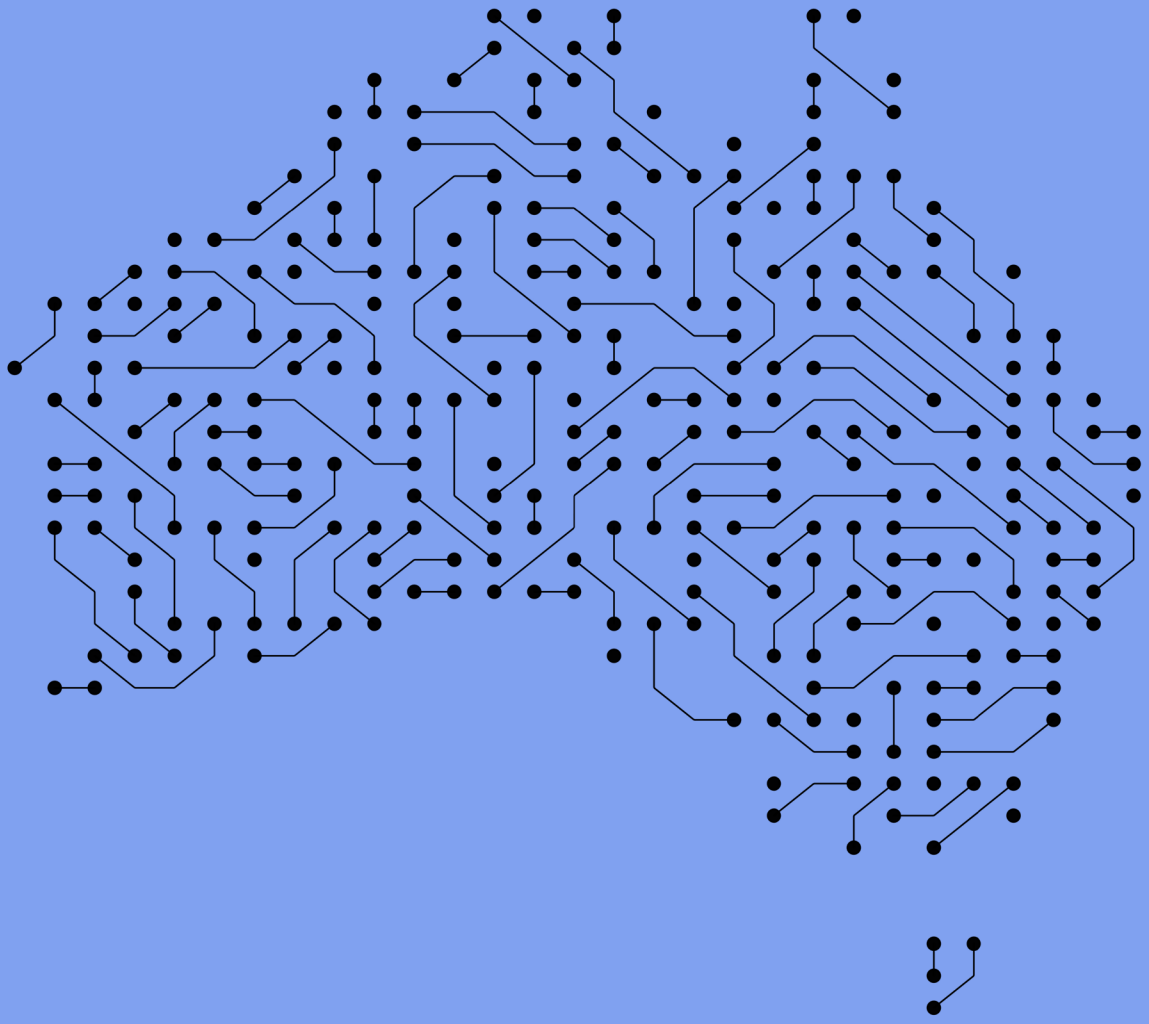

Towards high quality in Australian educational technology

July 2024

Prof Leslie Loble AM and Dr Kelly Stephens

UTS Centre for Social Justice and Inclusion

PRF PAUL RAMSAY FOUNDATION

This report forms part of the work program supporting the Australian Network for Quality Digital Education. The Network brings together leaders from across education, industry, social purpose and philanthropic organisations, government and research, in the common purpose of ensuring that all Australian students benefit from the best educational technology (edtech), and the benefits of edtech are leveraged to tackle the persistent learning divide. Members of the Network have provided valuable engagement, input and feedback as part of the report's development, though the paper does not represent a consensus or endorsed Network view.

The Network is Chaired by Leslie Loble AM, who is Industry Professor at UTS Centre for Social Justice and Inclusion (socialjustice.uts.edu.au).

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We all acknowledge the Traditional Owners of country throughout Australia and pay our respects to Elders past and present.

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Any enquiries about or comment on this publication should be directed to: edtechnetwork@uts.edu.au

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Executive Summary

Improving educational outcomes for students – and particularly disadvantaged students – should be our highest priority across the education sector and a key focus for government. This relies on high-quality curriculum, expertly delivered, though there is no established mechanism in Australia for independently assessing the quality of curriculum resources of any kind.

Increasingly, artificial intelligence (AI) and digitally based resources and learning applications form a mediating layer between curriculum and delivery of teaching and learning, both in the classroom and at home. This makes it a high-stakes and high-leverage mechanism for achieving the objective of educational improvement.

The growing centrality of technology in teaching and learning comes with benefits. Educational technology (edtech) has the potential to help overcome longstanding inequalities through its capacity to support curriculum access and success for a wider range of learners, including students experiencing disadvantage. It has opened doors to learners with disabilities and special educational needs, with assistive technology offering inclusive ways of representing information, expressing knowledge and engaging with learning (UNESCO 2023b). Intelligent tutoring systems are proven tools that can create adaptive learning paths for students based on their identified learning needs, with evidence that these systems can particularly benefit lower-achieving students (Loble and Hawcroft 2022).

Realising this benefit, however, is not straightforward. The edtech needs to be well-designed in the first place, but it is very difficult to know when this is the case. The edtech market is burgeoning – for example, some 500,000 learning apps can be found on the Apple and Google app stores, with more marketed directly to schools – but **there is no independent, comprehensive source of information about the quality of digitally enabled educational resources in Australia.**

Schools, teachers, students and their parents can find themselves having to navigate a confusing market without the time, information, or technical expertise they need to answer critical questions like: Are these tools aligned to the Australian curriculum (or local variants) and to evidence-backed approaches to teaching and learning? Are they designed to benefit the full range of learners? Who owns the data and what does that mean for data sovereignty and safety? Is there evidence that they work, and for whom? Without answers, worldwide:

> Edtech decision makers currently select and implement technologies with almost no information about what is likely to work in their schools. They spend tens of billions of dollars each year on edtech that is underused, inequitably used, or ineffectively used. (EdTech Evidence Exchange 2021:4)[1]

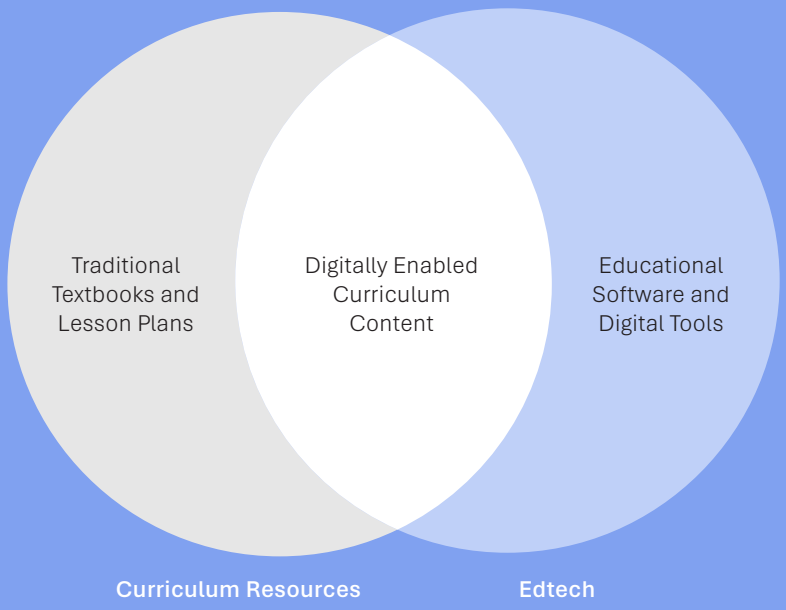
1 The US Edtech Evidence Exchange is a large-scale collaboration between education technology researchers, the edtech industry, educators, entrepreneurs, philanthropic 'impact' investors, and advocates. Their EdTech Genome Project sought to build understanding of the school contextual variables that influence the success or failure of edtech.

What is edtech?

Educational technology, also known as 'edtech' can refer to a broad category of tools, from hardware used in educational settings (such as the electronic whiteboard), through learning management platforms, to individual tutoring systems.

We use edtech to refer primarily to specific-purpose, technologically enabled resources and software applications that support teaching and learning. This remains a diverse category, including digitally-housed curriculum materials that set out a sequence of learning lesson-by-lesson, applications that adapt content to support individual students' learning progress, and applications that support the identification and addressing of learning difficulties. Applications that support teachers and schools to establish the conditions for learning (such as socio-emotional check-ins or early warning systems) are in broad scope, although more relevant in some parts of the discussion than others.

The schema below illustrates the relationship between elements of the curriculum and edtech landscapes. Generative AI is complicating this picture.



In worst-case scenarios, edtech is not only ineffectual, but dangerous. Protecting student and teacher privacy and safety should be a baseline but one analysis found that 89 percent of 163 education technology products recommended during the pandemic could or did collect information on children in educational settings or outside school hours (UNESCO 2023b). Sometimes this information is traded or sold. The lack of informed consent around the tracking and scraping of children's data from some edtech platforms cannot be left to individuals (students, parents, teachers) or even schools to resolve. It requires system-wide regulatory standards and controls. The incorporation of AI into edtech further complicates the situation – it can increase utility through the ability to adapt to individual learners but increases the stakes through its potential to amplify rather than reduce inequity. Further, impacts can emerge over time, requiring monitoring and oversight over a product lifecycle.

At the same time, **an absence of clearly articulated quality expectations means that students, schools, systems and governments may fail to benefit from a growing edtech sector.** Industry investment in developing new products may go to waste, or developers may prioritise servicing international markets where processes are clearer. A lack of incentive to 'design (better still, to co-design) at the margin' – that is, with the needs of all student groups firmly in mind – will disproportionately impact students with learning challenges, and schools serving disadvantaged communities.

Quality assurance (QA) processes have emerged in response to these needs, particularly in the United States (US) and Europe, with likely more on the way. For example, in November 2023, the Council of the European Union recommended that EU countries, stakeholders and the European Commission work together to provide quality requirements and create guidelines for better digital education content, aiming to improve the quality, safety, trustworthiness, and inclusiveness of digital education materials (EC 2023).

Our review of a spread of QA processes focused on eleven mechanisms that are gaining support from the education sector, as well as the edtech industry and funders (public and philanthropic). While certainly not exhaustive, examples [see **Appendix A**] include substantial US, UK, European and Indian initiatives, as well as two Australian processes. These mechanisms vary in their primary focus – curriculum resources or edtech – but all intend to identify, assess and label learning tools and resources to guide decision-making and support better learning outcomes. All rest on a set of identified criteria and use a specified process of expert review (primarily based on trained educators).

There is some variability regarding these elements, but **six broad quality domains** emerge from these mechanisms and relevant literature:

- Aligns with curriculum
- Supports quality teaching practice (and is transparent about how)
- Has a robust evidence base (evidence-based design, and evidence of effectiveness)
- Is accessible and inclusive (supports all learners)
- Values usability, including support for effective teacher use
- Safeguards the privacy, security and ethical use of user information and data.

Notably, curriculum alignment and evidence of efficacy appeared less frequently in the examples we reviewed. While requiring that tools support effective teaching was common, providing evidence of learner progression was not.

Key elements also emerge from the assessment processes. **Teacher and other expert and stakeholder involvement is central,** from the development of quality criteria to the role of trained assessor. Processes differ significantly in the transparency of their findings. It is more common not to make full assessment reports publicly available and only to identify those products that have achieved certification.

Quality assurance processes are not the only mechanisms for ensuring that technology delivers on its potential in education. Other key approaches focus on:

+ Building teacher and school capacity to evaluate edtech
+ Strategies to support the effective implementation of edtech.

All three approaches are important and are not mutually exclusive. This paper focuses on the first of these – frameworks and mechanisms that seek to support the quality assurance process for edtech tools in K-12 education – as it is a pressing and growing challenge for time- and resource-pressed teachers, will enable better-informed decision-making to assure high quality education resources in Australian schools, and will provide key guidance to the edtech sector about quality expectations.

Implications for an Australian approach

The recent report *Improving Outcomes for All: The Report of the Independent Expert Panel's Review to Inform a Better and Fairer Education System* found that '[Australian] governments should focus on the potential for digital technologies and digital innovation, including generative AI, to support teaching, learning and assessment approaches to improve the learning experience of students and drive powerful learning and progress in student achievement.' Moreover, it recommended that 'governments, school systems and approved authorities ensure all educators and school leaders have access to the highest quality evidence-based professional development and curriculum resources,' including through establishing an independent process to quality assure comprehensive and sequenced curriculum materials against rigorous criteria (Australian Government, Department of Education 2023b:65,18). Maximum leverage would be achieved by bringing these processes together.

In summary:

- We need a national quality assurance process for digitally enabled teaching and learning resources, with clear criteria and robust and transparent assessment process, to ensure Australian students can benefit from the highest quality learning tools and curriculum resources.
- The priority is for resources that support all students to access and succeed in curriculum-aligned learning.
- The criteria should accommodate different types of edtech, from applications that scaffold learning for individual students with specific needs, up to resources that support full curriculum delivery.
- At a minimum, the criteria should assure curriculum depth, coherence and fidelity; evidence-backed pedagogy and support for quality teacher use; and safe and ethical use of data (including disclosure of AI use and source).
- The quality assurance process should recognise the need for monitoring and oversight across the lifecycle of products, especially when AI is part of the edtech.
- Teachers should be central to the development of criteria, the QA process and the assessment of resources together with wider stakeholder expertise.
- Results from the assessment process should support effective use and purchasing decisions by schools, systems and parents.

