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EdTech insights:  
How emerging  
technologies are  
transforming  
higher education

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OES empowers universities to evolve at scale and speed, so they can best support students in the fast-paced digital era. Via our thought-provoking podcast series, *The Thought Bubble*, we explore emerging technologies and their capabilities set to transform how we teach, learn, evaluate and experience higher education.

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From adaptive assessment to artificial intelligence and the metaverse, conversations with cross-disciplinary leaders and innovators from diverse fields have revealed four pressing themes for our sector:

### 1 Technology is key to expanding access and equity

As the Federal Government's Australian Universities Accord seeks to improve access to higher education and greater participation for students from underrepresented backgrounds, technology will play a leading role.

A compelling example of technology's power to expand access is at education company Duolingo, where a 'digital first' approach has revolutionised access to English language tests for entry into higher education institutions. According to

Duolingo Chief of Assessment, Dr. Alina Von Davier, talking to test-takers to understand their challenges helped the company design a test that has genuinely disrupted the sector by better meeting user needs.

Meanwhile, Google's renowned internal g2g peer-to-peer learning program also leverages user needs to inform its offering.

"User behaviour is always a better indicator of engagement than

satisfaction surveys," says former Peer-to-Peer Program Lead at Google, Jimmy Pearson.

The accessibility benefits of artificial intelligences (AIs) are also significant, with the potential to deliver the following at high speed:

- multilingual translations
- voice to text
- voice to image
- voice and image to Braille.

### 2 The future of higher education is collaborative

From its global view of the sector, HolonIQ suggests a more collaborative approach will deliver benefits for both institutions and students.

"Digital allows for much more sharing of learning content and the future is going to be collaborative rather than individual institutions trying to do everything themselves," says

HolonIQ's Founder and Co-CEO, Maria Spies. "You don't necessarily lose the essence of great education because you do it at scale or because you partner with others to do it."

### 3 Immersive experiences will complement and enhance learning

Artificial intelligence and the immersive experiences promised by environments like the metaverse are already making their way into higher education settings.

"You could be in a blood vessel, you could be on Mars, you could be in a gallery in Paris. The metaverse can also

take you places that aren't accessible in the real world, like the Bronze Age or Ancient Egypt," explains Meta Director of Technology Strategy, Jason Juma-Ross.

Meta predicts that wearable virtual and augmented reality tools will soon enable richer immersive learning

experiences for students. Realistic AI-powered virtual tutors could soon help individually guide students to achieve better learning outcomes.

At the same time, the opportunities and challenges of AI innovations such as ChatGPT demand new and flexible thinking from our sector.

### 4 Strong governance and trust systems are vital to technology enablement

As universities explore and embrace new technologies, strong governance, accountability and trust systems are vital to inform and educate users and make intended outcomes clear.

A robust governance framework, in place from the outset, can increase trust, accelerate uptake and reduce the cost to introduce new technologies, says KPMG Futures Partner in Charge, James Mabbott.

Clear communication with stakeholders is essential for institutions to effectively manage the consent, privacy and reputational issues that may be created when new technologies are introduced.

By looking outside the sector for advances in technology, we can continue to drive innovation and transform how we teach, learn, evaluate and experience higher education.

We hope the following pages inspire future-focused conversations within your institution or faculty.

# Foreword

Education and technology are changing at a rapid pace. As OES's Chief Academic Officer, I am in regular conversation with university leaders – both within Australia and overseas – about the transformative opportunities that new technologies offer: to improve learning, to enhance the student experience and, importantly, to broaden access to high quality higher education.

Fortunately, technology is expanding opportunities for knowledge and skill development, career enhancement and employability for those who have otherwise found it difficult to access higher education. It is also transforming the higher education experience for students and academics alike. As unprecedented data and learning analytics combine with the immersive possibilities offered by artificial intelligences, virtual reality and the metaverse, the way learning is delivered, experienced, evaluated and assessed is evolving at a brisk pace.

There are a myriad of challenges and opportunities for individual institutions as they navigate this era of continuous technological disruption.

Simultaneously designing programs that meet new expectations for engaging, anytime anywhere delivery while also creating a sense of connection and belonging across cohorts (that we know leads to better student outcomes) requires strategic thinking and a nimble ability to embrace change.

