SUMMARY REPORT

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EXECUTIVE SUMMARY

1. Artificial intelligence (AI) is a term that describes a machine or computer program that uses features of human-like thinking such as prediction, pattern recognition, problem solving and forms of logical action to undertake a task. The use of AI in school education is still in its early stages of development; however it is likely to be used in intelligent tutoring systems, with pedagogical agents (characters) that adaptively assist students in computer-assisted learning programs, in automarking, and in predictive features of learning management systems. AI offers possibilities for personalised adaptive learning and presents profound ethical quandaries related to the opaque and proprietary nature of the algorithms, data privacy concerns, and the history of machine-driven bias. Educators will need to develop foundational knowledge of learning about and with AI in order to empower themselves and students to thrive in an AI world.

2. In response to the possibilities and problems that AI poses, a group comprising university researchers, a policy-maker and an industry representative organised the first national gathering on AI and school education held on the 2nd August 2019. The day was called ‘YAI? Roundtable and Data Safari’. The purpose of the day was twofold: (i) to gather the collective wisdom of education experts and industry to scope out current knowledge, practice, opportunities and concerns related to AI and schooling; and, (ii) visit a range of industry stakeholders developing AI applications used in schools to deepen an informed perspective on state-of-play and the future of the technology. The day was divided into two parts. The Roundtable was held in the morning and the Data Safari in the afternoon.

3. A range of stakeholders participated in the ‘YAI? Roundtable’. Participants were from diverse professional backgrounds and included teachers and principals, researchers, policy makers and industry representatives. The round table was largely focused on small and large group activities designed to brainstorm issues and responses to the use of AI in schools. The three topics for discussion were: (i) perceptions and concerns regarding the use of AI in school education; (ii) cases of AI in school education; (iii) ethical issues and impactful opportunities for AI in school education.

4. The roundtable brainstorm activity raised a number of ethical concerns related to explainability, transparency and accountability of AI systems in schools with concern about bias, data capture and use, privacy and the undue influence of industry identified as key issues. Engaging students, teachers and the community in understanding AI and in developing applications for its use in schools was considered vital. The potential for AI to personalise learning, assist in differentiation of curriculum and relieve teachers’ administrative load were highlighted.

5. Prior to the Roundtable participants were surveyed about on their beliefs about AI and its use in school education. An analysis of the forty one fully completed surveys revealed concerns about privacy and inappropriate use of data, automated decision making where humans were left out-of-the-loop, and users’ lack of understanding of the technology. Participants thought AI might be usefully employed to monitor and respond to student progress, timely identification of risk and differentiation, and greater consistency in reporting.

6. A Data Safari, involving visits to industry sites, was conducted during the second part of the day. Industry representatives showcased products that used AI with participants having the opportunity to ask questions.

7. The YAI? Roundtable and Data Safari marked a first national step in promoting and broadening dialogue about the use of AI in school education. However, formalised mechanisms are required to build and sustain dialogue on the technology with involvement from the teaching profession, students, parents and care-givers and local communities essential to informed, ethical decision-making.
1. Introduction

Artificial intelligence (AI) is a term that describes a machine or computer program that uses features of human-like thinking such as prediction, pattern recognition, problem solving and forms of logical action to undertake a task. AI is a common part of our everyday lives and the technology powers computing applications such as internet search engines, smart phone assistants, social media photo tagging and fun filters, online product advertising, chatbots and autonomous vehicles. The use of AI in school education is still in its early stages of development; however it is likely to be used in intelligent tutoring systems, with pedagogical agents (characters) that adaptively assist students in computer-assisted learning programs, in automarking, in the internet-of-things that are part of smart classroom technology, and in predictive features of learning management systems, to name few applications. AI offers possibilities for personalised adaptive learning and presents profound ethical quandaries related to the opaque nature of the algorithms used in much of the technology, privacy and the history of machine-driven bias (Loble et al., 2017; Southgate et al., 2019).

Educators will need to develop foundational knowledge of learning about and with AI in order to empower students to thrive in an AI world. In response to this, a group of interested scholars, a policy-maker and an industry representative organised a national gathering of experts to learn about, discuss and share wisdom regarding AI and school education.