Introduction

This paper forms part of the work program supporting the Australian Network for Quality Digital Education (the Network). The Network brings together leaders from across education, industry, social purpose and philanthropic organisations, government and research, in the common purpose of ensuring that all Australian students benefit from the best educational technology, and the benefits of edtech are leveraged to tackle the persistent learning divide. Members of the Network provided valuable engagement, input and feedback as part of the report's development, though the paper does not necessarily represent a consensus or endorsed Network view.

Why does edtech quality matter?

A high-quality curriculum, skillfully delivered, is the heart of schooling, and core to student engagement and learning success (Hunter et al. 2022). We know that the choice of instructional materials can have a big impact on student learning (Magee et al. 2018) and that those materials are increasingly technologically based. Today, 'digital technologies have come to mediate every educational process' (Hillman 2022) and teaching and learning applications increasingly form a translational layer between the intended curriculum (the Australian Curriculum and state-based syllabuses in larger jurisdictions) and the curriculum as implemented (delivery of teaching and learning in the classroom). They are also frequently a mechanism for learning at home.

Edtech has significant potential to help address the persistent divide in student learning outcomes. Technology in education has the power to help overcome longstanding inequalities through its capacity to reach and engage a wider range of learners, including students experiencing disadvantage. It has opened doors to learners with disabilities and special educational needs, with assistive technology offering inclusive ways of representing information, expressing knowledge and engaging (UNESCO 2023b). Intelligent tutoring systems, in particular, are proven tools that can create adaptive learning paths for students based on their identified learning needs, with evidence that these systems can be of particular benefit for lower-achieving students (Loble and Hawcroft 2022).

At the same time, research into the efficacy of technology in education has been marked by mixed results, leaving education 'full of doubts about [its] value' (Luckin and Cukurova 2019).[2] While there is strengthening evidence of the positive impact of educational technology on student outcomes (Loble and Hawcroft 2022; Luckin and Cukurova 2019), the variable quality of edtech significantly mediates effect. Well-designed and implemented edtech can help lift learning outcomes, but poorly designed products are wasted investment at best and at worst may have negative learning impact and present potential ethical harm.

Education is a human right (UN OHCHR 1989: article 28). Given the inherent vulnerability of children, however, selling products to schools should be considered a privilege (Hillman 2022). In our age of increasingly ubiquitous, complex, powerful and data-hungry technology, there is a responsibility to students and families to ensure that learning applications meet educational, technological and ethical expectations.

2 Research into many educational questions is marked by mixed results, largely because of the complexity of educational settings.

The argument for a quality assurance process

> Edtech decision makers currently select and implement technologies with almost no information about what is likely to work in their schools. They spend tens of billions of dollars each year on edtech that is underused, inequitably used, or ineffectively used. (Edtech Evidence Exchange 2021:4)

Choosing learning applications in a rapidly proliferating market of edtech offerings is a confusing process. There are around 500,000 'educational' apps in the Google and Apple app stores (HolonIQ 2018), though analysis in the UK has found that up to a quarter of commercial applications labelled as educational 'did not include any explicit learning content' (UNESCO 2023b:69). In examining the relationship between Australian schools and edtech, the Australian Council for Educational Research (ACER) observed that 'the lack of an evidence-based framework for decision-making leaves schools vulnerable to aggressive marketing by technology vendors' (Saubern et al. 2022).

A marked information asymmetry increases the challenge facing teachers, schools and parents. The information currently available to educators making edtech selection decisions does not help them understand how a technology will work in their context, with their students (Edtech Evidence Exchange 2021). The information necessary to make a direct assessment of quality and applicability frequently can only be accessed through some form of an agreement with a provider; for example, to trial a product. This is true for parents as well as schools and teachers.

Thoroughly assessing the quality of learning supports and edtech applications can also require detailed expertise across curricular and technological domains, and substantial time. Time-poor decision-makers may be forced to cut corners. A study of school district stakeholders in the US found that very few searched literature or consulted sites such as the What Works Clearinghouse as part of their edtech product decision-making process, relying instead on word-of-mouth and peer recommendations, marketing materials or anecdotal evidence from small pilots (Morrison et al. 2019; Zeide 2019). Without quality benchmarks and incentives for their adoption, decision-making about edtech solutions can become ad hoc and inefficient in nature, making for adoption without regard to the impact on learning (Patel et al. 2021). The rapid proliferation of edtech products can exacerbate this, leading to further fragmentation of the classroom-level curriculum offering, rather than to strengthening it.

An absence of independent, reliable, and easy-to-navigate information about the quality of edtech products also impacts the industry's ability to accurately understand and meet educational needs.[3] Edtech product companies find it difficult to differentiate themselves and to design for different quality parameters without clear quality standards. This can lead to substantial private investment, without also leading to solutions that meet the needs of learners or teachers (Murthy et al. 2021). In turn, a lack of market demand for quality further reduces incentives for edtech product development that reliably boosts student learning, especially for students experiencing disadvantage.

3 The US Department of Education's Office of Educational Technology produced a helpful document outlining key opportunities for edtech companies. Published in 2015, it remains broadly relevant today (US Department of Education, Office of Education Technology 2015).

In 2013, the US Department of Education's Office of Education Technology observed the impact of internet-based resources on teachers' choices, identifying challenges that continue to resonate: rapidly growing range of products; increase in products from unfamiliar sources; 'freemium' products; and frequent refinement or modification of products. The challenge in identifying quality and effectiveness means that:

> ... one or both of two things can happen: excellent and effective digital learning resources may be underused because educators cannot find them among all the choices available, and resources that are chosen may not be effective or may not fit within the constraints of a particular classroom or learning environment (for example, the length of the class period, curriculum context, or available bandwidth) (US Department of Education 2013:63).

Edtech as part of a digital education ecosystem

Technology by itself will not transform education. The OECD describes digital education ecosystems as comprising three parts: 'digital tools for system and institutional management, digital tools for teaching, learning and assessing in the classroom, *and human beings that make these tools alive and meaningful*' (OECD 2023:15, emphasis added). The focus on the interplay between tools and their use reflects a firmly human-centred approach to technology in education.

This human-centred approach occurs across responses to generative AI, like the Australian Framework for Generative Artificial Intelligence in Schools, the UNESCO guidance for generative AI in education and research, and the EDSAFE AI SAFE Framework (Australian Government, Department of Education 2023a; UNESCO 2023a; EDSAFE AI Alliance 2023).[4]

The need to ensure that technology delivers on its potential in education, together with this human-centred orientation, has prompted a range of approaches and frameworks to drive quality. These can be broadly divided into:

- Mechanisms to support the selection of quality edtech tools (and incentivise their development)
- Approaches to building teacher and school capacity to evaluate edtech
- Strategies to support the effective implementation of edtech.

All three approaches are important. This paper focuses on the first of these – frameworks and mechanisms that seek to support the quality assurance process for edtech tools in K-12 education – as it is a pressing and growing challenge for time- and resource-pressed teachers and will enable better informed decision-making to assure high quality education resources in Australian schools. As well, quality edtech starts with quality design, which precedes (and impacts) quality use and evaluation.

4 The EDSAFE AI Alliance framework creates a policy process and map for the essential issues in creating a safe AI system, bringing together 24 global AI safety, trust and market frameworks with the aim of achieving equitable outcomes for students and improving teacher working conditions (EDSAFE AI Alliance 2023).

Australian foundations

The Australian Framework for Generative Artificial Intelligence in Schools identifies six high-level principles and 25 elaborating statements 'to guide the responsible and ethical use of generative AI tools in ways that benefit students, schools and society.' Education Ministers have committed to ongoing work to build upon the foundation of the Australian Framework, including work by Education Services Australia (ESA) and the Australian Education Research Organisation (AERO) to develop edtech standards.

Australia has been identified as having strong practice in some relevant areas. NSW's data analytics program SCOUT has been called out as a noteworthy example of an 'expert system approach' (OECD 2023:71). ESA's Safer Technology for Schools (ST4S) initiative provides a privacy and security framework for edtech companies and a basis for expanded standards work. Similarly, the National Schools Interoperability Program promotes common technical standards and supports through the Systems Interoperability Framework (also widely adopted in the UK and US). Seeking to grapple with the additional challenges of generative AI, several jurisdictions have established school-based pilots with variously customised generative AI chatbots.

There also are a growing range of relevant international initiatives that offer useful lessons for Australia, including the EU, Singapore and the US (outlined at **Appendix D**).

Key Components for Quality Assuring Edtech

A number of organisations and processes have emerged to assess edtech tools to assist administrators and educators in discovering and selecting resources. A review of these examples identified eleven QA mechanisms that are gaining support from the education sector, as well as the edtech industry and funders (public and philanthropic). [Details for these processes are included at **Appendix B** (quality criteria assessed) and **Appendix C** (assessment process).]

Broad similarities exist across the mechanisms, which can be analysed according to three elements:

+ **Criteria** – quality criteria are the foundation of these processes and are typically developed based on a mix of existing curriculum and quality assurance frameworks, academic research and stakeholder consultation. A rubric may weight specific criteria to guide assessment. Some mechanisms make all criteria mandatory while others allow separate assessments for elements (e.g., 'research-based design', 'learner variability').

+ **Assessment process** – robust QA mechanisms all spell out specific processes for tool or resource assessment to ensure reliability and validity of judgements. Assessments are conducted by one or more reviewers. Practising or experienced educators, trained in the application of the criteria, are central to most processes. Some processes include other experts, such as reviewers with expertise in edtech and product design, instructional designers or academics. The time taken to assess a product varies from one to six months. Most QA mechanisms rely on self-selection (providers apply for the assessment) though some also will proactively select platforms for review based on educator recommendations or market review (e.g., a tool with wide or growing take-up). Some processes require self-assessment as part of, or a pre-requisite for, full assessment.

+ **Reporting and quality indicator** – tools and resources that meet quality criteria to a sufficient standard are listed on the QA mechanism's website alongside information about the tool and its quality assessment, such as the resource's purpose and scope (e.g., curriculum area) and how the product met quality criteria. A more detailed evaluation report is not typically published, though some QA mechanisms do make reports publicly available. If edtech developers or resource publishers fail to meet requirements, they are often provided with recommendations for improvement privately. For those mechanisms that offer certification badges, many have a certification expiry date of one to two years to accommodate product changes. After expiry, providers may re-apply for certification.

Quality criteria domains

Six key quality domains emerge from the processes reviewed. These are broadly consistent with the findings in key policy and research reports by the OECD, UNESCO, The World Bank, European Union and UNICEF.[5]

Processes place different emphasis on different domains, however, and a similarly titled domain can mean substantially different things, which underscores the need for clear explanations.

1. Aligns with curriculum

Quality curriculum, skillfully delivered, is the key to educational outcomes. For this reason, curriculum alignment appears first here. Curriculum alignment is deeper than a tick-box approach to covering syllabus dot points. Curriculum that enables students to progressively build and master subject-specific knowledge and skills is:

+ Selective (purposefully chosen content)
+ Coherent (interconnected across topics, subjects and stages)
+ Carefully sequenced (builds on prior knowledge and gradually increases complexity)
+ Specific and clear (AERO 2024).

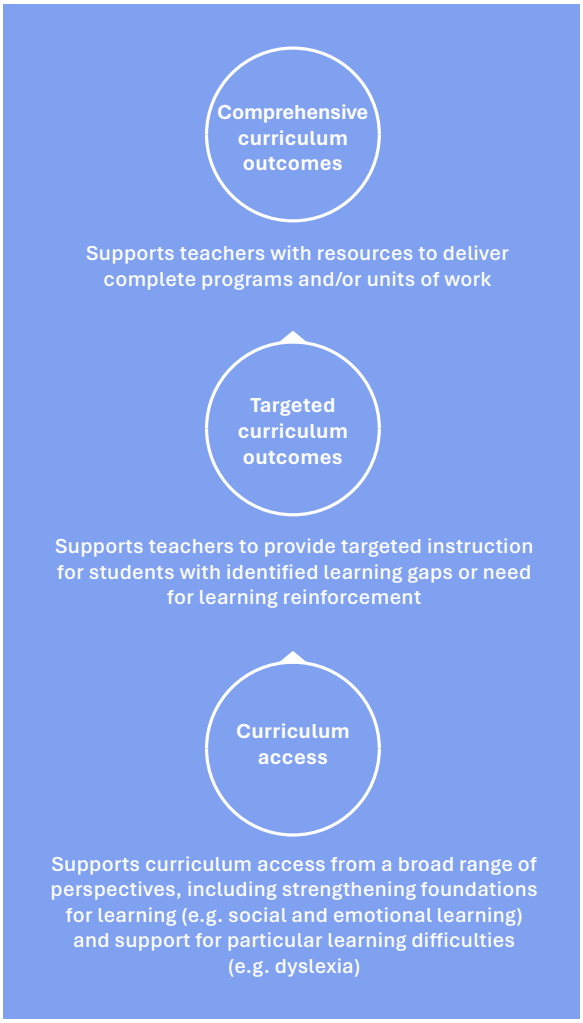
Not all QA processes require evidence of alignment with a specific curriculum. This reflects the breadth of application types that some processes consider and likely the internationalisation of the edtech market. Organisations making their assessments or certifications available to edtech providers anywhere in the world may find it difficult or impossible to make a judgement of curriculum alignment against differing global criteria. Other mechanisms place a high priority on curriculum alignment in purpose, process and remit. For example, EdReports confines itself to the US 'Common Core' curriculum, evaluating year-long curricula programs in the fields of mathematics, English language arts, and sciences, and requiring that comprehensive teaching support resources include all a teacher needs to teach a class (such as a high-level curriculum map, detailed lesson-by-lesson materials and assessments).

Implications for an Australian approach:
What should be the scope of any Australian QA process is a key question. Quality curriculum is critical to strong educational outcomes, and the importance of ensuring all teachers have access to deep and comprehensive curriculum resources has been strongly argued by Grattan Institute, for example (Hunter et al 2022).

It is also well known that some students – disproportionately those from less advantaged families and communities – will require additional scaffolding and support to access the curriculum and experience learning success. Technology has significant potential to assist these students, both through applications that target specific learning gaps and provide the additional practice necessary for learning mastery, and through applications that make learning more accessible to students grappling with particular learning and other challenges.

5 Drawn from the following sources: OECD 2023; UNESCO 2023b; UNESCO 2023c; World Bank n.d.; EC 2023; UNICEF Innocenti 2024 and UNICEF 2023. See Appendix D (International Developments) for detail on each.

