



**Towards effective
ICT training:** A needs
and gaps analysis of the
ICT Training Package

APPENDICES

MAY 2025

ICT Training Package needs and gaps review

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Appendix A

List of participating stakeholders

Registered Training Organisations (RTOs)

TAFEs	Universities/higher education providers	Senior secondary schools	Private and community RTOs
<ul style="list-style-type: none"> • Bendigo Kangan Institute • Box Hill TAFE • Chisholm TAFE • Federation TAFE • GOTAFE • Holmesglen Institute • Melbourne Polytechnic • Sunraysia Institute of TAFE • TAFE Gippsland • TAFE NSW • TAFE QLD • TAFE SA • TASTafe • The Gordan 	<ul style="list-style-type: none"> • Federation University • Monash College • RMIT • Swinburne University • University of TAS • Victoria University 	<ul style="list-style-type: none"> • Catholic Schools Parramatta Diocese • Edmund Rice Education Australia • Sydney Catholic Schools 	<ul style="list-style-type: none"> • Academy IT • Asset College • Australian College of Commerce and Management • Australian College of Digital Technologies P/L • Bell Training Solutions Pty Ltd • Charlton Brown • Community Colleges Australia • Danford College • Equinim College • Falcom Institute of Technology • Frontier Institute of Technology • Goanna Education • Integracom • Inventorium RTO Pty Ltd • Ivet Institute • Lumify Group • Macedon Ranges Education • Macquarie Community College • Mindroom Innovation • NAT Institute of Technology • NextEd Group Limited • Paradigm Training Group Pty Ltd • The Business School • The Imperial College of Australia • TITEB Tiwi Island Training and Education Board • Trinity Institute • Upskilled

List of participating stakeholders

continued...

Quality assurance consultants, training product developers

- ReadCloud
- RTO Associates
- RTO Works

State Training Authorities (STAs) and curriculum authorities

- QLD State Government Department of Employment
- Skills Planning and Purchasing, Skills SA
- Skills TAS, Department of State Growth
- VIC Curriculum and Assessment Authority
- VIC Skills Authority

Priority cohorts

- Australian Digital Inclusion Alliance (ADIA)
- TITEB Tiwi Island Training and Education Board
- Wellsprings for Women
- Women's Health in the South East (WHISE)

Jobs and Skills Councils (JSCs)

- BuildSkills Australia
- HumanAbility
- Industry Skills Australia (ISA)
- Manufacturing Industry Skills Alliance (MISA)
- Mining and Automotive Skills Alliance (AUSMASA)
- Powering Skills Organisation
- Public Skills Australia
- Service and Creative Skills Australia (SaCSA)
- Skills Insight

ICT NGA technical committee / working group

- Australian Computer Society (ACS)
- Australian Public Service Commission (APSC)
- Chisholm TAFE
- Community Colleges Australia
- Department for Education, Children and Young People (DECYP) RTO
- Lumify Learn Pty Ltd
- NextEd Group Limited
- TAFE QLD

Industry associations and peak bodies

- Australian Computer Society (ACS)
- Australian Council of Trade Unions (ACTU)
- Australian Information Industry Association (AIIA)
- Australian Services Union (ASU)
- Business Council of Australia (BCA)
- Community Education Australia (CEA)
- Council of Small Business Australia (COSBOA)
- Independent Tertiary Education Council Australia (ITECA)
- NSW Digital Compact
- Professionals Australia
- Tech Council of Australia (TCA)

List of participating stakeholders

continued...

FSO taskforces

Innovation Taskforce	Large Employer Taskforce	RTO Delivery	RTO Taskforce	Cyber Security Technical Committee
<ul style="list-style-type: none"> • Amazon Web Services (AWS) • Australian Services Union (ASU) • Commonwealth Bank Australia • HEDx • Impactive Systems • Microsoft Asia • ReadyTech • Victoria University • Western Sydney University 	<ul style="list-style-type: none"> • Atlassian • Blundstone Australia • Deloitte Australia • Finance Sector Union (FSU) • MyState Limited • Suncorp • Telstra 	<ul style="list-style-type: none"> • Holmesglen • National Institute of Technology • North Metropolitan TAFE • TAFE NSW • TAFE SA • Tas TAFE 	<ul style="list-style-type: none"> • Box Hill Institute • Canberra Institute of Technology (CIT) • Chisholm Institute • Equinim College • Nexted Group • North Metropolitan TAFE (WA) • St George & Sutherland Community College (SGSCC) • TAFE NSW • TAFE QLD • Verto 	<ul style="list-style-type: none"> • Alyve • Australian Computer Society (ACS) • Australian Public Service Commission (APSC) • Australian Women in Security Network (AWSN) • Canberra Institute of Technology (CIT) • Communications and Information Technology Training (CITT) • CyberCX • Deloitte Australia • Department of Defence • South Metropolitan TAFE • Tesseract