Identifying, evaluating and implementing new technologies requires both courage and foresight. And as the insights in this paper reveal, there is often an element of trial and error along the way.

In my experience, a genuine commitment to understanding student and industry expectations goes a long way towards designing impactful programs and developing relevant, high quality course portfolios.

In creating *The Thought Bubble* limited edition podcast series, our goal has been to explore technology and innovation from the perspective of those adjacent to, or outside of, the Higher Education sector. The insights shared reveal ways new and emerging technologies will propel higher education into the future.

**Sue Kokonis,**  
Chief Academic Officer, OES

# Redrawing the lines: the end of education with borders

With Founder and Co-CEO of HolonIQ, Maria Spies



*“Digital allows for much more sharing of learning content and I think the future is going to be collaborative rather than individual institutions trying to do everything themselves.”*

## Key insights:

- The foundations on which universities have been built have radically changed.
- Universities need to delve into their strengths to understand and build competitive advantage.
- Bending or blurring borders between disciplines can give students more flexibility and institutions an edge.
- Advancing the way learning is designed can help universities meet the needs of new student cohorts.

Digital modalities have the power to erase borders and fundamentally change the delivery of a high-quality education.

But will technology be able to realise the accessibility opportunities the sector is envisaging? Changing an education model built and refined over generations is about more than just technology, explains Founder and Co-CEO of HolonIQ, Maria Spies.

“It’s really up to the social and economic environment in which that technology is sitting. Technology can enable access, but it’s the system of higher education, how it’s funded and how it’s structured that makes the biggest difference.”

## Flexibility: a new definition

While every university talks about flexibility on their online course pages, flexibility of time and place is just one element. Another is flexibility of packaging what students can study. While universities are traditionally organised around disciplines with hard borders, as the world speeds up there is pressure to bend the borders between disciplines to give students more course flexibility.

HolonIQ believes aggregation, sharing and collaboration should also become more common across higher education.

“Digital allows for much more sharing of learning content and I think the future is going to be collaborative rather than individual institutions trying to do everything themselves,” Maria says. “You don’t necessarily lose the essence of great education because you do it at scale or because you partner with others to do it.”

## Facing change

From HolonIQ’s perspective and global view of the sector, Australian universities are quite advanced in their adoption of technology. But there are opportunities to uplift the way learning is designed from the outset.

Many established universities face challenges when compared to newer institutions such as Western Governors University, the largest online university in the US.

Western Governors was founded in the late 1990s, with the 21st century college student in mind. Its focus was on students who had started but not finished degrees in health and in business and its courses were designed from scratch to be stackable. They were also created to cater for students who are working adults.

“The difficulty for most universities is that they were designed a long time ago, for the undergraduate student coming to campus full time. The challenge is to adapt to a new group of learners with different needs.”

Maria advises universities to delve deep into what they are really good at, to understand and build their competitive advantage. Retaining core values while being open to new approaches and product structures is critical.

“Changes to the world require changes to some of the thinking around university products at a fundamental level. That’s not to say we should just throw out the bachelor’s degree. But we need to recognise that it’s not going to deliver for every sector, job type or career goal.”

HolonIQ is an education market intelligence platform with the world’s most sophisticated education market datasets. Its Founder and Co-CEO, Maria Spies has worked with EdTech start-ups and founders around the world to support their growth.



# Embedding technology: to the metaverse and beyond

With Meta Director of Technology Strategy, Jason Juma-Ross



*“Adding the metaverse to your institution’s digital strategy can help you build organisational knowledge, understand your partner ecosystem and identify internal champions ready to actively explore and take it forward.”*

## Key insights:

- The metaverse is a combination of virtual reality and mixed reality worlds.
- Metaverse avatars could soon replace today’s chatbot solutions.
- Create a dedicated team to explore how your institution could enter the metaverse.
- Make sure your metaverse users understand how their data might be used, so they can make informed choices.

What is the metaverse and what does it mean for universities? According to Meta Director of Technology Strategy, Jason Juma-Ross, the metaverse is a combination of virtual reality and mixed reality worlds.

“You can compare the metaverse to the internet, but instead of thinking about pages, think about three-dimensional spaces, with the ability to move between and communicate within those spaces.”