The diagram below shows how we might understand curriculum alignment from this broader perspective.



This does not mean that other edtech applications (e.g. general applications, student management systems) do not need to meet expectations, for example regarding data privacy, security and ethical use.

2. Supports quality teaching practice

Most mechanisms require that the applicant outline a pedagogical rationale for the tool and design choices within it. There is, however, great variation in the specification of this requirement. This 'broad church' approach is consistent with some commentary, e.g., by the European Commission, which prioritises meeting the needs of diverse stakeholders to the extent that 'quality criteria should support all the key stakeholders to develop, procure and use content that is appropriate for their setting, and … should not stray into areas that relate to the quality of curriculum or pedagogical approaches' (EC 2023).

At the same time, many of the positive evaluations of edtech tools point to the link between impact on student outcomes and use of evidence-based learning science. There also is increasing understanding of the cognitive science of how students learn and the implications of this for teaching practice. AERO links the evidence for how students learn with core teaching practices in its Model of learning and teaching. Key elements include:

+ The deliberate development of students' self-regulated learning
+ Planning and sequencing learning to support changes in students' long-term memory
+ Teaching in ways that manage cognitive load for learners (explicit teaching)
+ Gradual handover of learning responsibility to students as they develop mastery, supporting application of knowledge and the development of higher-order skills such as critical and creative thinking (AERO 2023).

Assessment and feedback are critical to evidence-based teaching practice, enabling teachers to understand clearly what knowledge and skills students have mastered, what they need to practice, and what they should learn next. Learning applications offer significant opportunities to gather formative assessment data seamlessly and provide it to teachers in formats that are easy to access and understand.

Tools underpinned by generative-AI technologies raise more complex issues for assessing both pedagogic and curriculum alignment, given the inherently unpredictable nature of generative AI outputs. Regarding the emerging category of education-sector generative AI, UNESCO argues that:

> ... it is essential that efforts are put into refining foundation [generative AI] models not only through adding subject knowledge and de-biasing, but also through adding knowledge about relevant learning methods, and how this can be reflected in the design of algorithms and models (UNESCO 2023a:13).

Implications for an Australian approach:
Greater clarity regarding quality teaching practice could create stronger alignment across curriculum, pedagogy and evidence domains and help guide the quality of edtech platforms. The requirement that tools are transparent about their underpinning pedagogical approach is a minimum and necessary first step. A further step would be to outline expectations regarding the specific types of evidence that should inform the assessment of quality teaching practice in these tools.

3. Has a robust evidence base

Evidence-based design is strongly emphasised in the literature reviewed, which supports basing product design on evidence of how students learn and requiring products to provide the theoretical underpinnings for the design and implementation of edtech solutions (Murthy et al. 2023).

The requirement that tools be evidence- (or research-) based is encompassed in the criteria for many of the processes reviewed but expressed differently, with different implications. There are three main approaches:

1. The *criterion for pedagogy* (above) includes an implicit or explicit reference to aligning with a research base. For example, one QA process assesses tools for design 'on principles of educational psychology.' Multiple processes require reference to learning sciences, though this can seemingly cover a diverse range of teaching and learning approaches.

2. The QA process explicitly requires that a tool's *design* process be evidence-based. This means both that a tool has been designed with reference to relevant research and that this evidence informs a model or theory of change for the product.

3. The QA process explicitly requires that a tool provide evidence of *efficacy* – an assessment of whether a product has demonstrated its impact on students or that it will work within a specific classroom, school or system setting (e.g. most thoroughly through a robust evaluation process, or randomised control trial).

Proven evidence of efficacy is not required by most of the QA mechanisms reviewed and is explicitly outside the remit of some. This is counter to the preference of governments for evidence-informed policy and practice, and the mission of high-profile organisations such as the US What Works Clearinghouse, the UK-based Education Endowment Foundation's Teaching and Learning toolkit and more recently, ICEIE as part of their 5Es Framework.[6]

The deprioritisation of proven efficacy may reflect the difficulty, cost and time involved in conducting scientific trials of edtech products, which are inherently dynamic. Edtech products have been reported to change every 3 years, on average, meaning that by the time trials are conducted and a product is proven to be useful, technology may have evolved (UNESCO 2023b:3).

The focus on evidence-based design rather than evidence of effectiveness may also reflect views about a product's sphere of control, which does not easily extend to implementation fidelity. For example, EdReports explicitly assesses the curriculum as written, not as implemented.

This landscape may be shifting, however. Digital Promise's recently released 'Evidence-based Edtech Product Certification' now requires both empirical evidence supporting product design as well as a 'well-designed education research study' which indicates that the product has had a positive impact on learners and/or educators.

Implications for an Australian approach:
Clarity regarding the understanding of, and expectations for, evidence is critical. Practical approaches to addressing the challenges of obtaining rigorous evidence of efficacy in a technological environment will be important. A starting point can be found in existing standards; both AERO and the US organisation, Evidence for ESSA, approach the question of effectiveness through standards of evidence. AERO's Level 2 benchmark ('research associates the approach with positive effects') might be a logical minimum for efficacy.

Evidence for ESSA

Evidence for ESSA was launched in the US in 2017 to provide the most recent and reliable information on educational programs meeting evidence standards. Under US federal school funding (the Every Student Succeeds Act, or ESSA), states are expected to ensure education initiatives address a four-tier hierarchy of evidence. Established by respected education researcher Robert Slavin at Johns Hopkins University, the Evidence for ESSA website reports effect sizes for interventions across reading, maths, socio-emotional learning and other domains, including impact assessments for learning technology. A 'strong' intervention must be supported by at least one randomised control study with statistically significant positive effect, and have no studies showing significant negative effects.

4. Is accessible and inclusive

Digital materials and technologies are accessible when students with and without disabilities can use them in an equally integrated and equally effective manner, and with substantially equivalent ease of use (Jones and Fox 2018). Several QA processes reviewed had general accessibility requirements in their criteria and looked for some form of certification that the edtech application adhered to accessibility guidelines, e.g. the Web

6 The Teaching and Learning toolkit is translated to the Australian context by Evidence for Learning, incubated by Social Ventures Australia; ICEIE is a global non-profit organisation which has developed the 5Es Framework, an aspirational framework presenting a blueprint of quality standards for the edtech industry. The 5Es include efficacy, effectiveness, ethics, equity and environment. ICEIE currently offers certifications for the first two dimensions: efficacy and effectiveness.

Content Accessibility Guidelines (WCAG) (W3C Web Accessibility Initiative 2024). Embedding accessibility in an edtech product's design could include user interface supports and features such as adjustable toggles which allow users to adjust the tool to meet their needs (e.g., font size, verbal function, dictation).

Accessibility is only the first part of inclusion, which means catering to a broad range of students (sometimes referred to as learner variability), a key component of equity.[7] Edtech has significant potential to help teachers do this, but without other incentives a profit focus may push edtech companies to design for 'a mythical average learner' (Noakes et al. 2020).

Around half the processes reviewed provide some detail about the inclusivity expectations of resources. Beyond technical accessibility, these tend to consider whether products are (1) created to meet the needs of students at differing ability levels, and (2) designed with students from a wide range of backgrounds (e.g., socio-economic, cultural) in mind. Digital Promise's specific-purpose Learner Variability certification requires vendors to make information on how different learners are expected to benefit from the tool's features and, significantly, how input from educators and diverse learners has been incorporated in the design process (Digital Promise n.d.).

Accessibility and inclusivity are best baked into design from the beginning. Principles of co-design are important, above and beyond user testing. For example, the US Office of Education Technology (n.d.) recommends that developers hire individuals with disabilities and engage with the disability community to contribute to the design process, test tool compliance with individuals representing a range of disabilities prior to release and provide a specialised user support line for accessibility assistance. This principle also holds for building tools that meet the needs of students and educators from diverse backgrounds.

What appears to be missing from quality assurance mechanisms reviewed is explicit consideration of First Nations communities. Education New Zealand (NZ) supports Aotearoa indigenous edtech companies, seeing it as crucial for the education sector to align curriculum materials to community values and incorporate Aoteoroa's indigenous voice. Kaupapa Māori-owned edtech companies were spotlighted by Education NZ for using indigenous researchers, designers and content developers to create digital learning experiences for indigenous learners, their whanau and communities (ENZ 2023).

Australia has expertise to build on in this domain with the work of organisations such as Indigital, the Australian Literacy and Numeracy Foundation, and Education Services Australia, which have developed digital learning initiatives working with First Nations communities.

Generative AI amplifies the potential and risks of edtech tools for education inclusion. Differentiating lesson content, for example, is a commonly cited positive use case on teacher social media. At the same time, the issue of bias in generative AI models has been well documented (UNESCO, IRCAI 2024; Australian Government, eSafety Commissioner 2023), extending the risk of algorithmic bias that predated generative AI. (Algorithmic bias is discussed further under criterion six, below.)

7 ICEIE's 5Es Framework offers a potentially useful framing by placing accessibility and inclusion considerations under an equity dimension. Their equity dimension assesses who the edtech solution works for by looking at how much an edtech product focuses on marginalised communities and promotes equal rights and social justice, measured through a human-rights perspective with attention to equitable use across vulnerable and historically represented groups (ICEIE 2024).

Implications for an Australian approach:
Inclusion as well as accessibility is essential. Determining the detailed requirements for inclusive edtech is an opportunity to implement good practice via co-design.

5. Values usability, including support for effective teacher use

Over half the mechanisms reviewed nominated usability as a criterion for quality. The usability requirement is generally specified to mean user-friendly for students and educators, to ensure even less tech-savvy users can navigate the interface. A few mechanisms added additional detail, for example: ease of setup, user satisfaction, interface learnability, navigation, or whether the interface was fun and interesting for learners.

Usability can overlap with, and amplify, the pedagogical approaches of a tool. Age-appropriateness is a foundational element, but others include whether the interface and visual design facilitates student learning, supports students in engaging thoughtfully with the subject, and is neither distracting nor chaotic. From a teacher perspective, considerations can include whether the tool helps them quickly and reliably achieve instructional goals, would prompt them to change their practices of instruction or has sufficient levels of challenge to address different student needs and the range of curriculum requirements.

Usability can also extend to teacher support outside of the tool itself. Various QA processes consider whether teachers receive feedback or support in navigating the product, or whether a tool is designed with professional development in mind. One process requires that the product support teachers to utilise fully the resource, including to understand learning of students through engagement with progress data.

Implications for an Australian approach:
The Australian Digital Inclusion Alliance identifies three components of digital inclusion: affordability (internet and devices); accessibility (including for people with disability and people from culturally or linguistically diverse backgrounds); and ability (skills and confidence using technological platforms) (Australian Digital Inclusion Alliance 2020).

While affordability considerations are predominantly beyond the remit of a QA mechanism, it should be easy for parents and schools to understand the baseline requirements for any tool to be used effectively.

Teacher skill and confidence is key to successful edtech implementations, so usability features both within and external to the tool are key. Highly intuitive tools minimise the time impost on teachers and students trialing or adopting new resources. In addition, professional development to support teachers' effective use of new tools could be helpfully considered by a QA process. This could extend to the formats in which professional learning is provided, recognising that face-to-face opportunities are optimal but situational constraints can require virtual, asynchronous, and/or short 'just-in-time' versions.

6. Safeguards the privacy, security and ethical use of user data and information

Safeguarding children's privacy, data and online safety is an essential component of edtech governance, especially as AI becomes a larger feature of the systems behind these tools. Reviewed QA processes vary in the detail of their assessments in this domain, though most typically assess privacy against established jurisdictional regulations and sometimes international frameworks such as the General Data Protection Regulation (GDPR) and the Global Education Security Standard (GESS).

The pivot to online learning during the global pandemic produced significant evidence of concern. One analysis found that 89 percent of 163 education technology products recommended during the pandemic could or did collect information on children in educational settings or outside school hours. Further, 39 of 42 governments providing online education during the pandemic fostered uses that risked or infringed on children's rights (HRW 2022). The sale or exchange of edtech data to advertising technology (adtech), where it occurs, also is an issue of significant concern. The lack of informed consent around the tracking and scraping of children's data from some edtech platforms cannot be left to individuals (students, parents, teachers) or even schools to resolve. It requires system-wide regulatory standards and controls.

The integration of AI with edtech raises the 'inscrutability of algorithmic calculations' (Zeide 2019) and the potential for algorithmic bias. These are issues of inclusivity, technically expressed. A lack of transparency and regulation around the algorithms used in edtech tools may lead to unfair limitations and directions on some students' opportunities to learn. Adding complexity, for AI to individualise learning experiences, it is likely to require further student information, potentially including personal or sensitive information (US Department of Education, Office of Educational Technology 2023).

The dynamism of AI also means that potentially harmful consequences may emerge later. For the QA mechanisms reviewed, however, consideration of core data protections occurs only at the point of assessment. A lifecycle approach to this quality criterion thus becomes more important to consider outside of the 'upfront' QA assessment.

Implications for an Australian approach:
Australia has existing and planned work to set new safety rules that will shape edtech, including ESA's extension of the ST4S, the development of national AI assurance standards, the Australian Government's development of a responsible AI strategy, the Attorney General's AI and copyright reference group, and the recommendation for a Children's Online Privacy Code. It is proposed that the latter will align as much as possible with the UK Age-Appropriate Design Code, which applies to edtech platforms. The Code's substantive requirements may also address how the best interests of child users should be supported in the design of an online service (Australian Government 2023: Proposal 16.5). The integration of AI into edtech also means ongoing oversight and safety audits will be required to monitor edtech tools so that ethical and safety hazards do not emerge as the tool changes.

Safer Technologies 4 Schools (ST4S)

ST4S is an Australian national privacy and security initiative for digital products in K-12 education used by schools across Australia and New Zealand. This initiative is a collaboration across all Australian state, territory, Catholic and independent school sectors and the New Zealand Ministry of Education, and administered by Education Services Australia (ESA) on their behalf. ST4S takes a standardised approach to evaluating digital products against a nationally consistent security and privacy control framework to assist schools in choosing digital products and services. Once assessed, tools scoring favourably can display a badge to indicate to schools that they have met required standards.

Quality criteria development

The quality assurance processes reviewed typically developed their criteria and associated rubrics using a combination of existing curriculum and quality assurance frameworks, research and stakeholder consultation.