Timeline and details of engagement

	Date	Activity	Objective	Stakeholders
Engagement Expression of Interest (Eoi)	May – July 2024	<ul style="list-style-type: none"> Initial Eoi email sent to: <ul style="list-style-type: none"> – 1,489 x RTOs with ICT training products on scope – 164 x select industry stakeholders as well as State and Territory Government representatives Direct calls made to nonresponding RTOs with ICT training products on scope Second Eoi email sent to 297 x RTOs with explicit ICT training products on scope who did not respond to initial email or direct calls 	Invite stakeholders to engage with Information, Communications and Technology (ICT) Needs and Gap analysis (NGA)	<ul style="list-style-type: none"> RTOs with ICT training products on scope Educational experts and trainers / teachers STA and curriculum authorities Employers / industry Peak bodies Priority cohorts
Survey	July 2024	<ul style="list-style-type: none"> Online survey sent to 112 x RTOs that expressed interest in completing the survey during the EOI process 14 x survey responses received 	Gather feedback and input on current usage, perception, and effectiveness of the ICT Training Package	RTOs with ICT training products on scope
Individual consultations	May – November 2024	58 x individual consultations with 88 x stakeholders	To gather insights on the usage and efficiency of the ICT Training Package and the alignment of skills and knowledge acquired by learners with current industry demands	<ul style="list-style-type: none"> RTOs with ICT training products on scope Educational experts and trainers / teachers STA and curriculum authorities Employers / Industry Peak bodies Priority cohorts

Timeline and details of engagement

continued...

	Date	Activity	Objective	Stakeholders
Workshops	August – December 2024	<ul style="list-style-type: none"> • 3 x virtual workshops • 4 x in person workshops held in Queensland, Victoria, New South Wales and Tasmania 	<ul style="list-style-type: none"> • To share findings to date and gather input on possible updates to the ICT Training Package • To gather insights on the usage and efficiency of the ICT Training Package and the alignment of skills and knowledge acquired by learners with current industry demands • Validate ICT NGA findings to date • Gather feedback on priority of findings, potential impacts and workshop possible solutions / updates to the ICT Training Package 	RTOs with ICT training products on scope
FSO State Forums	July – October 2024	In person workshops held during FSO State Forums in Western Australia, South Australia and Queensland	To gather insights on the usage and efficiency of the ICT Training Package and the alignment of skills and knowledge acquired by learners with current industry demands	RTOs with ICT training products on scope
FSO Taskforces	July 2024	Virtual meetings with FSO taskforces	<ul style="list-style-type: none"> • To present ICT NGA findings to date • To attain insights on urgent skill needs • Gather feedback on the purpose of the ICT Training Package, it's usage and efficiency and the alignment of skills and knowledge acquired by learners with current industry demands 	<ul style="list-style-type: none"> • Innovation Taskforce • Large Employer Taskforce • RTO Taskforce • RTO Delivery • Cyber Security Technical Committee

Timeline and details of engagement

continued...

	Date	Activity	Objective	Stakeholders
FSO Workforce Planning	2024	Consultations	<ul style="list-style-type: none"> • To attain insights on urgent skill needs • Gather feedback on the purpose of the ICT Training Package, it's usage and efficiency and the alignment of skills and knowledge acquired by learners with current industry demands 	<ul style="list-style-type: none"> • 26 x finance organisations • 33 x technology organisations • 25 x business organisations • 16 x community groups representing diverse groups • 24 x training providers • 8 x JSCs • 17 x government agencies (Commonwealth, State or Territory) • 5 x unions
ICT Technical Committee	January – February 2025	2 x 1-hour virtual meetings	Attain feedback to inform and validate findings and draft recommendations	ICT NGA Technical Committee
Validation of draft findings and recommendations	February 2025	Invitation to provide feedback on draft findings and recommendations	<ul style="list-style-type: none"> • Attain feedback to inform and validate findings and draft recommendations • Gather insights on digital and technical skills needs in their sectors, overlap with technologies trained in ICT training, impact of updates to the ICT Training Package 	<p>Peak bodies and associations</p> <ul style="list-style-type: none"> • Australian Computer Society (ACS) • Australian Council of Trade Unions (ACTU) • Australian Information Industry Association (AIIA) • Australian Services Union (ASU) • Business Council of Australia (BCA) • NSW Digital Compact • Professionals Australia • Tech Council of Australia (TCA)