On the 2nd August 2019, we held two first national events on AI and school education in Sydney, Australia. The morning was devoted to the national Y AI: Research, Policy and Practice in School Education Roundtable at the Sydney Business School. This was followed by an afternoon Data Safari to industry offices (see section 4 of this report). The purpose of the day was twofold:

i. To gather the collective wisdom of education experts and industry to scope out current knowledge, practice, opportunities and concerns related to AI and schooling; and,

ii. Visit a range of industry stakeholders developing AI applications used in schools to deepen an informed perspective on the state-of-play and the future of the technology.

Participants of the Y AI Roundtable included a number of state and federal policy-makers, curriculum specialists, leading teachers from public and private education sectors, researchers, and some industry representatives. Participants were from New South Wales, Victoria, Queensland and South Australia. Most Data Safari participants had participated in the YAI Roundtable with some additional teachers and school leaders attending this part of the day. Participants were invited on the basis of their identified expertise in AI and school education or an intersecting field (i.e. STEM policy, educational technology research etc).

The day was organised as a partnership between the New South Wales Department of Education (Joachim Cohen), Intel (Jodie Frew), and the University of Wollongong (Sarah Howard, Maarten de Laat) and the University of Newcastle (Erica Southgate).

This report is a record of the first national Y AI: Research, Policy and Practice in School Education Roundtable and Data Safari. It includes a section on the process and outcomes of the roundtable, findings from a survey of participants on their perception of key issues in AI and school education, and an overview of the Data Safari activities at each industry site.

References


2. Summary of the Y AI? Educator Survey

The questionnaire aimed to explore participant understanding and some beliefs about AI and its use in education. The questionnaire was distributed to Y AI? Roundtable participants through an initial informational email, with one follow up in a Roundtable reminder. 47 of Roundtable participants submitted questionnaire responses. Of these 47, 41 were complete.

Of those completing the questionnaire:
- 48% identified as female (Q1)
- The average number of years in teaching was 16.5 (Q2).
- Three-quarters of those completing the questionnaire reported having over 10 years of experience in Education.

Interest in AI in Education (Q3) was most frequently related to their work as university researchers. The full distribution is presented in Figure 1.

Participants reported a range of definitions of AI (Q5). Core themes arising out of these definitions included: i) AI simulates human intelligence, ii) AI is an automated machine and/or computer programmed that is able to ‘think and learn’, iii) it is able to make decisions, and iv) AI uses data to provide solutions. In some cases, people identified that most AI is ‘narrow’, which includes algorithms to perform specific automated tasks. The broad aim of the field to achieve ‘general’ AI, which would be closer to simulating human intelligence and decision making (For a full list of responses see Appendix 1).

General concerns about and perceived benefits of AI.

Participants were first asked to choose their top three concerns related to AI (Q6). There were 100 total responses to this item. The most frequently identified concerns were that AI systems are biased, who holds the power in an AI world and inappropriate use of data (see Figure 2).

- Privacy of my data
- Inappropriate use of my data e.g. data sold without consent
- Humans are being left out of decision making
- Humans are unaware or unable to understand the decisions being made for them by AI
- AI has the power to take my job
- AI will result in de-skilling of professionals e.g. RoboJudges
- AI systems are biased e.g. AI targeting/favouring a specific group of people

Figure 1. What is your interest in artificial intelligence (AI) in Education?

Figure 2. With respect to AI, I am concerned that... (Q6)
They were less concerned by workers being deskilled by AI or AI taking one’s job. Other concerns identified were related to ethical use of AI and inappropriate conclusions being derived from data. Overall, the most significant concerns were related to use and quality of data being used to develop AI, rather than AI itself.

Participants were asked to identify three positive contributions from the use of AI (Q7). There were 92 responses to this item. The most frequently identified positive contributions through use of AI as being related to more efficient use of resources and reduction of human error (see Figure 3). They were less convinced there would be contributions in the area of improving safety, making their world easier, automating and increasing accuracy of identified risks. Other possible contributions identified were related to entertainment and new ways of learning and supporting more inclusivity. However, results do reveal some controversy about contributions. While some people felt reduction of error was possible, others did not believe increased accuracy was a potential gain. This may reveal a lack of developed AI performing quantifiable tasks well and related experiences with inaccuracies.

Participants were asked to identify three areas of AI they trusted to make decisions (Q8). There were 76 responses to this item. Participants’ trust in AI, on the same items related to what AI may contribute, were similar.