While the emphasis placed on some quality domains varies across mechanisms, the foregrounding of stakeholder involvement is consistent. Teachers and schools are key contributors, with educational administrators and organisations, curriculum experts, and the edtech industry also commonly involved. The method and scale of consultation varies, from surveys to consultative forums. For example, EdReports' rubric development teams examine existing rubrics from the field, consider criteria most important to teachers, and incorporate findings from a national learning tour of content experts and educators.

Assessment process

Assessors

The range of assessors generally reflects the range of stakeholders consulted in criteria development (though some organisations cite additional fields of expertise such as child health and development). The use of trained teacher evaluators (as primary assessors or alongside expert reviewers) is a priority in the organisations reviewed. This can build professional trust in the process by ensuring that current classroom experience is included.

One hybrid model combines bottom-up and top-down forms of assessment, providing expert reviews while allowing educators to provide star-rating reviews of products through an accessible forum. Such online recommendation systems must contend with the vulnerability to manipulation.

Self-assessment processes can be used as a pre-condition for formal assessment, as in the example of the ST4S process. This can help strengthen the market signals regarding quality and support a clearer understanding of the standards in practice by developers. Practically, it can reduce the time spent reviewing products with clear gaps in their meeting of requirements.

Prioritisation of tools for assessment

There is a tension between depth and speed of assessment. It is likely that demand for assessment could exceed supply, making necessary the prioritisation of tools and resources for assessment. Precedents exist for prioritising by centrally determined needs (e.g. jurisdictional curriculum change) and by user demand (e.g. educator request, usage level of a product). In Lithuania, where quality assurance requirements for digital education content are legislated, materials are selected for review by the National Education Agency based on 'complaints received the previous year from the users, if a new version of the material has been published or there were any changes to the teaching curriculum' (EC 2023:37). In cases where edtech providers pay for the assessment service, it may be that the capacity to review expands to match demand.

Reporting and quality indicator

Transparency of quality assessment findings
It is uncommon for a process to release full reports of every assessment process. More often, organisations publicly identify only the tools that have satisfactorily met their standards, though unsuccessful vendors usually receive a report outlining where their product falls short with recommendations for improvement. This still retains incentives for quality improvement and better purchasing decisions, especially if the QA mechanism is aligned with consumer access and need. Most of the reviewed QA mechanisms operate independently of government, which can help sustain confidence in arm's length assessment. There are exceptions, primarily in nations with centralised national education school systems.

Interestingly, the funding source for these QA mechanisms does not appear to have much direct relationship to the transparency or rigour of a process. Of the organisations we have reviewed, half receive some level of government funding, half receive philanthropic funding and two are private companies. The groups overlap. Funding source therefore is not necessarily a strong proxy for independence. Appropriate governance and clarity of expectations, particularly transparency of findings, may provide greater leverage to ensure that outcomes for students, teachers and schools always come first.

Three gaps in the processes

Three potential gaps arose from this review of QA processes and literature. One is a teaching and learning consideration, one is a technical consideration, and one is a question of process.

1. **Supporting the teacher as learning professional** – while it is agreed that positive impact depends upon strong pedagogical integration by teachers, there is little requirement that tools explicitly provide support for this, e.g., by including material such as teacher guides that build professional knowledge and capacity or, for less comprehensive resources, by providing suggestions of how the resource may be integrated into the overarching teaching and learning program of a teacher, faculty or school. This may include guidance on appropriate use, including whether (as well as when) to use a tool, or what might constitute overuse. Clarity on how a tool integrates with teacher expertise should be considered as part of determining quality expectations.

2. **Interoperability** – international organisations emphasise the importance of edtech interoperability, including advocating for open-source products. The intent is to mitigate the risk of vendor capture. For example, the European Commission argues for 'open ecosystem principles, so users are not thrust into others' walled gardens' (EC 2023:35). In Australia, interoperability is considered within the ST4S assessment process, which is oversighted by the National Schools Interoperability Program.

3. **Prioritising (or stage-gating) of quality criteria** – some processes allow edtech providers to choose quality domains for assessment where different certifications are offered. This suggests there may be room for something other than an 'all or nothing' approach to quality assessment even within a more holistic process. Consideration of a stage-gate process could be helpful in accelerating the review process and ensuring that essential criteria are prioritised. For example, if curriculum content or evidence-based pedagogical alignment is not clear or sufficient should a full assessment proceed? Should all technologically enabled resources demonstrate adherence to relevant data and safety requirements before progressing further through an assessment?

Oregon – Quality assurance integrated with education policy

The Oregon Department for Education has a state-based process of quality assuring instructional materials across six subjects. Procurement of materials is managed by individual schools and districts by selecting from a state-recommended list developed through department reviews of materials. Reviews are subject to cycles, each subject is reviewed over a year and is reviewed every seven years. Assessment criteria for reviews are developed by Instructional Materials Criteria Committees recruited by the department each year and typically involve the following requirements:

- Subject-specific criteria for substantive and procedural knowledge strictly aligned to state curriculum standards
- Evaluation of equity and pedagogy to ensure learning progression, authentic, relevant and collaborative student engagement and culturally responsive instruction
- Evaluation of technical usability including edtech features, adaptable supports for teacher implementation, students from special populations, bilingual students and at extension and catch-up levels, and for families in supporting students at home
- Evaluation of student assessments for clarity of learning goals, standards alignment, elicitation of evidence, meaningful and accessible feedback and ability to determine next steps for learning.

Reviews are conducted by evaluation committees of experienced teachers, and through the State Instructional Materials Review Association (SIMRA) network of reviewers. Review evaluations behind each material on the recommended list are made available, as are the responses of publishers, who are notified of review outcomes prior to the recommendations being made public. The state also has an arrangement with EdReports who curates a repository of resources. Districts hold responsibility to conduct independent reviews for any materials not quality assured by the state, using the same adoption criteria as the state-based process.

Source: Grattan 2024 and Oregon Department of Education 2023 (Adoption criteria for K-12 Science Instruction Materials)

Conclusion

Edtech learning applications play an increasingly important role in supporting teachers and helping to overcome Australia's widening learning divide. Despite the significant and growing size of the market, Australia currently lacks an organised, comprehensive quality assessment process to support better decision-making, help edtech developers align with quality expectations and, most importantly, bring extra resources to address student learning needs. International examples of quality assurance mechanisms share many characteristics and offer important lessons and questions for application in an Australian context.

The recent report *Improving Outcomes for All: The Report of the Independent Expert Panel's Review to Inform a Better and Fairer Education System* found that '[Australian] governments should focus on the potential for digital technologies and digital innovation, including generative AI, to support teaching, learning and assessment approaches to improve the learning experience of students and drive powerful learning and progress in student achievement.' Moreover, it recommended that 'governments, school systems and approved authorities ensure all educators and school leaders have access to the highest quality evidence-based professional development and curriculum resources,' including through establishing an independent process to quality assure comprehensive and sequenced curriculum materials against rigorous criteria (Australian Government, Department of Education 2023b:65,18). Maximum leverage would be achieved by bringing these processes together.

Appendices

Appendix A: Brief description of QA processes reviewed

Common Sense

Common Sense is a US non-profit organisation founded in 2003 and funded by philanthropy, affiliate and business distribution partners. They advocate for digital equity and tech accountability for children through providing independent ratings and reviews of media, curriculum and classroom resources to assist parents and educators in deciding which apps, websites and resources their child should consume. The organisation is divided into Common Sense Media, which reviews TV shows, movies, podcasts, books for parents, and Common Sense Education, which supports K-12 schools through a Digital Citizenship curriculum preparing students with digital literacy skills and training for teachers. Edtech ratings fall under Common Sense Education, where an expert writes star-rated reviews on the learning capabilities and privacy ratings of each resource, and educators are also able to submit their own ratings of each tool.

Digital Promise

Digital Promise is a global non-profit organisation established in the US in 2011. Funded by philanthropy and corporate partners, they advocate for equitable learning environments through the use of technology. Digital Promise offers a range of education initiatives, from providing internet access for K-12 students to microcredentials for adults. They offer four types of certifications for edtech products: Research-Based Design, Learner Variability, Practitioner-Informed Design, and Learning and Employment Record (LER) technology certifications. To date, they have certified 76 edtech products. Digital Promise also offers an edtech pilot framework to assist administrators and developers in testing edtech tools in districts and schools across the US.

EdReports

EdReports is a US-based non-profit organisation founded in 2014. They publish free reports on K-12 instructional materials with the aim of identifying and increasing demand for high quality curriculum resources to improve student learning outcomes. Educator review teams evaluate year-long materials for quality and curriculum alignment, measuring for alignment against the American Next Generation Science Standards (NGSS) and the Common Core States Standards (CCSS). Edtech-specific quality requirements are addressed under evaluation of a resource's usability. Reports published indicate if materials meet, partially meet or do not meet expectations and all are displayed on EdReports' website. To date, EdReports has conducted over 500 reviews.

EdTech Tulna
EdTech Tulna is an Indian initiative created in 2021 by a partnership between the edtech department at IIT Bombay (a research institute) and Central Square Foundation, an NGO focusing on educational policy and strategy. The initiative aims to address the challenge of information asymmetry of edtech quality in India by developing a research-based framework to set quality standards and a corresponding product evaluation index which evaluates existing products in the ecosystem for public use. The index evaluates products along three constructs: Content Quality, Pedagogical Alignment and Technology & Design.

Educate Ventures
Educate Ventures is a London-based for-profit company which offers a range of services to edtech start-ups, researchers and educators to further evidence-based edtech and leverage data and AI to benefit education. These services include Continuing Professional Development training, helping organisations create AI plans and offering expert AI speaking services. Their EdWard badge is a formal recognition that an edtech company has participated in EDUCATE Programmes and that applied research was used to develop its edtech tool. The award has two levels, Evidence Aware, the demonstration of understanding of how to apply research methods, and Evidence Applied, the application of research methods to improve product development or quality of delivery.

Education Alliance Finland (EAF)
EAF, founded in 2015, was run by a for-profit Finnish company until its recent acquisition by EdTech Impact. EAF provides a product evaluation and certification service, which assesses digital and physical learning products and course materials. The evaluation method, developed by Finnish educational researchers, follows the same learner perception as the current Finnish curriculum and focuses upon assessing pedagogy and learning engagement. Certified products are listed on EAF's catalogue for teachers, parents and students to identify quality materials. Alongside its parent company, EdTech Impact, EAF is also partnered with Education Data Digital Safeguards and WhatWorked Education (an organisation providing impact evaluation services of edtech tools for edtech providers) who have collectively built and implement the EdTech Impact Quality Framework.

This framework awards a range of badges to edtech products to drive edtech quality and transparency. Each certification is based on the specialisation of the partners:

- Certified Teacher Recommended (rewards the top 10% of customer-reviewed products on the EdTech Impact marketplace),
- Certified Impact Evidence (rewarded to products who have successfully completed the WhatWorked Education evaluation method for efficacy),
- Certified Lawfulness, Ethics & Safety (rewarded to products that have successfully completed the EDDS evaluation method – described below – for data management, socio-ethical, cybersecurity, age-appropriateness and accessibility), and
- Certified Pedagogical Quality (rewarded to products which have successfully achieved the Education Alliance Finland pedagogical evaluation).

EdTech Impact and Education Data Digital Safeguards (EDDS)

EdTech Impact is a for-profit company founded in 2018. EdTech Impact provides a marketplace for edtech providers to display their tools and for customers to easily review them. Edtech platforms or resource providers must purchase a subscription in order for their product to be reviewed and listed on the marketplace. EdTech Impact also offers a Manager platform specifically for schools and Multi-Academy Trusts which allows school leaders to access information assisting in edtech decision-making, including which school uses what products; what edtech products may be underused; what evaluation or external evidence products have; whether products have been assessed externally across lawful, ethical, security or other criteria; what teachers or school users say about individual products; view demos submitted by teachers about how they use particular products.

EDDS works under Etoile Partners, a for-profit geopolitical consultancy. EDDS provides evaluation and audit services of edtech tools and vendors through blind peer reviews to ensure products meet appropriate requirements, which prioritise children's wellbeing, needs and rights to quality education. Products and vendors are granted an active certification with EdTech Impact, which marks where they are on the pathway to reaching minimum requirements, and reports are made available to users with an account. EDDS and EdTech Impact are evaluation partners alongside Education Alliance Finland and WhatWorked Education, who all partnered to build the EdTech Impact Quality Framework.

Evidence for ESSA

Evidence for ESSA was launched in the US in 2017 to provide the most recent and reliable information on educational programs meeting evidence standards. Under US federal school funding (the Every Student Succeeds Act, or ESSA), states are expected to ensure education initiatives address a four-tier hierarchy of evidence. Established by respected education researcher Robert Slavin at Johns Hopkins University, the Evidence for ESSA website reports effect sizes for interventions across reading, maths, socio-emotional learning and other domains, including impact assessments for learning technology. A 'strong' intervention must be supported by at least one randomised control study with statistically significant positive effect, and have no studies showing significant negative effects.

International Society for Technology in Education (ISTE)

ISTE is a global non-profit organisation established in the US in 1979. Its regional focus is on Europe and North America, with the US, China, Chile, the UK and Mexico as their countries of interest. ISTE has developed a framework, the ISTE Standards, which provides a road map for students, educators and leaders globally with the stated aim of rethinking education and empowering learners. The ISTE SEAL programme evaluates and certifies edtech products for quality and usability against the ISTE standards and through evaluation of the user interface and support for teaching practices backed by research and learning sciences. Tools that receive the SEAL are displayed on the ISTE website and reports are published on each. ISTE also recently merged with ACSD, an organisation specialising in providing professional learning services focusing on technological innovation, and acquired EdSurge, an education journalism and research site which has an edtech product index enabling educators to discover and compare edtech tools.

NSW Department of Education's Online Learning Tools Marketplace

The NSW Department of Education's Online Learning Tools Marketplace, launched in 2022, provides schools with an approved product catalogue of commercial educational online resources to assist with school procurement of teaching, learning and productivity tools. The department ensures that each product listed meets requirements for syllabus, pedagogy, data privacy and cyber security. Suppliers enter into agreements with the department to ensure their tools meet and maintain these standards, and the department has established pricing with vendors of all products available on the marketplace. The department also centralises logins to these tools through student and staff's NSW DoE credentials. Other states have similar approaches.

