of a cluster, how are you working to ensure you are collaborating effectively? What frameworks or supports are you using?
- What opportunities for collaborating with parties outside of your school might be pursued (i.e. parents, businesses, support agencies etcetera).

Collaboration readings

TKI/Enabling eLearning:

Communities of Learning | Collaboration (Note: The Resources tab also contains a lot of new resources to support CoLs collaborating)
http://elearning.tki.org.nz/Leadership/Communities-of-Learning

Collaboration and PLD across the Katote Cluster

Getting started in an ILE | Working collaboratively (open the collapsible to access the content)

Collaborative teaching in a year 5–6 innovative learning environment (video)

Snapshots of learning | Teacher inquiry — many of the spirals of inquiry snapshots are done collaboratively, the focus of the snapshots is the inquiry process rather than the collaboration process in itself. However you can draw conclusions and make comments on the benefits of collaboration to support change in teacher practice across a team.
http://www.elearning.tki.org.nz/Teaching/Snapshots-of-Learning/Search/(type)/1/(tag)/51
Using digital technologies to support learner agency | Seven principles of learning |
Social nature of learning (scroll down and open the Social nature of learning collapsible to access the content)
http://www.elearning.tki.org.nz/Teaching/Learner-agency

The Portal Unity Project (video) — this video, while focused on Daniel telling his story - it is underpinned by collaboration. He worked with 4 friends to create the Game mod, they had a mentor, connected with an online expert, and finally their game was picked up by PC gamer.

Some other links across TKI and wider:

Communities of Learning | Kāhui Ako: Collaboration to improve learner outcomes

Communities of Learning: Working toward collaborative practice

Community of Schools — Tips and starters: Working together

ED Leaders | Collaborative cultures
http://www.educationalleaders.govt.nz/Leading-learning/Collaborative-cultures

ED Leaders | Promoting collaborative learning cultures
http://www.educationalleaders.govt.nz/Leading-learning/Collaborative-cultures/Promoting-collaborative-learning-cultures

Ideas into action for school and system leaders: Promoting collaborative learning cultures: Putting the promise into practice

ED Leaders | West Auckland principals collaborate (ED Leaders has masses of principals collaborating stories)
http://www.educationalleaders.govt.nz/Leading-learning/Collaborative-cultures/West-Auckland-principals-collaborate

NZ Curriculum Update | Achievement; building and working with a collaborative team — “Building a collaborative team requires commitment to the principle of inclusion and a clear understanding of what it means for the school, the student, and their family and whānau.”

Inclusive Education | Supporting positive peer relationships | Structuring your classroom to facilitate collaborative learning (a suggestion from the guide)
http://inclusive.tki.org.nz/guides/supporting-positive-peer-relationships/
CORE Resources:

**Collaboration Framework** — a Collaboration Matrix that addresses key considerations for those seeking to establish collaborative learning communities across a number of schools. Free to download this guide.

**Catalyst, a collaborative inquiry game** — excellent for introducing staff to the process of collaborative inquiry
http://www.core-ed.org/shop/catalyst/

**More than parallel play** — blog post
http://core-ed.org/legacy/thought-leadership/blog/collaboration-%E2%80%94-so-much-more-parallel-play

**Collaboration matters** — blog post
http://core-ed.org/legacy/thought-leadership/blog/collaboration-matters

**Getting started in an ILE | Working collaboratively**

**Snapshots of learning | Teacher inquiry** — many of the spirals of inquiry snapshots are done collaboratively, the focus of the snapshots is the inquiry process rather than the collaboration process in itself.
http://www.elearning.tki.org.nz/Teaching/Snapshots-of-Learning/Search/(type)/1/(tag)/51

Research:

**Politics of Collaborative Inquiry**

**10 reasons for collaboration**

**Tribes, institutions, markets, networks** — a framework about societal evolution — David Rondfeldt
https://www.rand.org/content/dam/rand/pubs/papers/2005/P7967.pdf

**Powerful Learning:** Studies Show Deep Understanding Derives from Collaborative Methods
https://www.edutopia.org/inquiry-project-learning-research
Video Resources

EDtalks:

Collaboration beyond sharing — suggest you start the video at 1:41, “There are four key areas to consider for effective collaboration...”
http://edtalks.org/#

Patrick Lencioni on Trust
https://www.youtube.com/watch?v=m09n81lB2BA

PL on Teamwork
https://www.youtube.com/watch?v=iJTtKVe-hQ

PL on difference between accountability and conflict. Key part of collaboration
https://www.youtube.com/watch?v=cNkHZojrCPo

Professional Learning

Workshops:
http://www.core-ed.org/professional-learning-solutions/
- Introduction to collaborative practice in the primary school
- Extending collaborative teacher practice in the junior primary school
- Extending collaborative teacher practice in the middle and senior primary school
- Collaborative practice in the Secondary school
- Leading collaborative change
- Becoming a connected Educator and Developing a professional learning network

Online Programmes:
MLP (Middle Leadership Matters)
http://www.core-ed.org/professional-learning-solutions/online/middle-leadership-matters/

Conferences:
uLearn
http://www.core-ed.org/events/ulearn/
Deep Learning Lab
Process

Data Science

Data science is about large data sets, and it is also about data and information from lots of settings. We need to know how we can benefit from data science, while at the same time being aware of how it impacts on our behaviour.