The most frequently identified trusted uses of AI related to more efficient use of resources and reduction of human error (see Figure 4). Participants were less trusting of AI improving safety, making their world easier, automating and increasing accuracy of identified risks. This was similar to responses related to contributions. The largest difference was observed in trusting personalisation. This was thought by 9% to be a contribution, but only trusted by 5%. There were several areas of trust also identified by participants, such as enabling and empowering people and supporting human decisions. However, the belief was also expressed that AI decision making needed to be supervised by humans to insure insights were appropriate.

Figure 3. With respect to AI, I feel its most positive contribution could come from... (Q7)

Figure 4. With respect to AI, I trust it to make decisions about... (Q8)
Use of AI in Education.

Participants were asked to choose three areas where they felt AI would impact on the classroom (Q9). There were 82 responses to this item.

The most frequently identified area of impact from use of AI in the classroom was in relation to student progress being more easily monitored and uses not identified in the questionnaire (see Figure 5). Participants also felt students at risk would be more easily identified. Interestingly, this use is related to recommender systems, which were not believed to potentially have impact on the classroom. Participants were less likely to feel systems would be supporting students’ self-regulation and consistency in reporting. These beliefs may be related to the subjective nature of these two practices and possibly having experience inaccuracies in these areas. Other areas of impact identified, which were reducing teachers’ administrative work and actual knowledge about AI. Participants expressed the belief that having AI in the syllabus would contribute to students learning about what AI is, ethical issues, etc... This suggests the actual impact of AI is not solely in relation to supporting learning and teaching, but also contributing to necessary knowledge and digital literacy.

However, when asked to choose the top three ways these uses were actually impacting on the classroom the responses were less positive. In total, there were only 34 responses to this item. This is a significantly lower response rate to how AI will (or may) impact on the classroom, suggesting perhaps fewer participants believed AI was impacting on the classroom.

Roughly, the distribution of areas of impact were similar between what ‘will’ have impact and what may be currently observed. However, there were simply fewer responses. The most frequently identified area of impact from use of AI in the classroom was in relation to student progress being more easily monitored and automating differentiation (see Figure 6).

Figure 5. How do you think AI will impact upon the classroom? (Q9)

Figure 6. Do you think AI is impacting the classroom in any of the following ways? (Q10)

Participants reported significantly less frequency believing that students at risk would be more easily identified, from 18% in the future to only 5% believing it was currently impacting on the classroom. Interestingly, this use is related to recommender systems. These were not believed to potentially have impact on the classroom (Q9), but were believed to
be currently making an impact in the classroom. This is an area that needs further investigation to possibly identify different understandings of recommender systems or to clarify what is understood as ‘impact’.

Participants were less likely to feel AI would impact on greater consistency in reporting, more accurate and timely identification of students at risk and timely identification of intervention points. These were consistent with what participants were less positive about in regard to future impact. Ultimately, participants were unsure of the current impact and future impact of AI.

There was the belief that many of the known AI uses were interrelated, such as monitoring progress and reporting, but that these were all underdeveloped and not well understood.

**Ethical concerns**

Participants were asked to identify their top three ethical concerns about using AI in the classroom (Q11). There were 92 responses to this item.

The most frequently identified ethical concerns were inaccuracies, users lack of understanding and data privacy (see Figure 7). Participants were less concerned about automation and data storage. Other concerns identified were that AI was ‘creepy’. This may relate to general feelings about a lack of transparency and understanding about AI. Overall, the main ethical concerns related to possible impact on the individual, in relation to their data and how they may experience AI. These ethical concerns correlate to participants’ concerns about the use of AI, generally (Q6).

![Image](image.png)

**Figure 7. What are your top three key ethical concerns about using AI in the classroom? (Q11)**

**Current use of AI**

The final questionnaire item asked participants if they were already using AI in their classrooms, if they could explain what they were using. There were eight responses. Two categories of use arose out of this question (for a full list of responses see Appendix 1). The first was related to the creation of AI, such as machine learning and participating in ‘AI for Good’. The other use was in the form of writing and mathematics support tools, such as tools that assess students’ work and provide feedback. In all cases, participants did not express deep uses or development of AI.