Safer Technologies 4 Schools (ST4S)

ST4S is an Australian national privacy and security initiative for digital products in K-12 education used by schools across Australia and New Zealand. This initiative is a collaboration across all Australian state, territory, Catholic and independent school sectors and the New Zealand Ministry of Education, and administered by Education Services Australia (ESA) on their behalf. ST4S takes a standardised approach to evaluating digital products against a nationally consistent security and privacy control framework to assist schools in choosing digital products and services. Once assessed, tools scoring favourably can display a badge to indicate to schools that they have met required standards.

Appendix B: Features of quality assurance mechanisms (quality criteria assessed)

A sample of eleven processes was assessed to investigate how a range of jurisdictions are assuring quality in edtech and curriculum materials. The methodology used publicly available information. A broader literature review also was conducted. These eleven mechanisms were chosen for geographic spread and representation of a range of QA approaches including centralised government procurement systems, independent non-profit review systems, and commercial enterprises offering QA as a paid service. This sample concentrates on QA processes for materials addressing K-12 education. It captures a representative part of a fast-growing edtech QA market, and provides insight into common practice.

These eleven processes are documented in the table below, which looks at the quality criteria assessed, and in Appendix C, which outlines the governance, structure and process itself.

Methodology

Five key areas framed the research and collation process in order to understand quality assurance processes for digitally enabled curriculum materials:

- Who is currently assuring for quality in curriculum materials and edtech products around the world?
- What does a typical quality assurance mechanism look like in terms of governance, structure and resources?
- What does a typical assessment process followed by existing QA mechanisms look like?
- Are there core quality dimensions that recur across existing quality assurance mechanisms?
- What can we learn from existing QA mechanisms to apply in an Australian context?

A review of literature and international policy developments provided additional insight.

Only English language and publicly available mechanisms were included in the sample given research and accessibility capabilities.

Curriculum alignment	Supports quality teaching practice	
	Clarity regarding pedagogical approach	**Provides evidence of learning progression e.g. through student data**
+ **EdReports** Curriculum is the main dimension assessed. Review tools are created utilising state standards, and evaluation reports convey the extent to which materials are aligned to the Common Core State Standards or designed for the Next Generation Science Standards (US curriculum). Evaluation is conducted in three progressive gateways, with the first two focusing on alignment indicators, and the last on usability for educators + **NSW DoE Online Learning Tools Marketplace** Ensures tools are aligned with curriculum and syllabus links across key learning areas + **EdTech Tulna** Evaluates alignment with coverage and accuracy against Indian national standards and curriculum	+ **EdReports** Alignment with a pedagogical approach is incorporated into the requirement for evidence-based design, which considers whether materials incorporate a research-based progression into the learning of foundational skills + **NSW DoE Online Learning Tools Marketplace** Each product listed must meet requirements for pedagogy + **EdTech Impact/EDDS** Tools must demonstrate clear values to teaching and learning, to equity and quality education. Also requires for 'pedagogical flexibility' + **Education Alliance Finland** Pedagogy is one of the main quality dimensions assessed. The pedagogical design of products is measured using principles of educational psychology. Pedagogical assessment has four parameters: passive versus active, rehearse versus construct, linear versus non-linear and individual versus collaborative + **Evidence for ESSA** No explicit mention of pedagogy but many program descriptions weave teaching and learning analysis into the description of each tool's capability and how students use them + **Digital Promise** The research-based design and evidence-based edtech certifications require providers to demonstrate how learning sciences informed product design. Providers must give as evidence artifacts (e.g. journal article, white paper, theory of change) or an annotated bibliography which demonstrates how rigorous learning science research was foundational to the product's learning and design approach, alongside an explanation of how cited research was incorporated throughout development. Vendors must stay up-to-date with new learning sciences research	+ **EdReports** Considers how materials provide tools, guidance and support for teachers to collect, interpret and act on data about student progress towards curriculum standards + **ISTE Seal and Teacher Ready Project** Looks for tools that generate data to inform teachers and students about student knowledge, skill gaps, progress and participation. Also looks for whether a tool provides students with feedback which is specific, actionable and constructive to guide their learning journeys and teachers' instructional decisions + **EdTech Tulna** Considers analytics for learners' progress

Curriculum alignment	Supports quality teaching practice	
	Clarity regarding pedagogical approach	**Provides evidence of learning progression e.g. through student data**

	+ **ISTE Seal and Teacher Ready Project**
	Requires products to support teaching practices backed by research and learning sciences. Considers whether products go beyond 'drill and practice' to encourage deeper thinking. Also assesses for:
	  + 'Digital pedagogy': whether product design supports development of what it considers 'digital age' learning skills, capacity and knowledge, e.g. critical problem solving, design thinking, and how to behave safe and ethically online
	  + 'Pedagogical usability': how well a product facilitates the learning process, including instructional design
	+ **Common Sense Media**
	Assesses for pedagogy as part of the overall learning rating given for each product. Pedagogy is described as 'whether the tool helps teachers promote a more student-centered experience', 'whether students gain conceptual understanding or think critically', and 'whether it deepens teachers' pedagogical thinking'
	+ **EdTech Tulna**
	Pedagogical alignment is a key dimension assessed, defined as 'whether the product has incorporated learner-centric approaches and how it applies learning sciences theories and pedagogical design principles to create meaningful learning experiences.' There are 13 sub-dimensions assessed	

Robust evidence base		Accessibility and inclusivity		
Evidence-based design	**Efficacy**	**Accessible design**	**Inclusive design**	**Algorithmic fairness and human rights**
+ **EdReports** Gateway 1 includes an indicator requiring materials to incorporate transparent and research-based progression of learning in content addressing foundational skills. For example, the learning of phonological awareness must be on a research-based continuum + **Educate Ventures** Evidence-based design is the primary quality dimension assessed and measured through two categories: 'evidence awareness' and 'evidence applied'. To demonstrate 'evidence awareness, providers must supply: + a logic model or theory of change + a research proposal with an explicit research question(s) that demonstrates understanding of relevant research concepts and ethical considerations. 'Evidence applied' measures progress made on conducting the research outlined in the research proposal and communicating its outcomes + **ISTE Seal and Teacher Ready Project** Overlaps with pedagogical approach in that product features must customise learning to promote instructional design and align with research-based best practices in teaching and learning sciences	+ **Digital Promise** The Evidence-based Edtech certification requires evidence of a product's positive impact on learning and/or educators through provision of an education research efficacy study. The study must draw on and align with ESSA Evidence Tiers 3 and 4 + **EdTech Impact/EDDS** This part of the EdTech Quality Impact Framework is assessed by WhatWorked Education, which tests effectiveness of edtech products to ensure they improve educational outcomes for students	+ **EdReports** The review criteria require materials provide strategies and supports for teachers working with a range of learners to ensure all students can regularly and actively participate in learning. For digital tools, considers whether they integrate accessible supports for diverse learners. The technology information asks whether all content conforms to the US National Instructional Materials Accessibility Standard (NIMAS) + **EdTech Impact/EDDS** Have a specific certification for age appropriate, accessibility and inclusivity designs to prioritise user human rights and meet best interests of children. The organisation is preparing to work with their current edtech vendors in light of the EU Accessibility Act (as of June 2025, digital companies must ensure that the newly marketed products and services covered by the Act are accessible) + **EdTech Tulna** Has a 'universal design' dimension which measures whether products adhere to Universal Design of Information Technology and Web Content Accessibility Guidelines (WCAG) for learners with various learning challenges and physical needs	+ **EdReports** Considers whether materials provide a balance of images or information about people, representing various demographic and physical characteristics. Also whether materials provide guidance to draw upon student cultural and social backgrounds to facilitate learning + **Digital Promise** Certifications assess whether product developers have incorporated input from diverse and marginalised learners to inform design features. The Practitioner-Informed design certification also includes consideration of how providers can better support historically and systematically excluded learners and/or practitioners through their product + **Common Sense Media** Consider whether the tool is created with people of different abilities and backgrounds in mind + **Education Services Australia's Safer Technologies 4 Schools initiative** Criteria include whether the vendor has ensured that its staff/contracts receive training which acknowledges student diversity (gender, religion, indigenous cultural safety etc) in product design	+ **EdTech Impact/EDDS** While not considered by other mechanisms, EDDS has called this out as an important consideration when designing edtech products for children under its Ten Vertical assessment framework. This dimension ensures edtech providers are held accountable by making transparent the algorithmic and data processing in their products to safeguard children as a vulnerable cohort

Robust evidence base		Accessibility and inclusivity		
Evidence-based design	**Efficacy**	**Accessible design**	**Inclusive design**	**Algorithmic fairness and human rights**
+ **EdTech Impact** This part of the EI's framework is delivered through the assessments provided by Education Alliance Finland (see pedagogical alignment column), requiring alignment with principles of educational psychology + **Digital Promise** The Evidence-Based Edtech certification requires providers to prove how evidence was used to inform product development. Developers can use the following evidence types: appropriate methodologies, sampling, instruments, comparison groups and studies. Providers must make clear how the studies used are linked to the product and informed product design. The research basis for a product must also be shared publicly by the vendor. This dimension overlaps with assessment under pedagogical alignment as the requirement for evidence-base involves use of learning sciences research + **EdTech Tulna** As outlined under Pedagogy dimension, requires products to use learning strategies informed by educational research		+ **Digital Promise** Has a designated Learner Variability certification which assesses product design support for the full spectrum of learners, including learners' cognitive abilities, social and emotional needs, and personal backgrounds. Providers are required to give clear examples of how different learners benefit in their application. Products also must offer at least 6 distinct features, tools and/or learning experiences that support the diverse learner needs and can be adjusted by learners themselves to meet their varying needs. This information must also be easily accessible and public facing so educators and users can understand how the product supports learner variation + **Education Services Australia's Safer Technologies 4 Schools initiative** Criteria include compliance with WCAG 2.1 accessibility guidelines + **ISTE Seal and Teacher Ready Project** Accessibility is defined as the degree to which a product supports and accommodates diverse learner needs and preferences in multiple learning environments. Products must meet current WCAG guidelines at a minimum level so that content and support videos are accessible to a wide range of people with physical, learning, cognitive or other disabilities. Examples given are closed captioning and speed control for audio and video being easy to find, and whether important functions (e.g. buttons) use high contrast design	+ **Education Alliance Finland** EAF's engagement criteria incorporate some inclusion considerations regarding whether products use 'welcoming and caring' language, whether visuals and characters used are suitable for targeted users, ensuring that the product does not make assumptions on users' ages, gender, race or origin, and ensuring products do not include discriminative narrative or enforce stereotypes. These complement the holistic framework of Edtech Impact (see under 'evidence-based design column) + **ISTE Seal and Teacher Ready Project** Inclusivity is a key dimension measured. Products must help teachers provide learning experiences relevant to students of diverse cultures, genders, socioeconomic statuses, religions and backgrounds. The criteria consider whether students can see themselves in the product's content, activities and examples. To achieve this, inclusion indicators include 'empathy opportunities' (whether a product supports empathy building and constructive communication of diverse perspectives) and 'inclusive awareness' (whether product provides reasonable opportunities for learners to build awareness of individual, structural and cultural aspects of privilege, power and oppression)	

Usability and support for quality teacher use			
Usability	**Meaningful learner engagement**	**Recommended usage limits**	**Teacher-focused design**
+ **EdReports** Considers whether instructional materials are user-friendly for students and educators, with a visual design that is not distracting + **EdTech Impact** The user experience dimension considers user satisfaction and ease of setup which is delivered by EAF as part of EdTech Impact's holistic framework + **Education Alliance Finland** The learning engagement dimension includes consideration of whether tools are easy to use and intuitive to navigate, whether the visual design is suitable for the target group and whether the user interface scales correctly across a range of devices + **ISTE Seal and Teacher Ready Project** Product usability is defined as 'the degree to which a tool helps a user meet a need or accomplish a task, including achieving a learning objective.' 'Edtech usability' is defined as including both pedagogical usability (how well a product facilitates the learning process –discussed under the pedagogy column) as well as technical usability (the ease of use and interaction with a product). The technical dimension considers features related to a strong and age-appropriate interface design which facilitates learnability, easy navigation, maximisation of time on tasks, control over actions and general usability + **Common Sense Media** Considers a tool's user interface design including whether it is appealing and easy to use, even for less tech-savvy users + **EdTech Tulna** Criteria employ user-centered design principles to consider whether each tool's interface design is intuitive and helps learners easily understand their actions and action consequences while using the tool	+ **EdReports** Considers whether materials are well designed to facilitate thoughtful student engagement and learning of content. Examples include design supporting regular student participation such as through integrating interactive tools, virtual manipulators and/or dynamic software, and existence of opportunities for students to monitor learning + **EdTech Impact** Learning engagement falls under the 'Quality pedagogy' dimension of the framework assessed by EAF, see below + **Education Alliance Finland** Learning engagement is one of three core dimensions EAF evaluates. The criteria measures products against six aspects of learning engagement: autonomy, competence, relatedness, respect, stimulation and safety. Considerations include whether products are designed to be fun and interesting for learners (looking at the interactions and motivational mechanics of the tool), whether users can create their own goals, and whether the tool allows for functional student feedback + **ISTE Seal and Teacher Ready Project** Looks for features and tools available to: help students monitor their progress and set personal goals with periodical reflection; and engage students in assessing their learning. Examples involve product functionalities encouraging students to reflect on information through note-taking mechanisms or structured prompts, and support collaboration with other learners and teachers + **Common Sense Media** The engagement dimension considers whether tools are visually appealing and motivate and hold student interest. Also considers whether learning is reinforced and extended beyond the digital experience + **EdTech Tulna** Considers whether a product's design for learner navigation and pace gives students adequate control over their learning trajectory, and whether interactivity features are meaningful to the content taught. Also considers whether tools provide meaningful analytical information for learners to track their level of understanding and guide them toward their desired goal	+ **EdTech Impact** While this dimension is not generally considered by the mechanisms (according to publicly available information), EdTech Impact provides recommended usage information for many tools listed, often for both per day and per week use. EdTech Impact notes that this usage information is supplied by the provider themselves	+ **EdReports** Review criteria consider whether materials support teachers to fully utilise the curriculum, understand the skills and learning of students, and enhance a teacher's ability to differentiate and build knowledge. Also considers whether materials provide teacher guidance for the use of technology to support and enhance student learning + **ISTE Seal and Teacher Ready Project** Criteria consider whether the design of the product interface and user experience helps teachers quickly and reliably achieve instructional goals, such as whether products provide adjustable settings for teachers to customise controls and content. Also considers whether educator support materials are provided by vendors + **Common Sense Media** Considers whether teachers receive feedback or support for navigating the product + **EdTech Tulna** The pedagogical alignment dimension considers whether product design includes supports for teachers so that they can use it meaningfully and customise it in response to learners' needs on the ground