The metaverse offers universities incredible immersive learning potential.

“You could be in a blood vessel, you could be on Mars, you could be in a gallery in Paris. The metaverse can also take you places that aren’t accessible in the real world, like the Bronze Age or Ancient Egypt.”

There are already functioning immersive environments that have been designed to influence users’ emotional or cognitive states and even provide pain relief.

While a VR headset allows you to experience the metaverse as it exists today, Meta predicts that access will become increasingly available via tablets and mobiles, as well as wearable virtual and augmented reality tools. Think glasses that translate the signs in front of you into your language when you’re in another country.

## Metaverse opportunities in higher education

How to plan for the opportunities and challenges of the metaverse is a key question for higher education providers.

Tools such as Horizon Worlds and Meta’s Spark Studio already enable content creators to build highly engaging 3D learning experiences.

“Institutions delivering trade and apprentice courses could use the metaverse to simulate high risk learner situations. Language learners could head to the streets of foreign cities via the metaverse, or into a virtual university space to practice conversation skills.”

While university chatbots are reasonably prevalent now, a metaverse avatar might provide more engaging, augmented support for students, Jason says.

## Where should universities start?

Jason recommends getting involved in current technologies now as a way of educating the organisation.

“Adding the metaverse to your institution’s digital strategy can help you build organisational knowledge,

understand your partner ecosystem and identify internal champions ready to actively explore and take it forward.”

A recent OES collaboration with VR specialists Talespin allows students to practice interpersonal skills, including teamwork and giving feedback, in realistic virtual environments. Cutting-edge immersive technologies that require no code mean these web-based VR learning experiences are scalable, cost effective and essentially metaverse-ready.

## Understanding the risks

As with any new technology, risk assessment is critical. For example, should people who enter the metaverse be worried that everything they do is being tracked?

“At Meta we’re using research to explore those kinds of key questions now. It’s important that users understand how their data might be used, so they can make informed choices.”

Ultimately, Jason says the metaverse isn’t trying to replicate the real world.

“We’re not trying to have people spend all their time in the metaverse. It’s a 3D environment for those times that you can’t be there in person.”

Jason Juma-Ross has spent more than 20 years in the tech industry and is Director of Technology Strategy at Meta (formerly known as Facebook). He works on innovation and the commercialisation of Meta’s family of products, apps and services.

# From AI to B: the future of AI

With KPMG Futures Partner in Charge, James Mabbot



*“An AI-powered digital assistant could guide students to achieve better outcomes...AIs could also play a strong role in course content generation, which could free lecturers up to spend more time assisting students one-on-one.”*

## Key insights:

- AI has the potential to free up time for more human-centred conversations.
- Establishing genuine trust is crucial to the introduction of any AI technology.
- To achieve the best outcomes, involve a broad range of stakeholders in the adoption and development of AIs.
- A robust AI technologies governance framework is vital, to ensure people understand what the AIs are being used for, what the intended outcomes are and what controls are in place in terms of their application.
- Risk assessments for AI solutions must address cybersecurity.

Establishing trust with users will be a key piece in the AI journey for universities says KPMG Futures Partner in Charge, James Mabbot, who prefers the plural ‘artificial intelligences’ (AIs).

KPMG Futures conducted a recent study in partnership with the University of Queensland, finding that trust is central to driving acceptance of AIs.

Drivers of this trust include belief in the adequacy of current regulations and laws to make AI use safe, as well as familiarity with and understanding of AIs and their perceived impact on society, including job security.

More broadly, the rapid growth of emerging AI platforms such as ChatGPT (an advanced AI-guided chatbot) and Lensa AI (an AI-powered image manipulator) underscore the imperative for robust systems to govern AI application in higher education.

## AI opportunities

Once trust is established, AIs could play a significant role in the online experience universities provide their students and faculty, from chatbots and digital assistants to content creation.

“Chatbots are a good example that many institutions are already using. Likewise, virtual lecturers or digital tutors could support a student’s online learning experience. An AI-powered digital assistant could guide students to achieve better outcomes,” says James.

OES currently uses AI predictive modelling and design thinking techniques to provide students from one of their university partners with a personalised study tracker. The tracker assists students to optimise their learning and improve outcomes including assessment submission, pass rates and progression through their degree.