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Timeline and details of engagement

Date	Activity	Objective	Stakeholders
<p>Validation of draft findings and recommendations <i>continued...</i></p>			<p>RTOs</p> <ul style="list-style-type: none"> • Academy IT • Box Hill Institute • Federation University • Holmesglen Institute • Ivet Institute • Lumify Group • RMIT University • Swinburne University of Technology • TasTAFE • TAFE Queensland • The Gordon TAFE • Upskilled
<p>February 2025</p>	<p>Invitation to provide feedback on draft findings and recommendations</p>	<p>Gather insights on digital and technical skills needs in their sectors, overlap with technologies trained in ICT training, impact of updates to the ICT Training Package</p>	<p>JSCs</p>

Appendix B

Key insights by stakeholder group

Key insights from training providers

Flexible, modular learning and micro-credentials

- Modular credentials, stackable units, and micro-credentials are suggested as a flexible learning approach to cater to diverse student needs and evolving industry demands.
- Micro-credentials are valued for rapid upskilling in specific skills, especially in cybersecurity and small business, allowing for quick, industry-relevant training.
- Concerns were raised about the non-accreditation of many micro-credentials, leading to a preference for those endorsed by industry and universities, ensuring wider recognition and transferability.
- Micro-credentials are considered a valuable tool for flexibility and the potential for rapid skill acquisition, especially when they complement accredited training and help address skills gaps in emerging fields like AI and cybersecurity.
- A flexible training system with core units and interchangeable micro-credentials is proposed.

Clarity about progression and pathways

Training providers emphasised the need for:

- clear pathways in ICT career development, particularly to cater to both entry-level workers, those with existing but unrecognised skills, and career changers.
- flexible pathways and recognitions for people without formal qualifications, especially in emerging areas like cybersecurity and cloud computing.

Key insights from training providers

continued...

- an emphasis on targeted career transitions, that support mobility, allowing professionals from other fields to transition into ICT roles
- incorporation of industry-recognised certifications (e.g., Microsoft, CISCO) into training packages to ensure graduates are job-ready and have recognised credentials
- a narrative around pathways within ICT roles, mapping skills from foundational positions to advanced roles

Industry relevance and agility

- There was a strong emphasis on ensuring qualifications and training are agile and able to keep up with technological advancements and future skills requirements.
- Flexibility in performance criteria, maintaining core units while allowing room for future innovations, and integrating internationally recognised frameworks are seen as essential for global mobility and relevancy.
- Emphasis was placed on continuous collaboration with industry stakeholders and experts to ensure training products remain relevant and aligned with industry needs.
- Regular updates were suggested, including forming advisory groups, maintaining ongoing discussions, and engaging with RTOs and industry partners.
- Industry certifications, such as from Cisco and Microsoft, are seen as valuable tools for enhancing job readiness and employability.
- The importance of transferable skills across different platforms and technologies to adapt to rapid changes in the ICT industry was highlighted.

Guidance and support for implementation

- The importance of using the CVIG to support the delivery and assessment of ICT qualifications was highlighted, providing essential information for structuring training and assessment strategies.
- A targeted guide that addresses current industry needs, offering practical examples and real-world applications is recommended.
- The CVIG should be regularly updated to reflect evolving technologies and industry standards and contain detailed advisory information for trainers.

Practical learning and work experience

- Work-integrated learning and practical, hands-on experiences are considered critical for student success. Training programs should combine theoretical education with practical application in a workplace to prepare students for the ICT industry.
- Advocate for a stronger focus on hands-on skills through work-based learning models like traineeships, apprenticeships, and internships. Proposals include incentives for industry involvement in work experience programs and stronger industry partnerships.
- Industry-recognised certifications (e.g., Microsoft, CISCO) and industry partnerships would enhance employability.