What’s it about?

Data science is a recent term. Nate Silver said, as part of his keynote address in 2013, “I think data-scientist is a sexed up term for a statistician” but by 2014, the American Statistical Association renamed one of its journals to “Statistical Analysis and Data Mining: The ASA Data Science Journal”, and by 2016 had changed it to “Statistical Learning and Data Science”. Data science is about large data sets, and it is also about data and information from lots of settings.

Data scientists are sought after, as more businesses, government agencies and international organisations have massive computing power combined with equally massive data sets (everything from digital photos to personal data) available to them, and want to apply machine-learning techniques to a wide range of problems. For this reason, a 2012 Harvard Business Review article was headed “Data Scientist: The Sexiest Job of the 21st Century”. Universities are now setting up data science learning programmes to meet this need. Data scientists are now the most desirable (and well paid) jobs in the US!

Data scientists’ most basic, universal skill is the ability to write code. They also need to communicate in language that all their stakeholders understand—to tell stories with data, whether verbally, visually, and ideally both as an infographic. Most importantly they need to be intensely curious—to have a desire to go beneath the surface of a problem, find the questions at its heart, and distill them into a very clear set of hypotheses that can be tested. This curiosity characterizes the most creative scientists in any field.

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What’s driving this?

Increasingly we see evidence of how data science and analytics are used in decision making across multiple sectors today, and expert opinion on what the future might hold. The focus on data science in this trend recognises the related areas of Big Data and Data Analytics that have been the focus of previous trends in the CORE Ten Trends series.

We need to know how we can benefit from data science, while at the same time being aware of how it impacts on our behaviour. For example, it can make our life easier:

- **Internet search** — every search engine nowadays is making use of data to provide you with the best results — in just seconds!

- **Digital advertisements** — ever wondered how the sites you visit know how to display advertisements for the sorts of things you are interested in?

- **Recommender systems** — think of how Amazon is able to recommend other books for you based on what you’ve been searching for, or how even Netflix now uses a percentage system to show the match of a show to ones you have watched before.

- **Price comparison websites** — aggregating data from dozens of other sites and representing it to you in seconds.

We can also be misled as information, ideas, or beliefs are amplified or reinforced by communication and repetition inside a defined system (such as Facebook). Those who write about this have used the metaphor of an echo chamber - a situation in which official sources often go unquestioned and different or competing views are censored, disallowed, or otherwise underrepresented.

**Machine learning has enabled us to unknowingly ignore the diversity around us. It’s bad enough being uninformed about a topic you’re passionate about. It’s far worse to falsely believe you’re fully informed on that topic.**

*Blame Machine Learning for Your Echo Chamber* by Derek Hsiang.

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9 [https://medium.com/@derek.hsiang/blame-machine-learning-for-your-echo-chamber-def570a18829](https://medium.com/@derek.hsiang/blame-machine-learning-for-your-echo-chamber-def570a18829)
What examples of this can I see?

One of the benefits of data science is that the information can be in any format - so not just achievement information... and can come from any source — not just from schools/kura or early years settings.

Data science is helping us in education. Consider the following examples:

- **e-asTTle** — the NZ developed online learning and assessment tool that provides accessible information in the form of a graphical dashboard.

- **PaCT** (progress and consistency tool) — aggregating data to support professional judgments in reading, writing and mathematics.

- **Secondary tertiary transition app** — data from schools and tertiary setting to see what young people do over time after leaving school.

- **Public Achievement Information (PAI)** — collection of infographics that summarise a wide range of education topics.

How might we respond?

One gnarly challenge of education is how do we spread what works? How do we deeply understand the challenges we face in the education sector and learn from each other? At the moment we have a large number of closed systems — each school, each kura and each early years centre is separate from others. There is no large source of data and information to draw on and learn from. Imagine if we saw education as an ecosystem (as described in Derek Wenmoth’s think piece on leadership[^10]), that was an open system with a multitude of tools, technologies and platforms that worked together, just how much we could learn from each other. We could develop tools that would use data and information to identify what works where, when and why, that could then support teachers with similar students.

We are starting to develop more open Communities of Learning | Kāhui Ako in which data and information from a range of sources such as school-based Student Management Systems (SMS), Learning Management Systems (LMS), health, social welfare, local community data can be shared, for the benefit of supporting individual young people to succeed.