**Conclusion**

In conclusion, results from the Y AI? Roundtable questionnaire suggest that participants were mainly concerned with AI in relation to how it may impact on users from a perspective of data use and privacy. More popular concerns, such as AI taking over work or becoming pervasive, were not expressed. This is likely a function of the group participating in the data collection. Individuals were invited to the Roundtable based on their work in the area of data, AI, digital technologies and computing. It is likely this group has a better understanding of AI than the general public. Further research is needed to gather a wider sample of perceptions and beliefs. A wider sample of participants will provide a more balanced view of AI and support development of educational strategies to inform educators and students about AI in Education.
3. Summary of Y AI Discussion

The Roundtable commenced with an overview of the day followed by introductions from attendees and a brief presentation on defining AI, its uses in education and the ethical issues associated with the technology. In groups of 6-8, participants brainstormed responses to three topics:

1. Perceptions of and concerns about, AI in school education
2. Case studies of AI in school education
3. Ethical issues and impactful opportunities on AI in school education

After each brainstorm, small group responses were shared with the larger group. The following provides a visual representation of the small group contributions on each topic with a word cloud displaying the main terms and ideas that were raised. (For full details of each groups contribution click here).

Perceptions of and concerns about, AI in school education

- We need to raise awareness of the technology generally and how AI is part of and influences our everyday lives.
- We need to better understand informed consent with the technology and who has access to data and for what purposes.
- AI should be actively used by students to develop critical thinking about the technology, and knowledge of and skills in using the technology including how AI make decisions.
- A concern is the anthropomorphising of technology.
- A shared ethics framework for educators is required, as is the need to build genuine discussion in the teaching profession on the ethical use of AI for schools.
- Increasing the transparency and explainability of the technology is vital in educational contexts.
- We need to come to grips with the trade-offs of using AI and in automated decision-making.
- There were concerns about use of biometric technology in classrooms.
- Professional learning for teachers on AI is required.
- We need to account for the impact of AI on pedagogy and learning including using the technology for its best purpose and the potential for AI-powered systems to free up teacher’s time to educate.
- We need to understand and be aware of the adverse impacts of biased data sets used to train AI.
- We need to critically engage with the influence of tech companies in decisions to deploy AI in schools and school systems.
The small group discussions raised the following points:

▶ Questions were asked about what apps currently use AI.

▶ Adaptive testing, automarking, plagiarism detection software, AI-generated writing and coding for humanoid robots were identified as some of the use cases.

▶ Concern were expressed about any AI system that might ‘leak’ student data.

▶ The collection of biometric data in classrooms (i.e. facial recognition for roll call or engagement/mood identification) was raised with the issue of the ethics of biometrics in schools flagged more generally as a concern.

Ethical issues and impactful opportunities related to AI in school education:

Some of the issues and opportunities raised were:

▶ The need to review/develop policy on AI at education systems and school level through the lens of an ethical framework.

▶ Robust, fair and transparent data management and mining policies are required.

▶ AI should enable the creativity and problem-solving capability of teachers and students.

▶ There is the potential to develop great resources for students, teachers and parents.

▶ AI could reduce the administrative loads of teachers and enable seamless tracking of personalised learning and differentiation of curriculum.
4. Data Safari

After the excitement and ideas of the roundtable, technology heavyweights were visited to see what they are already doing with AI in Education and how it can have a positive impact on classrooms.

This included Google, Microsoft, AWS, Adobe and Intel. We would like to thank each and every one of our technology partners for being so open to coming with us on this journey and being vulnerable to the questions, scrutiny and opportunities our safari explorers demanded.

Here are some of the highlights (Note links to all tools are available in Appendix 2).

Google

Did you know one of Google’s subsidiaries DeepMind has built an AI engine that can beat the grandmasters? Imagine what a honed intelligence engine like this could do to energise and optimise your school or your system.

In this efficiency focused session the power of AI and ML was explored, as well as the importance of the data set behind the computer intuition and delved into exploring the types of problems AI can assist schools in solving.

The AI power in simple and everyday tools like Google Photos was examined, accessible learning demonstration tools such as Google QuickDraw and Teachable Machine were discussed, explored and covered.