AIs could also play a strong role in course content generation and free lecturers up to spend more time assisting students one-on-one. More controversially, AIs could be used to drive benefits for students, for example to determine whether lecturers are performing to the same standard and driving equal outcomes.

KPMG Futures believes the accessibility benefits of AIs are also significant, with the potential to deliver high speed multilingual translations, voice to text, voice to image and voice and image to Braille. Course notes, lectures and readings can also be made more accessible, James says.

## Ethical considerations

“If AIs are employed in research and discovery, do those AIs have a creative right over the research or the IP that’s developed? Other broader ethical questions are around systemising bias and adverse outcomes that impact the most vulnerable,” adds James.

KPMG Futures suggests university leaders be clear on what they are trying to achieve by using AIs, what controls are needed and what remediation processes will be deployed should things not work out as envisaged.

Risk assessment should also address cybersecurity, in terms of whether AI technologies will introduce new weaknesses or entry points into existing systems, James says.

James Mabbot is a management consultant and technologist focused on identifying potential new business models that could incorporate future technologies. He has co-designed a number of industry accelerator programs designed to build next generation products and services.

# Access and equity: how adaptive testing is changing the game

With Duolingo Chief of Assessment, Dr. Alina Von Davier



*“We had experts working to ensure no questions feature social, cultural or any other form of bias. We also developed a bespoke tool, which takes factors such as native language and country of origin into account when assessing candidate performance. We even evaluate the technology candidates have available to them when they take the test.”*

## Key insights:

- Adaptive tests adjust to the performance of the candidate and have the potential to revolutionise higher education assessment design and quality.
- A combination of learning design and analytics can be used to embed fairness in testing.
- The best assessments give candidates the ability to demonstrate what they know.
- Successfully disrupting an established assessment system involves talking to users to understand and solve their challenges.

With the launch of its online English test, Duolingo—the education technology company famous for gamifying language learning—is disrupting English language proficiency testing for admissions to higher education providers.

Not only is the test available anytime, anywhere all over the world, unlike traditional English language tests, it is adaptive. In other words, it responds to the candidate’s ability level and performance.

## Increasing accessibility and equity

The creation of the Duolingo English Test was inspired by the company’s social mission and the personal experience of its CEO, Luis von Ahn, who wanted to take an English

language test but found that all the seats in the test centres in his country were sold out.

Solving accessibility challenges such as travel and cost were front of mind, says Duolingo Chief of Assessment, Dr. Alina Von Davier.

“Being able to take this test from home is a huge opportunity. Test-takers would previously need to travel sometimes significantly, sometimes across borders, just to reach a test centre—at enormous cost, stress and anxiety.”

Duolingo’s English Test is now accepted by more than 4,000 universities worldwide.

“University admissions globally understand the challenges candidates experience when trying to access traditional English language tests—this empathy has helped us win university trust and build partner relationships,” Alina says.

## Adapting to the user

Designed from the outset as a ‘digital first assessment’, the Duolingo English Test combines human expertise with artificial intelligence, making it fast, efficient and as reliable and accurate as any other test.

As an adaptive assessment, the test opens with questions of medium level difficulty. The way a student responds to each question influences which question they are served next. If they respond correctly, the next question will be a bit more difficult, but if they respond incorrectly, the next question will be slightly easier. This ‘back and forth’ continues until enough

information has been collected to successfully evaluate the test-taker’s skills in English.

## Embedding fairness through design

The Duolingo English Test addresses fairness and equity for users worldwide, with experts working to ensure no questions feature social, cultural or any other form of bias. The company has developed a bespoke tool called Analytics for Quality Assurance in Assessment (AQAA), which takes factors such as native language and country of origin into account when assessing candidate performance. Duolingo even evaluates the technology candidates have available to them when they take the test.

## Safeguarding test security

Security of assessments is a high priority sector wide. Ensuring its tests are secure underpins the value of Duolingo’s testing outcomes.

“One of the decisions we made early on, was that we would create as many test questions as possible so that, should any of them be leaked or stolen, the validity of our test won’t be impacted because we have a vast library of questions.”