The New Zealand Future Focus Forum identified four principles to help New Zealanders navigate the data future.

These principles can be applied at a school, kura or early years setting, or at a Community of Learning | Kāhui Ako setting.

- **Value**: New Zealand should use data to drive economic and social value and create a competitive advantage.
- **Inclusion**: All parts of New Zealand society should have the opportunity to benefit from data use.
- **Trust**: Data management in New Zealand should build trust and confidence in our institutions.
- **Control**: Individuals should have greater control over the use of their personal data.

At a national setting, education agencies along with other social sector agencies are using the protocols and data science to help people to know what to do, and also to evaluate whether what they do is good enough. They have access to wide ranging data held in systems run by government that encompasses social, health, justice and other agencies. These same principles can help all educators, whether working in a closed setting or a more open one, to think about what we do with data and information and how we support our young people to think as data scientists.

### Some questions to act as a stimulus with your colleagues include:

#### Being transparent in our use of data and information

Do educators have protocols, governance, and practices that support the use of data and information that:
- supports all young people to experience education success and have choice in the pathways they chose to participate in life, education and citizenship?
- is inclusive — in what we collect or don’t collect and how we use it?
- those who should benefit trust us to use the data and information in ways that will benefit them?
- those who own the data and information can say what we can use and how?

**Supporting our young people to have the capabilities to be data scientists**

Do we design and orchestrate learning opportunities for young people that enable them to develop:
- coding and computation skills for algorithms?
- perspective taking, to want to understand problems from different points of view?
- critical inquiry; including curiosity and questioning about where the data and information has come from and whose voices are missing?
- story telling skills (visual, with data and with words, infographics) in ways that support others to take action?

#### Supporting our young people to be transparent in their use of data

Do we design and orchestrate learning opportunities for young people to develop protocols and practices that support the use of data and information that follow these four principles; value, inclusion, trust and control?
Data Science readings

Data science vs big data vs data analytics — useful info graphic

What is data science — Berkley School of Information
https://datascience.berkeley.edu/about/what-is-data-science/

13 Uses of Data Science today
https://www.analyticsvidhya.com/blog/2015/09/applications-data-science/

3 ways to use data to improve your teaching — Edutopia

The use of data science for education: The case of social-emotional learning (Springer)

Fixing education with big data — turning teachers into data scientists

Big Data:

What is big data? — what it is and why it matters

Four ways big data will revolutionise education
https://datafloq.com/read/big-data-will-revolutionize-learning/206

Big data and analytics can change education in three positive ways

Data Analytics:

What is data analytics?
http://searchdatamanagement.techtarget.com/definition/data-analytics

Analytics is taking education in a new direction
Learning analytics — CORE’s ten trends 2014

Learning analytics — CORE’s 10 trends 2015

Data driven organisations — CORE’s 10 trends 2016

New Zealand education use of data science:
The Progress and Consistency Tool (PaCT) — NZ Ministry of Education
https://pactinfo.education.govt.nz/

e-asTTle — online learning and assessment tool
https://e-asttle.tki.org.nz/

Public Achievement Information (PAI) — collection of infographics that summarise a wide range of education topics
https://www.educationcounts.govt.nz/topics/national-education

Secondary to Tertiary Transition App

Schools collecting holistic student data using a SMS for the purposes of making interventions, strategic planning, supporting teacher inquiry, and communicating with whānau:

- Principal at Nayland College, Daniel Wilson, discusses the three ways they are using KMAR to track and monitor student progress and achievement throughout the school.

- Principal at Konini School, Michael Malins, shares how they facilitate and keep record of teacher inquiry.

- Principal at Tawhai School, Matt Skilton, says that for strategic planning, having access to an SMS on data and analysis is vital.

- SMS — Connecting parents, students, and teachers

- SMS — Informing behaviour management strategies

- Student Record Transfer — Efficient data sharing between schools
Economic

Automation

“Any teacher that can be replaced by a computer deserves to be.”

David Thornburg

What’s it about?

The steady rise in automation of tasks that are repetitive or routine has been occurring since the start of the industrial revolution. In past decades we’ve seen robots replacing humans on assembly-line production of everything from cars to toasters.

In education, this includes a potential growth in human-machine interfaces that are capable of providing much more personalised, accurate and timely responses than a teacher with a class of 20 plus learners.

This thinking is not new. In 1954 B.F. Skinner embarked upon a series of studies designed to improve teaching methods for spelling, math, and other school subjects by using a mechanical device that could surpass the usual classroom experience for learners.

Only recently, as the level of technical sophistication combined with advances in artificial intelligence has grown exponentially, have we seen tasks previously considered unable to be automated now being taken over by robots with a wide range of ‘pseudo-human’ characteristics.