Discussion centred around the future as well as an interrogation of the processes Google use to develop their tools and consider data integrity and sovereignty of GSuite for Education and more. The conversation with Google will continue, reach out to Paul or Brent if there was something that sparked your attention and lit your fire for action!

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**Amazon**

At AWS Thinking Big was looked at, taking a peak at the phenomenal array of ways technology is impacting our daily lives, and then especially in education – the transformation potential was enormous & exciting.

This session took us down the path of voice, with an exploration of the power of AWS Alexa and gave consideration to how AI is influencing the way in which we interact with devices and computers. A real example from Saint Louis University in the US was explored, bringing to light to what is possible and perhaps how we can be considering changing the way in which we interact with customers and the learning opportunities that should be provided to students.

This session also brought up further concerns surrounding Data Privacy, Integrity and Sovereignty, and the team from Amazon were on the front foot with answers. However an overall theme was the thirst for further information and assurance to assist the development of AI as both a learning and assistive tool in the classroom!

To close, Amazon’s AWS Educate program was explored, and this tool provides students with access to industry standard education in key Digital Technologies skills that underpin the development of AI tools. This toolset, taking us to the other end of the spectrum and making us think that the development of AI does not only affect students and teachers as consumers, but also students and teachers as creators, something that should be empowered!

**Key AWS Contacts:**
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Jodi Phillips: jodphill@amazon.com

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**Microsoft**

AI in Education is a thing already? Yep...in this session how AI is already being used in Education was explored with a focus on tools such as Microsoft Teams, and Microsoft Learning tools within each core Microsoft product and took a peek at the roadmap into the future as we moved from theory to practice.

This session also provided some robust and current case studies within Australia and beyond of AI in action within the education sphere, as the power of Teams and Power BI were combined by Professor Kellerman from the University of NSW.

Other current and future examples of AI were also covered such as BOT building, smart marking and so much more in this action packed session. Take a peek at the links at the bottom for more information on all the above and reach out to Megan and Jason if you would like more information or to start a collaboration!

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Adobe

The final stop on our Safari was Adobe! Did you know Adobe does way more than Photoshop and that Photoshop is so much smarter than we think?

In this session we saw how the Sensei AI platform is already part of the Creative Cloud applications used in many classrooms, and how it is something that empowers efficiency and creativity and is something to be embraced and not feared.

Specifically, PhotoShop, Lightroom and Premiere Rush was explored in a demonstration of how AI can assist, streamline and turn each and everyone of us and our students into creators. This session also provided food for thought as the skillsets required for the jobs of the future. With technology tools removing the mundane and providing both efficiency and effectiveness gains means creators can focus on creativity and compilation, with fine, dexterous and laborious technical skills managed by AI!

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Intel

During the final stop at Adobe, the infrastructure required and the tools required to build AI into the systems we use everyday was taken into consideration and this is where Intel comes in.

With the power of Open Vino and other AI toolsets, Intel provides not only the tools but the guidance to make your AI dreams come true at the same time as prodising guidance as to the how, the why and the precautions.

Intel were our key Industry partner in both the Safari and Roundtable and if you are unsure of where to begin your AI journey, the team from this tech giant is a great place to begin.

Key Intel Contacts:
Jodie Frew: jodie.frew@intel.com

What an amazing afternoon of eye opening, thought provoking and opportunity creating information. Thanks again to all the industry partners and Safari attendees, please reach out, make connections and keep the fire burning, the future of AI is now and we as a collective of educators and technologists need to set the agenda!

PS If you would prefer a video summary to share, take a peek at this segment on T4L TV!
Appendix 1: Responses to open-ended questions from the survey.

Q5. In your own words what is Artificial Intelligence?