Dr. Alina Von Davier is a globally recognised researcher in computational psychometrics, machine learning and education. As Chief of Assessment at Duolingo, she leads the interdisciplinary R&D team responsible for the development of the Duolingo English Test.

# Peer-to-peer learning: the social committee

With former Peer-to-Peer Program Lead at Google, Jimmy Pearson



*“One of the elements professional educators feel nervous about is quality control, because the g2g program is essentially delivered by enthusiastic amateurs. But the quality metrics for internal Googlers were as good or better than those for external facilitators. And that has a lot to do with the relevance of the learning being delivered.”*

## Key insights:

- User behaviour is always a better indicator of engagement than satisfaction surveys.
- Genuine learner engagement is powered by robust data analysis and design thinking.
- Recognition and development opportunities for facilitators and teachers are critical.
- Diverse groups enable great online conversations, while including a provocateur can showcase a different perspective.

Engendering strong connections through online learning is a common higher education goal. At tech giant Google, the Googler to Googler (g2g) program allows any Google employee (known as a Googler) to conduct training for any other group of Googlers on any topic. It was founded to remove as many barriers as possible to learning and to maximise participation at scale. More than 10 per cent of Google’s 163,000+ employees act as g2g facilitators.

Former Peer-to-Peer Program Lead at Google, Jimmy Pearson says creating an engaging learning community through the g2g program challenged many assumptions about how and why we learn.

“One of the elements professional educators feel nervous about is quality control, because the g2g program is essentially delivered by enthusiastic amateurs.”

“But the quality metrics for internal Googlers who were delivering training were as good or better than those for external facilitators who would come in and lead training. And that has a lot to do with the relevance of the learning being delivered.”

## Understand your learners

To create an engaged cohort of learners, highly relevant content is critical. Building diverse learner groups can enable great online conversations, while including a provocateur can showcase a different perspective.

Student centricity and fostering meaningful connections is at the heart of OES’s work, harnessed by the underlying belief that a sense of belonging effectively builds and sustains online learner engagement. For example, a support ecosystem has been designed to help students connect easily and to quickly feel like members of their university community. This ecosystem includes a study buddy program, an authentic peer-to-peer student mentor program, an online orientation week and an online chat forum.

Offering bespoke experiences to specific cohorts can help create engagement beyond the learning sessions, such as a g2g program presented during Jimmy’s tenure that was aimed at staff returning from parental leave. It resulted in a thriving community of learners whose shared experience helped build strong connections that extended beyond the course duration.

But Jimmy acknowledges that understanding your customer base and knowing what they are looking for is “easier said than done.”

“We ran engagement surveys asking Googlers how satisfied they were with the g2g community and the course they had completed. But [we] found the results from these surveys weren’t as reliable as looking at actual user behaviour.”

Google also used A/B testing to identify and deliver g2g learning products that maximised engagement.

## Online goals and data-informed learning

Within the g2g program, ensuring learning objectives that suit an online modality is one of the most important steps.

While there is a wealth of data available about learner behaviour, Jimmy emphasises the need to build strong “connective tissue” between data analysis and learning design. Institutions that build a robust approach to this will deliver “meaningfully better experiences for learners,” he says.

Jimmy Pearson is an expert in creating learning cultures, with 10+ years of experience embedding learning in innovative public and private sector organisations. He is passionate about the role of learning in helping employees to thrive professionally, navigate change and drive innovation.



# Acknowledgements

This insights paper brings together the ideas and opinions of cross-disciplinary leaders and innovators who have appeared as guests on OES's thought provoking podcast, *The Thought Bubble*.

We thank the following guests from our first five episodes:

- Maria Spies, Founder and Co-CEO, HolonIQ
- James Mabbott, Partner in Charge, KPMG Futures
- Jason Juma-Ross, Director of Technology Strategy, Meta
- Dr. Alina Von Davier, Chief of Assessment, Duolingo
- Jimmy Pearson, former Peer-to-Peer Program Lead, Google

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The image features a dark blue background with several large, overlapping orange shapes. On the left side, there is a large, thick orange arc that curves from the top left towards the bottom. Below this arc, there is a solid orange circle. In the lower right quadrant, there is another solid orange circle, which is smaller than the one in the lower left. At the bottom right corner, there is a very small solid orange circle. In the bottom left corner, there is a small block of white text.

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