Building on the work of Skinner and others, researchers at the University of Arizona created what they call Knewton, a computerized-learning program that features immediate feedback and adaptation to students’ learning curves. In the near future this may develop even further as we see developments in the direct connections being made between computers and the human brain.
What’s driving this?

The belief that technology can automate education and replace teachers is pervasive — and certainly not new. The idea of introducing ‘teaching machines’ to eliminate the grossly inefficient and clumsy procedures of conventional education\(^\text{11}\) was written about as early as the 1930s, the intention being to free teachers from routine tasks and to be ‘real teachers’ instead of ‘clerical workers’.

This relentless pursuit of efficiency in our education system is frequently highlighted when arguing the case for introducing more educational technology products into schools and classrooms — just look at the advertising collateral from many of the hardware and software products being sold into schools.

This perspective is also reflected in discussions among teacher unions who argue for acknowledgement of time being taken for ‘administrative’ tasks when negotiating their terms and conditions for employment.

Then there are those who regard teaching as purely the transmission of knowledge who argue we’re at the point where the internet pretty much supplies everything we need — and that we don’t really need teachers in the same way anymore.

Key arguments for pursuing the use of robots and AI in education include:

- The automation of basic activities in education, such as marking and assigning grades or standards
- The adaptability of software to meet learner needs
- Providing the ability to point out places where courses need to improve based on learner feedback and performance
- Providing extra support for learners when and where needed, including affective responses
- The provision of timely and targeted feedback
- Ability to alter ways students find and interact with information based on their preferences and learning style
- Catering for (and even encouraging) learning from mistakes — through trial and error.

\(^{11}\) Pressey, S (1933) Psychology and the new education, Harper & Brothers
What examples of this can I see?

While it is easy to dismiss such talk as being ‘over the top’, and arguing that ‘real’ teachers can never be replaced, it is worth taking note of the fact that many of the service industries previously thought to be ‘safe’ from intrusion from robots and artificial intelligence are finding they’re not immune. The list of professions where key tasks are being automated in this way include everything from accountants, lawyers and financial advisers, through to counsellors, doctors and call-centre operators. In these examples, sophisticated artificial intelligence (AI) solutions, capable of learning, sensing and responding to emotion and of responding almost immediately with feedback based on a vast store of ‘cases’ that are searched and synthesised in a nano-second, are being used to replace what only humans have done previously — and with greater accuracy and immediacy than humans are capable of.

Because so much of what happens in our education system is premised on the daily interactions of teachers and students in traditional classroom settings, it’s not as easy to imagine where this change is happening, but consider the following:

**Adaptive learning systems** — where the power of technology is used to transform the learner from passive receptor of information to collaborator in the educational process. So much of what has happened in the exponentially growing ‘gaming’ field is being used to inform this.

**Video micro-teaching** — initiatives such as the Khan Academy are providing video versions of micro-lessons that can be searched for, viewed and reviewed at the exact time and place required by the learner.

How might we respond?

While the talk of automating any human activity, including teaching, frequently causes concern about what will be lost, the more appropriate response is to consider what new opportunities for teaching and learning might be achieved if we had better “thinking machines” to assist us? Instead of seeing work as a zero-sum game with machines taking an ever greater share, we might see growing possibilities for participation in this process. We could reframe the threat of automation as an opportunity for augmentation.

Some questions to act as a stimulus with your colleagues include:

- What are the tasks we currently do in our jobs that we’d consider repetitive and routine? How might these be automated?
- Are there examples of where this has already happened that we can think of? If so, what new opportunities have emerged in terms of how we use our time and talents?
- What are we teaching in our curriculum that is preparing our learners to think about a world where many of the jobs their parents do currently may no longer exist due to automation? What new skills are going to be required? And how are we intentionally developing these?
Automation readings

The Rise of the Useless Class by Yuval Noah Harari
https://ideas.ted.com/c/ideas.ted.com/the-rise-of-the-useless-class/amp/

What happens if robots take the jobs? The impact of emerging technologies on employment and public policy — Darrell West, Brookings Institute

Economists may be underestimaing how fast robots are coming — Bloomberg

54% of all jobs could be replaced by Technology — Mckinsey report, 2016

How to prepare your kids for the robot revolution — Liam Dann, NZ Herald

The definitive guide to eLearning automation — Christoforus Pappas, 2016

How technology will change the demand for teachers — Michael Hansen, opinion piece

https://hbr.org/2015/06/beyond-automation

The rise of teaching machines — Chronicle of Higher Education, 2011

Connecting computers to our brain to keep up with robots — Elon Musk

What is neural lace? (describes the developments in computer to brain interface)

10 roles for artificial intelligence in education — Teachthought, 2014
There’s currently a surge of interest in programmes targeting Science, Technology, Engineering and Maths (STEM), focusing on educators and others looking at where the jobs are right now and into the future.