Usability and support for quality teacher use		
Professional development	**Vendor support/responsiveness**	**Value for money**
+ **EdReports** The technology information captures whether there are online professional learning supports to help teachers use the materials, such as support videos and embedded teacher notes in materials. Also considers if there are digital teacher lesson guides (e.g. eBooks) made available by vendors + **EdTech Impact** EdTech Impact reviews include whether vendors provide training and support for educators e.g. through teacher demos, webinars, training sessions, videos and documentation. Note that this information is provided by the vendor themselves + **Evidence for ESSA** Reviews include whether a program provides professional development and/or training to assist teachers with implementing the program, including onsite workshops, email and telephone support, online resources and consultation	+ **EdReports** The technology information captures whether vendors provide technical support by assisting schools with any issues they may have, such as through phonelines or online support requests + **EdTech Impact/EDDS** EDDS considers overall provider responsiveness, whether product providers engage and take into account end user feedback, and whether they also address student feedback and complaints and provide redress. EdTech Impact reviews include whether support is available to schools, such as through a phone line, email, FAQs/forums, or availability of account managers. Note that this information is provided by the vendors themselves + **ISTE Seal and Teacher Ready Project** Criteria include whether the product provides teachers with easy access to technical support, including help resources and tutorials, customer service and embedded help functions + **Common Sense Media** The 'support' dimension asks whether teachers and students can get support and assistance from the provider when they need it	+ **NSW DoE Online Learning Tools Marketplace** Value for money is a criterion + **EdTech Impact/EDDS** Value for money is a criterion + **Common Sense Media** Reviews occasionally provide commentary to educators on whether the free version of a tool is sufficiently functional or how their instruction may benefit through use of the paid version

Privacy, security and ethical use of user data and information			
Privacy general	**Data protection and responsibility**	**Data logging, location, ownership and access**	**Cybersecurity**
+ **EdReports** The technology information has a data security and privacy section which addresses how student data storage, disposal and adherence to privacy laws + **EDDS/EdTech Impact** Assesses for data privacy and cybersecurity in line with their principle that children should be excluded from data collection where it is not needed for the immediate task and be allowed safe digital spaces to allow error and exploration without record + **Education Services Australia's Safer Technologies 4 Schools initiative** The ST4S assessment comprehensively covers security and privacy considerations. Assesses whether vendors run a security, privacy and online safety awareness program for staff, and whether the organisation has a documented and implemented security and privacy policy which applies to the product	+ **EdReports** Considers product conformity with US Family Educational Rights and Privacy Act (FERPA) regulations, which allow school districts to maintain control of the student record and impose rules to prevent unnecessary disclosures. Also asks whether a third-party has evaluated the product for FERPA compliance and compliance with state-level student education privacy laws, and whether data are collected from children under the age of 13 + **NSW DoE Online Learning Tools Marketplace** Requires data protection and security. Data must be properly protected and subject to the DoE's data security requirements + **EDDS/EdTech Impact** EDDS assesses products against the Global Education Security Standard (GESS), an international cybersecurity framework tailored to the education sector. The assessment includes whether products adhere to data privacy regulations and conditions, whether they make their processes transparent to external scrutiny and meets child safety requirements + **Digital Promise** All certification applications require the provider to upload a FERPA letter to ensure that data privacy standards are upheld	+ **EdReports** Considers whether data elements are encrypted, whether the end-user licensing agreements allow customers to scrape data from the product and whether personally identifying student data is provided to, generated by, or stored in any systems used by the product + **NSW DoE Online Learning Tools Marketplace** Ensure that products allow the DoE access to data on usage of the Online Learning Tools and data on learning progression of students + **Education Services Australia's Safer Technologies 4 Schools initiative** Ask vendors what data types are captured, stored and processed and whether this includes sensitive data. Also considers the vendor's data deletion and retention protocols. Regarding access, the assessment asks who has access to user data (such as third parties for advertising purposes) and whether those who have access have undergone screening processes and training to ensure they handle data sensitively	+ **NSW DoE Online Learning Tools Marketplace** Assessment criteria consider cybersecurity + **EDDS/EdTech Impact** Products must meet appropriate cybersecurity controls that underpin data privacy laws + **Education Services Australia's Safer Technologies 4 Schools initiative** Considers how the product's servers are secured, and whether the vendor has implemented perimeter controls e.g. external firewall, intrusion detection system and content filtering

Privacy, security and ethical use of user data and information			
Privacy general	**Data protection and responsibility**	**Data logging, location, ownership and access**	**Cybersecurity**
+ **Common Sense Media** The privacy evaluation considers general user safety, including whether users interact with other trusted users or can interact with untrusted users such as strangers and/or adults. Also asks whether profile information must be shared with other users for social interactions + **ISTE SEAL and Teacher Ready Project** Consider whether providers clearly document their data privacy priorities and practices, explaining them in language that is easy to understand, e.g., through publishing clear statements on how it stores and uses student data, through a data privacy certification and/or citing how it meets various data privacy recommendations and requirements (e.g. GDPR)	+ **Education Services Australia's Safer Technologies 4 Schools initiative** The assessment asks vendors detailed questions regarding their data management, including how data is encrypted for communications and whether data is protected in transit. Organisations must also identify what compliance certifications, assurance or security assessments they have completed for the product, including testing against education specific data standards such as the Schools Inoperability Framework (SIF) assurance for interoperability, and the National School Improvement Partnerships (NSI) and Hub Integration Testing Services (HITS) which tests and assures for education integrations and interoperability + **Education Alliance Finland** The safety dimension considers whether products are safe and secure to use. An example given is whether students' answers are only shared with the teacher so that no other students have access to them	+ **Common Sense Media** The privacy evaluation states that best practices regarding data include not sharing, renting or selling a person's personal information to third parties for financial gain. The criteria consider whether users can create or upload content, whether users have rights toward or retain ownership of their data, whether user data is sold by vendors and whether processes to access or review user data are made available to users + **Education Alliance Finland** The safety dimension includes consideration of data saving and access. Examples include whether data is automatically saved, so that users do not lose answers and achievements and whether it is clear who has access to user-shared content such as work and comments	

Privacy, security and ethical use of user data and information		
Whether third party providers involved	**Whether ads displayed**	**Legal and policy compliance**
+ **Education Services Australia's Safer Technologies 4 Schools initiative** Asks vendors if third-party products are used to provide their service. Also asks whether the involved third parties are regularly assessed, have contractual agreements to ensure they adhere to security and privacy policies, and whether risks associated with them are managed + **Common Sense Media** The privacy evaluation asks whether vendors share users' personal information with third-party companies and advertisers	+ **Education Services Australia's Safer Technologies 4 Schools initiative** Asks whether users of the product/service are exposed to advertising and marketing, and whether advertising includes products/services which are offensive or inappropriate for children e.g. racist or sexist content, pornography, promotion of gambling alcohol or tobacco + **Common Sense Media** The privacy evaluation asks whether advertisements and tracking are used in the product/service and states that responsible advertising practices 'limit the use of personal information for any third-party marketing, targeted advertising, tracking or profile generation purposes' + **Education Alliance Finland** The safety requirement includes consideration of whether products include content or advertising that could be harmful for the targeted users	+ **EdReports** The technology information considers whether tools comply with, global standards and/or certifications as well as US legal requirements + **NSW DoE Online Learning Tools Marketplace** The DoE requires vendors to meet their obligations under applicable Australian and NSW laws and NSW Government and DoE policies, and achieve an increase in security protection profiles + **EDDS/EdTech Impact** Criteria are not publicly available but EDDS key principles states that edtech products should be covered by strict licensing, regulatory oversight and systematic independent audits + **Education Services Australia's Safer Technologies 4 Schools initiative** Considers whether products/services are compliant with jurisdictional requirements regarding security and privacy and asks whether vendors have a documented security policy that ensures compliance with applicable laws and regulations

Appendix C: Features of quality assurance mechanisms (assessment process)

EdReports	ISTE	EdTech Impact and EDDS	Education Services Australia's Safer Technologies 4 Schools initiative (ESA)
United States **Service provided** + Independently reviews instructional materials and releases free, evidence-based reports to provide schools, districts and stakeholders with information about quality of material **What is evaluated?** + K-12 instructional materials + Where relevant, information about digital versions of curriculum materials is documented and usability of digital tools is measured under EdReport's third gateway **Service price / paid by whom?** + Is met by the EdReports budget **Incentives to participate** + Consumers of service are schools and teachers, not edtech companies. Schools use these guides to inform their choices re instructional materials **Success rate** + Out of 235 assessment reports listed on website, 113 met expectations, 50 partially met expectations and 72 did not meet expectations **Review process length** + Reviews take 4-6 months	United States / Global **Service provided** + Product certification (SEAL) evaluating and recognising edtech solutions that support best practices for digital-age teaching and learning + Product evaluation guide (through the Teacher Ready project) which aids teachers and edtech decision makers to find high quality products **What is evaluated?** + Edtech products (no further detail provided) **Service price / paid by whom?** + Edtech providers + Price not advertised **Incentives to participate** + Displaying certification badge signals to K-12 decision-makers that a tool meets ISTE-determined requirements of evidence-based, high-impact pedagogy, designed for scalable, equitable learning experiences **Success rate** + 53 tools are displayed as SEAL approved products on website, but total number assessed is undisclosed **Review process length** + Not stated	United Kingdom / Global **Service provided** + Product certifications following evaluation of edtech tools to identify quality tools to support school choices. Certifications are offered under the EdTech Impact Quality Framework, a partnership between EdTech Impact, EDDS, Education Alliance Finland (EAF; also reviewed here), and WhatWorked Education. There are four certifications: certified teacher recommended (through customer reviews on EdTech Impact), certified lawfulness, ethics and safety (using the EDDS evaluation method and network of external reviewers), certified impact evidence (using the WhatWorked Education evaluation method), and certified pedagogical quality (using the EAF evaluation method) **What is evaluated?** + Edtech products and vendors (no further detail provided) **Service price / paid by whom?** + Edtech providers pay for certification (price not available), but EdTech Impact's online marketplace for tools is free to educators who sign up (free sign-up) **Incentives to participate** + Certifications under the EdTech Impact Quality Framework are active, meaning they indicate where a vendor is on the pathway to meeting minimum appropriate requirements and standards. Depending on the assessment (EDDS, EAF, etc.) the vendor and their product is ranked (e.g., 'works with the minimum expected requirements', 'works towards meeting the expected requirements' etc.) **Success rate** + Not available	Australia **Service provided** + Assesses edtech tools against a nationally agreed privacy and security framework + Readiness Check - self-assessment tool for suppliers to check how their product aligns with the national framework + Product Badge Program - to identify suppliers who have been assessed through ST4S **What is evaluated?** + Digital products and services in K-12 education **Service price / paid by whom?** + Free to be assessed, cost met through ESA budget **Incentives to participate** + Marketing benefits + Potential reduced compliance costs because providers are no longer required to undertake multiple assessments across individual privacy and legal frameworks **Success rate** + Not stated, but in the 2021-22 period, 100 assessment reports were conducted and 140 vendors completed a Readiness Check **Review process length** + Not stated

EdReports	ISTE	EdTech Impact and EDDS	Education Services Australia's Safer Technologies 4 Schools initiative (ESA)
Review assessment process + A review criteria and evidence guide are developed and used to assess curriculum materials according to each subject and grade + Progressive review via 3 Gateways (2 x curriculum alignment; 1 x usability) + Reviewers work in teams of 4-5. Individual reviewers spend 5-10 hours a week evaluating materials. Review team meets weekly over several months to write, share evidence and come to a consensus on scoring and the evidence to be included in the final report **Rubric development process** + Review tools are built through research into use of commonly-used rubrics and through nationwide consulting of educators, subject-matter experts curriculum experts, leading rubric developers (e.g. Student Achievement Partners) and organisations that have conducted reviews of instructional materials, lessons and tasks + Based on curriculum: Common Core State Standards (CCSS) and the Next Generation Science Standards (NGSS) + Subsequent revision of review materials Includes input from field experts: teacher membership organisations, state departments of education, school districts, researchers and leading policy voices	**Review assessment process** + Tools are assessed and aligned against the ISTE Standards for Students. ISTE Standards have been adopted by all US states and many other countries + Review conducted by trained ISTE Seal reviewers, a panel of 'education and instructional experts'. Reviewers each individually collect data. If all agree the solution is learning ready in three areas (alignment with standards, practical usability and digital pedagogical implementation), the solution is awarded the SEAL. A review finding report is then released **Rubric development process** + Standards are developed by the ISTE Standards Technical Working group, comprised of US representatives from different school districts and specialists in educational innovation. This working group also receives input from 2200 educators and administrators, and claims to draw from learning science research to inform standards	**Review assessment process** + The following information details the EDDS evaluation method (not necessarily applied to all four certifications under the framework) + EDDS team meets with client and takes rigorous data collection + Evaluation is conducted through blind peer reviews from EDDS' College of Reviewers, with 4-5 people reviewing various requirements + Reviewers use the EdTech Impact Quality Framework and EDDS' 'ten verticals' to assess products + Reviewers provide analysis, recommendations and actionable items to support the provider in meeting minimum appropriate criteria + Evaluation report is presented to provider with follow up consultation and support. Vendor is granted an active certification, which demonstrates where they are on the pathway to meeting minimum appropriate requirements and standards **Rubric development process** + The EdTech Impact Quality Framework is a collaboration with other expert education firms: Education Alliance Finland (see mechanism below), WhatWorked Education (conducts impact evaluations for tools), and in partnership with school stakeholders, edtech companies, industry experts, analysts and researchers + EDDS' individual evaluation method was developed by Dr Hillman (EDDS founder), following five+ years of research, consultations, and tests with edtech vendors and schools in collaboration with EdTech Impact; peer-reviewed journal articles inform some of the findings, efforts and EDDS' assessment tools	**Review assessment process** + The ST4S Working Group use a range of criteria to prioritise services for assessment including usage by local schools, procurement activities or recent reported incidents involving the product or products of a similar type + Suppliers are invited to participate in the ST4S assessment process and are sent an online questionnaire + Supplier responses are analysed and validated by the ST4S Team + Results are reviewed with the supplier + The final assessment results are made available to ST4S Working Group members and educational jurisdiction officials who engage their schools, software suppliers and communities regarding ST4S + Approved ST4S stakeholders may distribute the results to their schools **Rubric development process** + The National Schools Interoperability Program at ESA developed the assessment framework in collaboration with all Australian state, territory, Catholic and Independent school sectors and with a working group of privacy professionals and representatives across Aus and NZ