1. A.I. is the delegation of decision making to machines.
2. AI is a broad term that encompasses a range of computing capabilities and processes that use large volumes of data in ways that humans can’t readily do - these range from narrow applications through to more complex applications that currently only existing in science fiction (eg Skynet) - real-life current examples include things like virtual assistants.
3. AI is a machine system that uses human skills to undertake set tasks.
4. AI is an umbrella term that covers computer algorithms and integrated systems that simulate human intelligence e.g. learning, vision, reasoning and generalization.
5. AI is any automated system that has the goal mimic or even try to surpass human intelligence.
6. AI is programming that creates solutions from data. Narrow AI is ubiquitous in society and general AI is the new frontier.
7. AI is software that is able to learn, perhaps make prediction and/or decisions.
8. AI is the idea of intelligent machines that can learn and teach themselves. These machines/systems can make decisions based on the data it receives.
9. Artificial intelligence (AI) is virtual decision making by machines and robots.
10. Artificial intelligence is machine processes that are connected like neurons in a brain and learn as they go and automate and adapt processes to improve peoples lives.
11. Artificial Intelligence is the simulation of human cognitive processes by computers. Artificial Intelligence can make a significant contribution to society because computers can rapidly undertake algorithmic functions that process huge amounts of data from a wide variety of sources to arrive at conclusions often more quickly and more accurately than humans.
13. Computer aided intelligence that emulates human intelligence and human ability. AI implemented successfully should allow machines to perform human tasks unsupervised producing predictive and reliable outcomes.
14. Computer program able to make decisions, learn, and take actions.
15. Computers/machines that learn to do things based on processing or trawling through data, and past experiences to make contributions to potentially ever more complex decisions - using human created guidelines.
16. Delegated decision making.
17. Far more than what it is being widely used to describe right now.
18. Intelligent behaviour displayed by machines.
19. Is technology designed to make decisions.
22. Machines that are designed to think and learn.
23. Software that is able to ‘learn’ (change behaviour) without immediate human direction.
24. The ability for a machine to make autonomous decisions and act not like a machine.
25. The ability for computers to be programmed to be able to make decisions based on the data available. These decisions can be made with minimal or no human interaction.
26. The ability for machines to think and make decisions like humans.
27. The simulation of human intelligence by machines - deep learning/machine learning and more than just robots!
28. The use of coded decision making to accelerate the delivery of a process or activity.
29. When computers can perform tasks normally needed to be done by humans due to human trait, ways of thinking and capabilities.
Q12. If you are already using AI in teaching and learning, could you please write a few words about it?

1. I am not using it but I am building things that are likely to in the very near future.

2. I am using chatbots for differentiation and Microsoft Azure Machine learning and cognitive services. Also our school participated in the AI for good challenge.

3. I teach AI as part of IST. From my definition of AI, I don't “use” it.

4. Machine Vision, Game Development and Spatial Analysis Tools - esp. as it applies to multi-dimensional teaching e.g. building information modelling

5. N/A

6. On line learning platforms such as HotMaths are using rudimentary AI to assess student work and offer appropriate tutorials and practice questions. Our Yr 9 IST class have investigated AI and devised suitable scenarios for its use.

7. Our students took part in the AI for good challenge and are finalists for their innovative designs that aim to help people with disabilities live their best lives. We are tinkering with this new technology and welcome the opportunity to develop our professional capacity to use it more for Teaching and Learning.

8. We have been using an automated feedback tool called 'AcaWriter' to provide timely writing feedback at scale

Appendix 2: Resources for teachers

University of Newcastle:

- AI Resources for teachers - University of Newcastle

Amazon

To further explore the AWS Educate program – training, courses, hands on labs and understand how to implement within your school, institution or course, please reach out to Jodi Phillips – AWS ANZ Educate Lead - 0419 717 202 - jodphill@amazon.com

Microsoft

- Microsoft Learning Tools
- AI Specific
  - AI School
  - QandA Maker
  - QandA Maker Docs
  - Github Repo Teams Bot Builder
  - Github Teams Bot Complete Sample
  - Accessibility At Microsoft
  - Microsoft Education Transformation Framework

Teams Specific Resources:

- https://aka.ms/successwithteams
- https://aka.ms/teamsuniversity

UNSW Prof. Kellermann Question Bot Videos

- www.youtube.com/watch?v=cDtuNhsA-Lk
- www.youtube.com/watch?v=NcbQ2UK69Tc

Google

- Google Teachable Machine
- Google Quick Draw
- Google AI Experiments

Adobe

- Adobe Sensei
- Adobe Creative Cloud
- Dr. Tim Kitchen’s Blog from the event

Intel

Find out more about how Intel’s tools, systems and infrastructure can assist in meeting and making your AI dreams come true, click here.

Technology 4 Learning

- Technology 4 Learning Magazine
- Technology 4 Learning YouTube
- Technology 4 Learning Website

Photography: Technology 4 Learning Team, NSW Department of Education