What’s it about?

There’s currently a surge of interest in programmes targeting Science, Technology, Engineering and Maths (STEM), focusing on educators and others looking at where the jobs are right now and into the future. The critical thing about STEM education is that it is intended to be an interdisciplinary curriculum. Rather than teach these four disciplines as separate and discrete subjects, STEM integrates these core subjects into “interdependent” learning units based on real-world applications.

The drivers behind STEM are a significant contributor to the development in New Zealand, of the recently announced Digital Technologies Curriculum and the steady rise in interest and participation in initiatives such as the Maker Movement and Coding programmes in schools.

What’s driving this?

Behind the STEM focus is an economic imperative based on ensuring our current and future workforce are prepared for a STEM-based economy in the future. There are two basic drivers behind this approach, both deserving attention, but often the first is emphasised at the expense of the second.

1. Current skills shortages

Across the globe, there are reported shortages of workers with the necessary skills to fill positions in tech-based industries. If we are to meet this growing demand, there is an urgent need to ensure young people are given the opportunity to experience and develop an interest in the key areas of science, maths and technology so that they emerge from school ready to take up roles in these sorts of industries. The response to this driver is often seen in the provision of more STEM subjects as discrete parts of the curriculum.

2. Future skills shortages

Considering what skills a future workforce will need leads to a greater focus on the development of integrated or interdisciplinary approaches, and on
the development of competencies and transferable skills. Rather than focus purely on specific skill development, the emphasis here is on innovation and design. Purists in the STEM movement argue this is where the focus must be.

The emphasis on innovation leads to some of the counter-arguments being made to a ‘purely’ STEM approach. Innovation is not simply a technical matter but rather one of understanding how people and societies work, what they need and want.

It involves a broader set of skills that includes creativity and communication for example. Innovation is built on the successes and failures of the past, and of the potential impact on society into the future — thus requiring knowledge of history and development of citizenship. No nation will achieve success in the 21st century simply by making cheaper computer chips, but instead by constantly reimagining how computers and other new technologies interact with human beings.

What examples of this can I see?

Evidence of the uptake of STEM in New Zealand schools is now apparent in all levels of our schooling system (see Readings list for further information):

**Maker spaces** — specialist workshop areas where learners are encouraged to pursue ideas for building/creating solutions involving use of a wide range of tools and technologies. These are appearing both within schools and in public places such as libraries.

**Code clubs** — a variety of initiatives such as CodeClub Aotearoa and Code Avengers have emerged to support students learning coding. Most of these operate out of school hours, although there is a growing amount of resource to support teachers with their in-school programmes.

**Robotics** — whether using kits such as the Lego Mindstorms or building from scratch, having teams of students pool their skills to build robots that they then enter into competitions to test the robustness of their design, is an extremely successful way of engaging learners in STEM subjects.

**Science fairs** — these have been around for years, but a growing number now are focused more deliberately as events for students to showcase the outcomes of their genuine inquiry and teamwork in STEM areas.
How might we respond?

The focus on STEM is creating opportunities for robust discussion within schools and their communities about what is important for young people to be learning. Some questions to act as a stimulus with your colleagues include:

- What priority is given to the teaching/learning of science, technology, engineering and maths in your school? Are these taught as separate subjects or in integrated ways?

- How could you provide even more integrated approaches to STEM education in your school? Are the learning experiences that you create based in authentic contexts for the learners?

- How are you engaging with expertise outside of your school to ensure students have access to the best thinking and advice in STEM subjects?

- What about the other areas of the curriculum such as social sciences, languages and the arts? What is your school’s position on this? How might they complement the work in STEM and be included in any integrated approaches to learning that you plan?

STEM readings

Digital Technologies Curriculum:

- Digital Technologies Guidelines (NZ Ministry of Education)
  http://dtg.tki.org.nz/

- Digital Technologies and the national curriculum (NZ Ministry of Education)

Maker movement:

- A brief history of the Maker Movement
  https://curiositycommons.wordpress.com/a-brief-history-of-makerspaces/

- Maker Culture (CORE Education ten trends 2014)

- Designing a school maker space (US example)
  https://www.edutopia.org/blog/designing-a-school-makerspace-jennifer-cooper

- Setting up a school maker space (Australian example)
  http://makerspacesaustralia.weebly.com/setting-up-a-school-makerspace.html
Coding initiatives:
CodeClub Aotearoa
https://www.codeclub.nz/
Code Avengers
https://www.codeavengers.com/
TechGirls Movement
http://www.techgirlsmovement.org/