EdReports	ISTE	EdTech Impact and EDDS	Education Services Australia's Safer Technologies 4 Schools initiative (ESA)
Who makes the assessment? + Expert educators: network of 600+ reviewers who receive virtual and face-to-face professional learning on the curriculum standards and the EdReports review rubric and process **Do they publish reports on the products?** + Yes, for materials that do meet requirements as well as those which do not **Who funds?** + Philanthropy **Budget:** Annual US $7m	**Who makes the assessment?** + Panel of education, technology and instructional experts **Do they publish reports on the products?** + Yes, for products which have successfully been awarded the SEAL certification **Who funds?** + Philanthropy + Government + Consumer + Commercial companies **Budget:** Annual revenue $22.5 million USD	**Who makes the assessment?** + Note: The following information details the EDDS-specific evaluation method and is not necessarily applicable across all four certifications under the framework + EDDS' College of Expert Reviewers which is comprised of independent expert educators, legal, cybersecurity, AI scholars, ethicists, data protection officers, edtech investors, and ethical edtech providers **Do they publish reports on the products?** + Product profiles are available on EdTech Impact's marketplace once a free account is made. These profiles include the price and product capabilities. A small number of reviews have additional independent evaluations attached and pedagogical certification by Education Alliance Finland. The independent evaluations range from impact studies conducted by providers, to external third-party qualification reports or accreditation reports against Government schemes such as the UK's Online Education Accreditation Scheme + Additionally, schools and Multi-Academy Trusts have access to the EdTech Impact Manager platform, which allows them to see 1) which school uses what product; 2) what evaluation or external evidence these products have or do not have; 3) what edtech products may be underused; 4) what products have been assessed externally across lawful, ethical, security or other criteria; 5) what fellow teachers or school leaders say about individual products; 6) demos submitted by teachers about how they use particular products (for other teachers to gain insight and ideas) **Who funds?** + Is a commercial company + Also partners with Government through: UK Research and Innovation **Budget**: Not available	**Who makes the assessment?** + ST4S assessments are co-ordinated by ESA's National Schools Interoperability Program (NSIP) team and the ST4S team analyses and validates supplier assessment responses **Do they publish reports on the products?** + No **Who funds?** + Government: All Australian state governments, Independent Schools Australia, National Catholic Education Commission, NZ Ministry of Education + ESA itself operates as a not-for-profit organisation, generating sufficient income from commissioned projects and services to remain sustainable. ESA receives no core funding from its government owners **Budget**: ESA's annual revenue is AUD $36m but no information available for the ST4S initiative specifically

Education Alliance Finland (EAF)	Common Sense Media (CSM)	EdTech Tulna	Educate Ventures (EV)
Finland **Service provided** + Product evaluation and certification service aiming to improve the pedagogy of edtech products and help providers demonstrate educational impact to customers **What is evaluated?** + Range of digital learning materials: eBooks, apps, games, online courses and also non-digital products + To be suitable for evaluation, product needs to help achieve learning goals that can be defined, and have a pedagogical approach **Service price / paid by whom?** + Edtech provider + Not stated **Incentives to participate** + Providers receive an evaluation report with findings and suggestions on how to improve the learning impact of the product + If successful, awarded a Finnish Educational Quality Certificate which can be used in marketing and communication + Certified products are displayed and promoted on EAF's website as trustworthy edtech tools	United States **Service provided** + Platform which provides both expert reviews of media/edtech tools and allows educators to review too via a star-rating system. Aims to help teachers find the best learning resources to meet student needs and interests + Some reviews also conduct in-depth privacy ratings and evaluations of the policies and terms of products, independent of the learnings ratings + Recognises high-quality and impact media/edtech tools with their Common Sense Selections for Learning seal **What is evaluated?** + Products that have a digital component (e.g. website, app) and which are useful for learning + Preferences products that teachers and families can choose and use themselves, or advocate for in a school budget. Avoids large-scale curricula and nondigital resources + Editors consider review requests from educators and developers, coverage needs, popular trending and interesting products. Tools that are requested by several teachers are more likely to be reviewed **Service price / paid by whom?** + Ratings and reviews are free to public and are not influenced by developers and funders **Incentives to participate** Reviewed tools displayed on website for educators & parents	India **Service provided** + Defines research-based standards for quality design of edtech products to help stakeholders make informed decisions about product design and procurement + Three offerings: product design standards, software evaluation toolkits and evaluation reports. Uses these to provide free third-party evaluations to providers on the quality of their product design + Offerings also aim to assist institutions with procurement decisions, investments or grant-making **Service price / paid by whom?** + Free, product companies can apply for evaluation but are not charged **What is evaluated?** + Products serving K-10 users in the subjects of mathematics, English and science and in the following edtech use-cases: - Personalised adaptive solutions - Game-based learning - Practice and doubt solving - Interactive audio visual - Digital classrooms **Incentives to participate** + Providers receive a free third-party evaluation which gives them feedback on the quality of their product design and provides a market signal of quality. Their product will also be displayed on EdTech Tulna's directory **Success rate** + Not stated **Review process length** + Not stated	United Kingdom **Service provided** + Edtech product certification (EdWard) which acknowledges a company's understanding and use of applied research in the development of their product and that a company has participated in EV's impact training **What is evaluated?** + A company's understanding of how to apply research methods to product development, rather than edtech tools themselves **Service price/paid by who?** + Free for founders/developers of EdTech companies who have completed an EDUCATE upskilling programme **Incentives** + Provided with the EdWard brand image to display on provider websites. Can verify to schools that their product has a verified research foundation **Success rate** + Not stated **Review process length** + 1 month

Education Alliance Finland (EAF)	Common Sense Media (CSM)	EdTech Tulna	Educate Ventures (EV)
Success rate + Approximately 50% of evaluated products have been granted the Pedagogical Quality Certificate **Review process length** + Not stated **Review assessment process** + Review is conducted by three teacher-evaluators, and validated by a fourth specialist at EAF + Products are evaluated using EAF's own evaluation tool + Evaluation is carried out in two phases to determine the learning goals and pedagogical approach of the tool + Learning goals are mapped against national curricula and EAF's syllabus of competencies. The validator compares the product against these skills to determine which different capabilities can be taught and supported using the product	**Success rate** + 72 out of 2958 apps/websites were awarded the Common Sense Selections for Learning seal + Products can still be positively reviewed by experts even if not awarded the seal **Review process length** From a week to a few months **Review assessment process** Expert review process + Editors assign products for review to groups of freelance reviewers who test the product, evaluate against the rubric and assign ratings out of five stars. The review includes determining a recommended grade range, subject and key curriculum skills which teachers could address in using the tool + Each review is revised by at least one editor on editorial team who may test again and modify the review and score + Reviews are updated periodically for accuracy and certain tools are revisited at the discretion of the editorial team based on review popularity, product changes and developer requests Common Sense Selections for Learning Seal process + Editors hand-pick selections annually based on their independent rating criteria and pedagogical rubric	**Review assessment process** + Product companies approach EdTech Tulna if they are interested in conducting a public evaluation of their product design + Products are evaluated against their intended purposes and against EdTech Tulna standards on pedagogical alignment, content quality and technology design + No single consolidated score is assigned to products (to account for complexity and multi-dimensionality of quality), instead, results are presented in a multi-dimensional scale and published on website **Rubric development process** + The framework is informed by research literature (incl survey of multiple global evaluation standards), educational policies and stakeholder interviews + Educational policies reviewed were Indian government policy documents to understand grade specific requirements and expectations of learners in India **Who makes the assessment?** + Evaluations are conducted by expert review teams of 3-4 members + Team members are subject matter experts, instructional designers, user-interaction experts, user-experience design experts, and professionals with experience in teaching and implementing edtech in field settings **Do they publish reports on the products?** + Yes, full evaluation reports are published for every product reviewed **Who funds?** + Partnership between university (IIT Bombay) and philanthropic foundation (Central Square Foundation) **Budget:** Not available	**Review assessment process** + The EdWard has two levels (evidence aware and evidence applied), each level has a set of criteria which companies must meet. Evidence is required from the company to demonstrate that they meet criteria: a logic model/theory of change and a completed research proposal. Research mentors then independently assess and then collectively review applications **Rubric development process** + Basis for rubrics is EV's own academic research, primarily the EDUCATE Golden Triangle methodology for working with evidence-informed edtech + Rubrics are developed by the EV Research team, which includes educational researchers, entrepreneurs, technology experts and academics in the fields of AI, education and EdTech **Who makes the assessment?** + Research mentors **Do they publish reports on the products?** + No **Who funds?** + Is a private commercial company **Budget:** Annual current assets £109,378

Education Alliance Finland (EAF)	Common Sense Media (CSM)	EdTech Tulna	Educate Ventures (EV)
Rubric development process + Assessment tool is informed by national curricula + Was developed with educational researchers from ELE Finland (education advisory firm) and the University of Helsinki (Dept of Ed) + Evaluation method is outlined in a white paper written by EAF researchers which describes the theoretical background of the method and examines key components in the design of good educational solutions + EAF is also partnered with EDDS, EdTech Impact and WhatWorked Education to assess under the EdTech Impact Quality Framework **Who makes the assessment?** + Trained teacher evaluators + Evaluators are screened Finnish pedagogists, professionals holding master's degrees in education and specialised in the areas/subject in which they review. They are trained in using the EAF analysis method and tools **Do they publish reports on the products?** + Provides a sample report but does not publish reports on products assessed **Who funds?** + Is a private commercial company (recently acquired by EdTech Impact) **Budget:** Not available	**Rubric development process** + Developed by CSM education experts in consultation with an advisory board and through interviewing learning and technology experts and surveying 300 teachers and 1100 parents + Rubric took two years of development including two literature reviews of education research and existing rubrics + Rubric is subject to modification every few years according to experience, market shifts and teacher needs **Who makes the assessment?** + Reviews led by staff editors with 10+ years experience in reviewing learning media, experience teaching K-12 and learning design, edtech development and research + Freelance reviewers include edtech and learning media experts, child learning development scholars, instructional designers, K-12 subject area experts, and school technology leaders + Reviewers are trained on an ongoing basis in CSM's rubric and in learning, pedagogy and design, and are vetted for relationships with developers/ vendors to avoid conflict of interest **Do they publish reports on the products?** + Yes, for both products that are recommended and those that are not **Who funds?** Philanthropy, also has range of partners (affiliate, business distribution, education and research, foundation, pro bono and Latino) **Budget:** Annual US $24.6m		

Evidence for ESSA	NSW DoE Online Learning Tools Marketplace	Digital Promise (DP)
United States **Service provided** + Identifies and assesses impact studies of a range of programs and practices available to schools in the US to assess if they meet ESSA legislation evidence standards, and to communicate this information fairly and clearly + Also provides the following information on each program to assist educators in the selection process: program descriptions, cost, availability, staffing requirements and technological accessibility **Service price / paid by whom** + Is met by the Evidence for ESSA budget **What is evaluated?** + Reviews PK-12 reading, math and social-emotional learning programs and practices (including edtech, tutoring programs, professional development strategies, and whole-school reform approaches), with plans to continue adding topics indefinitely **Incentives to participate** + Is independent so providers have no choice in whether they are reviewed **Success rate** + Not stated **Review process length** + Not stated	NSW, Australia **Service provided** + An approved online learning product catalogue for educators in NSW for products that meet requirements for syllabus, pedagogy, data and cyber security + Ensures reasonable, equitable and transparent prices for tools (by negotiating with suppliers), improving accessibility **What is evaluated?** + Commercial online learning products like teaching, learning and productivity tools (full definition of 'online learning tools' provided in RFT) **Service price/paid by who?** + Free for schools + Requires department account sign in to access the marketplace **Incentives** + To be assessed by the NSW DoE as suitable, and have tool offered and easily accessible to schools in NSW **Success rate** + Not stated **Review process length** + Not stated	United States **Service provided** + Edtech product certifications for research-based design, evidence-based edtech: ESSA Tier 3, learner variability, and practitioner-informed design + Aims to close the digital learning gap by increasing digital equity **What is evaluated?** + Instructional learning products, edtech tools **Service price/paid by who?** + $500-750 USD for certifications + Edtech provider **Incentives** + Providers can display certification to consumers/potential consumers of their services and establish trust in quality design **Success rate** + Out of 30 pilot tests of the Research-Based Design Certification, 12 products earned the product certification **Review process length** + Product certification process takes four weeks from submission of application

Evidence for ESSA	NSW DoE Online Learning Tools Marketplace	Digital Promise (DP)
Review assessment process + Qualifying studies on the impact of edtech products are collected and assessed by the Evidence for ESSA team to see if the program meets each of the top three ESSA standards in a given subject and grade level + Each study is evaluated for statistical significance, effect sizes + Studies must meet requirements e.g. be 12-week minimum study, cannot be a provider-made impact study, no after-the-fact designs **Rubric development process** + A Technical Work Group was consulted to develop the policies, standards and review procedures Evidence for ESSA uses to apply the ESSA standards to assess programs + Members of the work group include researchers and policymakers familiar with research procedures and key decisions regarding evidence and evaluation **Who makes the assessment?** + Centre for Research and Reform in Education at John Hopkins University School of Education, in collaboration with a Technical Work Group and a Stakeholder Advisory Group **Do they publish reports on the products?** + Yes, all reviewed programs are displayed regardless of outcome **Who funds?** Philanthropy **Budget:** Not available	**Review assessment process** + The DoE enters agreements with suppliers to meet and maintain standards and to ensure the products used by schools are safe and fit for purpose + RFT specifies the following objectives which may be used to assess tools for approval: value for money; curriculum and syllabus alignment for KLAs; efficiencies for DoE and vendors; access to data (access to DoE data on learning progression and tool usage); data protection and security; legal and policy compliance **Rubric development process** + Unknown (Internal to DoE) **Who makes the assessment?** + Applications are assessed within DoE by SME panel (unknown whether includes external input) **Do they publish reports on the products?** + Unknown, DoE sign in required **Who funds?** NSW Government **Budget:** Not available	**Review assessment process** + Certification applications are independently reviewed by at least two trained reviewers, with a third brought in if the two reach different outcomes. The three then jointly determine whether the product has earned certification + Reviewers use a competency-based framework and certification criteria created by DP. Each certification has its own rubric and requires the submission of evidence by edtech providers to prove that the product meets the listed expectations for each certification **Rubric development process** + Review criteria is defined in a process which engages educators and administrators to identify high-priority edtech product features or design elements and then refined by DP content experts (educators, researchers and product designers). Criteria then undergoes multiple rounds of testing with products + Each certification is also informed by academic research written by DP researchers **Who makes the assessment?** + Reviewers are trained by DP in using the certification's rubric and have expertise in edtech, product design and research **Do they publish reports on the products?** No **Who funds?** Philanthropy, Government, Consumer **Budget:** Annual US $183m

Appendix D: International developments

Internationally, many jurisdictions are integrating edtech considerations into education policy more broadly. Those canvassed below provide a snapshot of the range of developments, including examples of edtech and curriculum material quality assurance mechanisms that have helped embed curriculum, learning and governance standards, with potential workload reduction for teachers and schools.