STEM in the news:
So why the STEM push? (EducationHQ NZ)
STEM in NZ primary schools (NZ Herald article)
http://www.stuff.co.nz/national/education/85799549/STEM-programme-bringing-innovation-into-primary-schools
STEM — Linwood College experience
http://www.techlink.org.nz/stories.cfm?area=10&SID=244

Robotics:
Robocup Junior — NZ robot building competition
http://www.robocupjunior.org.nz/
Vex Robotics competitions — Massey University
http://www.massey.ac.nz/massey/learning/colleges/college-of-sciences/about/engineering-technology/events/vex-robotics/vex-robotics_home.cfm
7 Reasons your school should teach robotics
http://www.eschoolnews.com/2015/01/13/robotics-stem-166/

NZ Tech Scene:
NZTech — promoting the NZ Tech sector
http://www.nztech.org.nz/
NZ needs to raise the tech bar
Not enough people to fill tech jobs
As teaching and learning increasingly take place in a flexible online environment, AI is becoming an interesting and promising innovation in education.

What’s it about?

The term ‘artificial intelligence’ (AI) was coined in 1956, however recorded history indicates that the notion of AI and attempts to create it have been around for a while. In 1949, Computer scientist Alan Turing, considered to be the father of theoretical computer science and artificial intelligence stated:

“I do not see why it (the machine) should not enter any one of the fields normally covered by the human intellect, and eventually compete on equal terms.”

Since Turing’s observation, artificial intelligence has developed exponentially. As a sub-field of computer science, AI focuses on the development of intelligent machines that work and react like humans. Today, the broad goal of AI is to better support the global workforce and individuals in their daily lives. As teaching and learning increasingly take place in a flexible online environment, AI is becoming an interesting and promising innovation in education.

“The recent developments in AI and machine-learning are a major exception with the potential to revolutionise how young people learn, teachers and tutors teach, and how society drives forward learning in the future.”

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What’s driving this?

Current developments in AI indicate how this field may change the learning process and impact on education. AI-based tutors (Intelligent Tutor Systems) are being created to complement in-class teaching, with programmes that:

- analyse interaction data to provide insights into the user behaviour of both teacher and student;
- find positive and negative teaching and learning patterns.

Some computer scientists argue that AI will not replace teachers but support them to become better teachers. Many of the aims in the development of AI are to provide platforms that better:

- monitor student responses to warn teachers that extra support is required;
- provide realtime feedback on a user’s progress;
- inform a teacher’s performance;
- assist teachers and schools to create textbooks and exercises that are customised to the needs of their specific courses and students;
- work within simulated and gamified virtual reality-type learning experiences that help engage learners;
- assist students to adopt productive learning behaviours, such as self-regulation and self-explanation.¹⁶

What examples of this can I see?

AI has the potential to enhance online learning using adaptive learning software and simulations in ways that more intuitively respond to and engage with students. Today, perhaps the most popular incarnations of AI have materialized in a growing host of virtual assistants, including Alexa, Cortana, and Siri. Chatbots are one form of AI that can potentially support students as personal, virtual tutors that could facilitate more opportunities for real-time interaction and feedback. As the technology becomes more refined, these AI advisors will be better equipped to interpret and respond to the subtleties of linguistics, gestures, and tones that vary in all learners. AI has tremendous potential to enhance creative inquiry and informal learning. The days of learners poring over pages of search results to uncover the most relevant graphic design tutorial or niche scholarly work are numbered, as AI recognizes users based on their previously specified interests and quickly returns fine-tuned data that will be most useful to them.¹⁷


The implications of AI on education

Reinforcement-learning algorithms, currently being developed as a mechanism of AI are going to get increasingly ‘data smart’. This means that interactive data and statistical techniques will help an educational programme to best ‘reason’ on what is the next best course of action to take for a particular teacher or learner. Computer scientists at Stanford University and the University of Washington are currently collaborating on the creation of a tutoring system that learns from the behaviour of its users and the feedback it receives from people. This informs the programme if its curriculum isn’t enabling all students. In turn, the programme adapts to the learning needs and capabilities of individuals. Learning can be made explicit for both teachers and students as the continuous analysis of interactions helps a teacher understand an individual’s approach and learning style in a given situation. This allows the teacher to adapt their teaching approach to better suit the needs of their student. It also has positive implications for teachers dealing with growing class sizes, yet endeavouring to personalise learning for every student in the classroom. Emma Brunskill, an assistant professor of computer science at Stanford University states:

“Such human-computer collaborations could help students to learn using approaches we can’t yet imagine. This vision of reinforcement learning has artificially intelligent agents redefining what outstanding human performance looks like—and enabling all of us to achieve it.”

The implications of AI on the workforce

AI is and will have a significant impact on the human workforce. In our everyday lives, an example of an area where AI is impacting on a current workforce is in intelligent writing systems — where so many of the articles and reports we read in newspapers and magazines nowadays are actually written with AI. Data-rich areas such as economy and sports are relatively easy for AIs to write about.

Another development is the evolution of AI enhanced robots. This reflects a movement beyond automation; that is simply about replacing tasks that are routine to ‘era three’ of automation; where machines take away the decision-making responsibility of humans.

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19 https://hbr.org/2015/06/beyond-automation
How might we respond?

In education, AI is advancing steadily with the growth of intelligent tutoring systems\textsuperscript{20}. The aim for some is that technological advancements such as these systems, as well as AI enhanced robots, do not replace human teachers. The hope is that there is a balanced blend of human and artificial intelligence to help inform teaching practice to meet the personalised needs of every learner. What is evident however, is that AI will have an increasingly significant impact on the role and nature of teachers’ work and a profound change in teaching and learning is on the horizon.

Some questions to act as a stimulus with your colleagues include:

- How could the development of AI in the education space impact on our teaching practice?
- How might AI benefit students who are disengaged with a subject, or who are lacking in skills or confidence?
- What are the implications around data being collected – will it be secure and ultimately benefit students?

Artificial Intelligence readings

Examples of educational platforms utilising or exploring Artificial Intelligence:

Thinkster math: Thinkster is a tablet-based math learning program that combines world-class curriculum with personalization from real, experienced teachers and artificial intelligence. http://hellothinkster.com/

Carnegie learning: A math education company that uses intelligent software to support individual and group learning. https://www.carnegielearning.com/

Third space learning: An online math tutoring programme, Third Space has launched an AI project that aims to find positive teaching and learning patterns. https://www.thirdspaceteaching.com/

Brainly: A social network that helps millions of students collaborate, is exploring the power of AI on its platform. https://brainly.com/

2018 Links:

How Artificial Intelligence enhances education: Founder of TechTalks, Ben Dickson shares the way companies are developing AI-powered tutoring systems to leverage reinforced learning and tell if its current curriculum isn’t enabling all students to learn well, then asks people questions to self-optimize the system. https://thenextweb.com/artificial-intelligence/2017/03/13/how-artificial-intelligence-enhances-education/#.tnw_qirnGnzq

How artificial intelligence is changing education: This article describes how machine learning finds patterns in data, teachers so can glean actionable insights from student performance and make informed and efficient decisions in helping steer them in the best direction. https://bdtechtalks.com/2017/03/09/artificial-intelligence-education-edtech/

\textsuperscript{20} https://library.educause.edu/resources/2013/7/7-things-you-should-know-about-intelligent-tutoring-systems
How AI will transform education in 2018: Dee Kanejiya is the founder and CEO of Cognii, a leading provider of artificial intelligence technology to education industry presents ideas about his AI. In particular, how it can play an important role in improving the quality and affordability of education.  

Examples of AI in education: 2016
The future of artificial intelligence in education: This Forbes article outlines some of the possibilities of artificial intelligence to make significant contributions to education.  
10 roles for AI in education: Education could look a whole lot different a few decades from now. This article outlines the role AI has in this change.  

Papers 2016:
Intelligence Unleashed. An argument for AI in Education: Published by learning company Pearson, the authors in this paper suggest the concept of AI as a “lifelong learning companion”, gathering data about children and assisting them as they grow and develop their knowledge.  

The NMC/CoSN Horizon Report: 2016 K-12 Edition: This report examines emerging technologies for their potential impact on and use in teaching, learning, and creative inquiry in schools.  
http://cdn.nmc.org/media/2016-nmc-cosn-horizon-report-k12-EN.pdf

Why we should take AI in education more seriously: Highlighting points in a publication about existing and emergent technology that could be leveraged to address some of the most intractable issues in education, including achievement gaps.  

Research:
Tanja Mitrovic, University of Canterbury  
http://www.canterbury.ac.nz/engineering/contact-us/associate-dean/tanja-mitrovic.html

Video:
Artificial intelligence and the future of education systems  
https://www.youtube.com/watch?v=ZdHhs-I9FVo
What is machine learning and AI’s place in education?  
https://www.youtube.com/watch?v=QNz6zE4c6wl
Artificial Intelligence will make our kids better learners  
https://www.youtube.com/watch?v=A6pTHTf0ktw
AI in Education  
https://www.youtube.com/watch?v=gnQwa71HrLI
Learner Agency

“Having agency as a learner is now becoming a default expectation”, to meet learning needs.

What’s it about?
Learner agency is about having the power, combined with choices, to take meaningful action and see the results of your decisions. It can be thought of as a catalyst for change or transformation. Within a school context, Learner Agency is about shifting the ownership of learning from teachers to students, enabling students to have the understanding, ability, and opportunity to be part of the learning design and to take action to intervene in the learning process, to affect outcomes and become powerful lifelong learners.