Europe: Across Europe, national and regional governments (e.g., Lithuania, Poland) and commercial actors have developed and begun applying criteria to identify high-quality resources for education settings. The European Union (EU) has recommended that member states adopt quality standards on a voluntary basis and released guiding principles for states to assist in the development of quality criteria (EC 2023). In addition to baseline requirements, e.g., online safety and protection of children, and openness regarding user data collection processes, they recommend guiding principles for criteria development which include:

- Saving teachers' time to focus on pedagogical value of the content
- Maximising equity and inclusion through accessible content and design which ensures diverse peoples are represented with contextual nuance, compassion and respect, especially those with disabilities
- Address utility and usability issues from both technical and pedagogical angles.

UNESCO: UNESCO recently released an initiative on the right to education, which builds on the Convention against the Discrimination in Education by adding new dimensions, one of which is strengthening the regulation of digital learning and non-state actors to better ensure learner protection (UNESCO 2023c). The Global Education Monitoring team also released a report *Technology in education: A tool on whose terms?* along with a #TechOnOurTerms campaign, which calls on decision-makers in edtech to prioritise the needs of learners, and to conduct assessments to determine the appropriateness, equity, evidence-based nature, and sustainability of applications (UNESCO 2023b).

The World Bank: The World Bank's edtech strategy proposes five principles for education systems to adhere to when making edtech investments: ask why, design for scale, empower teachers, engage the ecosystem, and data driven. 'Designing for scale' requires vendors to prioritise flexibility, user-centeredness and equity and inclusion, to ensure widespread and lasting impact. 'Empower teachers' requires that edtech solutions enhance rather than replace teachers by empowering teachers through providing access to content, data and networks to allow them to concentrate on individual student learning (World Bank n.d.).

UNICEF: UNICEF has a digital learning initiative which provides direction for the global adoption of edtech. Its report 'Responsible Innovation in Technology for Children Digital technology, play and child well-being' (RITEC), introduces a well-being framework for children which recommends all technologies aimed at children adhere to ten principles to ensure wellbeing: competence, self-actualisation, emotional regulation, social connection, safety and security, creativity, and diversity, equity and inclusivity (UNICEF

Innocenti 2024). UNICEF's Digital Learning Strategy for Europe and Central Asia outlines how it will support governments in ensuring quality, relevant, age-appropriate, inclusively designed and curriculum-aligned digital learning content, platforms and solutions (UNICEF 2023).

US: After the introduction of Common Core curriculum standards in 2010, educators reported issues with curriculum materials that lacked alignment and quality (Arabo et al. 2017).[12] In response, some state departments of education and a not-for-profit organisation, EdReports, began providing free, independent reviews of curricular resources, while other groups developed rubrics and evaluation tools to help districts and schools vet the quality and alignment of materials (Arabo et al. 2017).

The US has also sought to advance the use of evidence-based resources through the Every Student Succeeds Act (ESSA) passed in 2015, which is the main vehicle for federal education funding. ESSA incentivises states, local education bodies and schools to prioritise evidence-based learning (which includes edtech) by mandating explicit considerations of evidence for education interventions and outlining four levels of evidentiary quality. Since ESSA, analysts and edtech companies have reported a growing focus on independent evaluations and a shift toward proven quality. Public and philanthropic-supported resources are supporting the shift toward evidence and quality, through mechanisms such as the What Works Clearinghouse (WWC), Evidence for ESSA and now Digital Promise with a new ESSA-aligned evidence-based product certification. The US Department's Office of Educational Technology has also been instrumental in adopting the ESSA Standards of Evidence for edtech through the release of guides and support documents for both edtech providers and procurement teams (Kucirkova et al. 2023).

Asia Pacific: New Zealand is still in the early stages of developing edtech policy but has centralised procurement to reduce burden on schools and increase the value schools get from edtech (EdTechNZ 2021). The industry peak body, Education Technology Association of New Zealand (EdTech NZ)'s, FINDR tool allows schools to find NZ edtech companies and filter them by level of learning (early childhood, K-12, tertiary, educator PLD) and for tools catering to learners with disability (EdTechNZ n.d.). The association recommended that government simplify procurement by establishing a marketplace with validated solutions which comply with Ministry of Education criteria including security, privacy and data sovereignty (EdTechNZ 2021).

In Singapore, the Ministry of Education provides edtech tools through its Student Learning Space (SLS), a centralised platform to support student learning and teacher access to classroom resources (UNESCO 2023d). The SLS consists primarily of Ministry-created, curriculum-aligned tools and resources for student use, such as automated feedback for student writing support and an AI-enabled adaptive learning system to make customised learning recommendations. The SLS also can link with external systems to exchange content, tools assessment items and learning data and supports teachers through guidance on approved learning materials (Singapore Student Learning Space 2024).

12 This issue has been well documented in the bodies of work of Morgan Polikoff and William Schmidt.

Appendix E: Australian Network for Quality Digital Education

The current report has been informed by discussions of the Australian Network for Quality Digital Education, which brings together industry, government, schools and philanthropy to ensure that edtech adopted in Australia's schools meets the highest standards of quality and safety – and that edtech is leveraged to tackle the deep education divide and uplift outcomes for students who experience disadvantage.

At the inaugural meeting of the Australian Network of Quality Digital Education in November 2023, members identified a shared interest in developing a clear understanding of what quality edtech looks like and mechanisms to make it easier for educators and others to find 'tried and trusted' learning applications. An early version of this paper and the issues it outlines were also discussed by Network members at the second meeting of the Network on 20 March 2024. Insights from that conversation are summarised below and have informed this publication, noting that Network members retain their own perspectives and experience.

Overview

A presentation by Eric Hirsch, Executive Director of EdReports, outlining the approach to assessing curriculum materials for quality in the US, followed by panels looking at 'user' and broader 'ecosystem' perspectives of quality, supported consideration of four targeted questions:

- What are the potential benefits (and risks to mitigate) if there were an independent source of information about the quality of edtech tools in Australia?
- What kind of materials, programs and products would we envisage being reviewed in Australia?
- What are the key quality domains for which we should seek to establish criteria?
- What should it mean for a tool or resource to be evidence- or research-based?

Key discussion themes

Edtech is an increasingly dominant mediating layer for teaching and learning, creating a potential lever for improving student learning and outcomes, with coordinated action

In the early days of computers in schools, the focus was on learning about new technologies. Now most of the time that students spend using edtech is spent learning with it. Increasingly, edtech – or learning platforms and applications more specifically – are a common way for students to access curriculum content and learning activities. As such, they are an important potential lever for improving student learning and outcomes, provided they are high quality and well used, under the instructional leadership of appropriately supported teachers.

Edtech has potential to improve student outcomes, but specific action is needed to realise this. Accessibility of devices and reliable internet are ongoing challenges for some families and communities, but equally pressing risks include a lack of clarity and agreement about what constitutes quality for education technology and consequent impact on schools, teachers and students when quality markers are not clear or prioritised.

Inclusivity is a significant opportunity for edtech, and accessibility is a core requirement

Participants agreed that a key value-add of educational technology is its ability to make the curriculum (content, learning activities) more easily accessible to a range of learners, while minimising the time-impost of adaptation on teachers. With 25 percent of Australian students requiring adjustments, participants pointed

out that meeting the needs of all students must move beyond a 'nice to have' consideration and the facility for basic adjustments.

Accessibility can be considered a subset of inclusivity. Participants identified many groups of students whose needs could be prioritised in quality tool design, including First Nations students, multilingual students, and students experiencing educational disadvantage.

Participants considered:

- The possibility of taking a human rights approach to design, with guardrails to support cultural safety and to prevent the embedding of discrimination
- User co-design and community governance of resources as powerful methods for including First Nation perspectives and respecting First Nation history and cultural expertise.

One participant expressed the view that the imperative for adaptivity should be integral to edtech platforms, rather than schools bearing the onus of adapting platforms to their students.

Teacher professionalism and agency is key to leveraging value from quality tools

Participants noted current and significant workforce challenges including the increasing complexity and diversity of the student cohort, resource constraints and teacher shortage. There was agreement that tools should complement teachers, reinforce expertise and professional respect, and alleviate burden. Different views were expressed on how tools might best do this, including through:

- The provision of quality curriculum resources, presenting a cohesive sequence of learning
- Supporting teacher data use and accurate targeting of student need
- Creating more in-class time for teacher-student conferencing
- Supporting the implementation of teacher-developed curriculum (including scaffolding intentional planning to meet diverse student needs)
- Supporting the efficient execution of administrative tasks.

Participants agreed on the importance of dovetailing the implementation of tools with professional learning, ensuring teachers remain in the lead.

Questions of quality need to include a focus on the learning process

For edtech tools that directly seek to support teaching and learning, 'any process that looks at quality has to look at the learning processes.' For some participants, this explicitly meant alignment with the science of learning; another participant expressed the view that the integration of edtech into formal education models required new pedagogy.

Participants noted that 60 percent of edtech has nothing to do with instruction, teaching or curriculum but rather supports administration. Quality assuring these tools may be related to but not directly engage with teaching and learning and curriculum delivery, so the most appropriate quality framework for these tools should focus on privacy and security where they store significant, sensitive student data.

Evidence is a key indicator of quality in edtech and curriculum tools but its definition and measurement present challenges

Types of evidence identified

Participants distinguished between two categories of evidence: evidence of impact and evidence-based design. Evidence of impact involves evaluation of a tool's effectiveness and its impact on teaching and learning. Participants acknowledged the importance of efficacy when considering if a tool meets quality expectations, noting that there are challenges associated with generating robust evidence of impact, especially cost and time, and the need to be circumspect about generalisability.

Regarding evidence-based design, participants surfaced a range of potential quality indicators, including:

- Curriculum alignment
- Demonstration that a tool's approach is consistent with learning science (e.g., do the tools accommodate cognitive load theory? do they promote mastery learning?)
- 'Completeness' of the product (e.g., does it include assessments?)
- Demonstration that product development included quality processes (e.g., product mapping, theory of change).

Prioritisation of importance

Participants differed over which form of evidence should take priority. Some expressed the view that quality of product design is within the control of product developers. Others stressed that without evidence of a tool's effectiveness, stakes for implementation are unacceptably high.

Challenges

Discussants agreed there should be further development of (1) a clear and transparent description of quality, and (2) of what constitutes quality evidence that a tool meets these criteria, but foreshadowed key challenges and questions:

- Efficacy of, and trust in, any quality process depends on the reliability and credibility of the organisations involved
- How to ensure that system and regulator interest in quality assurance is mirrored by market interest in, and demand for, quality indicators?
- How to balance any independent mechanism with the desirability of building educators' individual capability in understanding evidence and evaluation?

In context of these challenges, one participant shared the UK Education Endowment Foundation's approach of 'evidence guardianship,' that is, quality assuring the evidence basis of rubrics, frameworks, and standards rather than assessing individual programs or tools, which would potentially more quickly diffuse quality expectations and standards across edtech. A related question arose: would this approach risk shifting the burden of evaluation to time-poor teachers and schools?

Defining the scope of any quality assessment process is a key challenge and priority

Edtech is a broad umbrella. To triage this remit, Network members made several suggestions for prioritisation:

- Usage levels
- Risks (to young people) and opportunities (for improved learning or support for teacher practice)
- Eliminating 'generic' functional/collaborative tools.

Student management and similar systems present a particular challenge in that the data risks may be high but the opportunities they present for improved teaching and learning are more removed.

Privacy, safety, and security of children's data is a necessary foundation of quality education technology

Participants agreed that data privacy, safety and security should be a pre-requisite for any understanding of quality in edtech, noting significant instances of poor practice within the sector. Participants noted that vulnerability is replicated across contexts, and that the most vulnerable children in schools are also the most vulnerable online. Two key questions emerged:

- Who is best placed to ensure these questions remain foregrounded in policy and program responses to edtech?
- How can the Network appropriately balance responsibility to this dimension of quality while also seeking to advance active consideration of other elements?

An independent source of information about the quality of edtech tools in Australia promises benefits but also risk to mitigate

The Expert Panel leading the Review to Inform a Better and Fairer Education System noted research showing 'that when teachers use high-quality curriculum materials – that is, coherent, evidence-based curriculum materials aligned with curriculum standards – in their classrooms, they can boost student achievement.' An independent, ideally national, source of information about the quality of resources and tools would make it easier for teachers, schools, and systems to choose high-quality tools. As well as benefits to student learning, Network discussants noted the potential for better maximising education expenditure – through informed decision-making, market shaping and procurement leverage. Increased clarity across key quality domains could also build sector capability and practice.

Potential issues identified, in addition to those identified earlier in this summary, include:

- Balance between demand for product review in a timely fashion and sufficient depth to avoid 'tick a box' approaches
- Impact on innovation, particularly small providers
- Insufficient understanding of, and buy-in to, quality criteria by schools (alternatively, restrictions on school or state autonomy may be unpalatable to some stakeholders)
- Breadth of quality domains and coordination across many processes and stake-holders
- Need to secure appropriate funding from government and/or philanthropy.

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