What’s driving this?
Moral imperative — drivers for agency or agentic practices
Learner agency is not a new concept, but it is definitely something that has come into the spotlight and quite rightly needs attention in our education system.

Agentic children turn into agentic adults. We have all heard the words “Successful people, act on their beliefs” and this is true in the light of agency. Therefore the moral imperative lies not just in the social and emotional wellbeing — it is an innate characteristic that must be acknowledged and addressed.

As explored by (Zhao, 2015) the world is faced with two paradoxical crises: massive youth unemployment and equally massive talent shortage. These must not be allowed to continue — they are both dangerous. Massive youth unemployment leads to personal poverty, psychological trauma, plus social unrest. Inequality thrives as talent shortage drives up the
incomes of highly talented workers, which in turn results in even bigger income gaps.

The traditional education model which prepared employment-minded job seekers, does not address either of these paradoxical crises. In this fast paced world of change, knowledge is now a central driving force, and agentic learners are critical for addressing talent shortages and massive youth unemployment.

Research shows that the more successful an educational system is in the traditional sense, the less likely it is to cultivate entrepreneurs. PISA scores, for example, have been found to be negatively correlated with nations’ entrepreneurial confidence and activities (Zhao, 2012). The new economy needs learners and entrepreneurs who have adaptive expertise to be innovative, flexible and creative in a variety of contexts.

**What examples of this can I see?**

**Embedding learner agency in school systems, curriculum**

While it is innate for us to have agency, our current mental models of school systems often limit agentic practices. Developing agentic learners is more than offering a list of choices and seeking student voice. This is a tokenistic or watered down version of authentic agency.

In order to avoid tokenism and embed a culture of agency, we must provide the conditions that shift the ownership of teaching and learning and place it in the hands of the learners themselves. This is also about involving students in the key aspects of decision making so they can fully experience the messiness of a real-world project, complete with the unexpected changes in direction, opportunities, and challenges that can arise.

It is an imperative that we move the level of engagement of learners from non-participation through tokenism to learner empowerment. Amplifying agentic practices gives permission to all learners, teachers and students alike, to embrace new possibilities for learning and educational systems. If nothing else, children should leave school with a sense that if they act, and act strategically, they can accomplish their goals. Johnston (2004), pg. 29.

A lead thinker in education noted that teachers do not create learning, learners create learning, and it is the teachers that create the conditions to promote learning (Wiliam, 2006). This is further empowered by parents and whānau who help to inspire and focus a sense of agency. As top rung of Arnstein's ladder of participation states, agentic learners initiate agendas and are given responsibilities and power for management of issues and to bring about change.
Technology enabling, enhancing, supporting these processes

Digital technologies have changed how teachers and students approach learning. Knowledge is no longer constrained by the physical boundaries of the traditional classroom. In today’s learning environments, access to limitless information rests at the fingertips of learners and their devices. Teachers can draw on these enabling technologies to move towards becoming a co-constructor of learning who builds knowledge alongside their students. In this sense, everyone is a learner and has the power to act in the agentic classroom.

Digital technologies enable learners to connect with, interact with and build on knowledge in ways otherwise not possible. When teachers scaffold, support and guide students through their use of digital technologies, students are empowered to drive their own learning.

Learners can use digital technologies to:

- transform information and make something new
- recombine information to solve a problem
- link information to show relationships
- modify information for personal preferences
- connect with others locally and globally
- discover solutions collaboratively and independently
- track, share and reflect on their learning, for example through e-portfolios.

Adapted from: Future-focused learning in connected communities, May 2014.

How might we respond?

Some questions to act as a stimulus with your colleagues include:

- How will you develop and deepen students’ engagement with and responsibility for their own learning?
- How will your school connect young people with peers, teachers, and other adults? How will they use technology to connect with the wider world around them?
- How can we support students to learn through authentic, relevant, real-world contexts, where their interests, skills, and the issues and opportunities within their own communities can form the basis for learning?
- How can we involve students in the key aspects of decision making so they can fully experience the messiness of a real-world project, complete with the unexpected changes in direction, opportunities, and challenges that can arise?

Learner Agency readings


http://zhaolearning.com/2015/04/06/a-world-at-risk-an-imperative-for-a-paradigm-shift-to-cultivate-21st-century-learners1/

Zhao (2012) World Class Learners: Educating Creative and Entrepreneurial Students

You may like to look at and even try some of these tools to review current practices and build an agentic learning culture:

Ladder of participation;
http://www.citizenshandbook.org/arnsteinsladder.html

Continuum of Student Voice;

Shifting the ownership of learning
Ten Trends feedback

If you have any feedback on our Ten Trends we would love to hear it. Please email marketing@core-ed.ac.nz.

Thank you.