Key insights from industry and employers

- There is a need for the ICT Training Package to include specialised training in cyber training, AI training, and digital literacy training should align closely with industry needs and provide clearer pathways for learners.
- Industry's use of micro-credentials, short courses, and badges that are self-service and driven by immediate needs was seen as responsive to industry demands and would allow learners to pick and choose the skills they need.
- Flexible training where learners can select the skills they need based on their job requirements is desired, moving away from pre-packaged training and allowing for more personalised learning experiences.
- Aligning the curriculum with vendor certifications would allow learners to stay current with technology and industry needs.
- While vendor certifications are valuable, they should not be the primary focus of training programs. Instead, global standards around skills and competencies should be prioritised.
- Students need to be effective in the workplace by understanding and applying core technologies. Additionally, there is a call for flexibility in developing training for emerging technologies.
- Generic training products are unlikely to deliver the specific needs of an organisation. Training should be contextualised to the unique operating environment of the organisation to ensure job readiness.
- There is a shift from focusing on jobs to focusing on skills. Skills are seen as more enduring and adaptable than specific job roles, which can become outdated.
- The importance of generalist skills such as creativity, communication, empathy, innovation, and problem-solving was highlighted. These skills are becoming critical as automation and AI become prevalent.
- Integration and optimisation skills are crucial for organisations if they purchase off-the-shelf systems and technologies.
- There is a need for responsive training delivery methods. How training is delivered can determine how quickly and effectively it can be updated and adapted to changing needs.
- Traditional views of qualifications as a linear progression are considered outdated, especially in fields like ICT where individual UoCs are often used as electives across other training products.
- It is important to have units available to increase skills, as digital skills are becoming increasingly necessary across various fields.
- Digital training needs to be tailored to specific industries to ensure its applicability and effectiveness.
- Workforce planning is often given to HR teams who may not understand or comprehend alignment to training with workforce needs.
- Insights from the degree apprenticeship program highlight the importance of support on the ground and the need for transferable skills.
- There are challenges in retaining trained employees, and it is important to create a supportive environment to prevent them from leaving before the employer benefits from their training.

Key insights from priority cohorts

- Vulnerable Australians often face barriers to accessing formal education due to a lack of cultural safety and previous negative experiences with formal education systems.
- Wrap-around services are considered valuable, particularly for vulnerable cohorts, to succeed in education and training. These services are crucial for engaging students and supporting completions.
- Disparities in funding and accessibility for community education across different states create inequities. Most funding and structured programs are concentrated in Victoria and NSW. This affects the ability of vulnerable cohorts to access training and education.
- Industry engagement and mentoring are essential for providing pathways for vulnerable cohorts into the ICT sector. There is a need for real-world examples and support to bridge the gap between training and employment.
- Successful models for attracting priority cohorts involve partnerships with community organisations that provide wrap-around support and connections to employment opportunities.
- The training package must include culturally responsive pedagogies and curriculums that value and embrace diversity. This includes providing reasonable accommodations such as assistive technologies, accessible learning materials, and supportive classroom environments.
- Training providers should implement mentorship programs and create pathways that specifically support First Nations people, women, and people with disabilities. This can include partnerships with community organisations and targeted recruitment efforts.
- The training package should be designed to be adaptable and flexible, accommodating the diverse needs of priority cohorts. This includes offering online and blended learning options, providing financial support for those in need, and ensuring that all materials are accessible.

First Nations people

Barriers and challenges include:

- geographical and socio-economic barriers that limit their access to quality education and training opportunities.
- a lack of culturally appropriate training programs that respect and integrate First Nations cultures and languages.
- significant underrepresentation in STEM fields.
- negative experiences with formal education due to systemic issues and life circumstances, making cultural safety essential for their participation.
- rural and regional First Nations communities that face significant disparities in accessing adequate funding for literacy, numeracy, digital, and employability skills.
- social and cultural factors hindering them from committing to long-term programs.

Strategies to address these include:

- ensuring that training products include culturally responsive pedagogies and curriculums that value and embrace diversity.
- implementing mentorship programs and creating pathways that specifically support First Nations people.
- designing training packages to be adaptable and flexible, accommodating the diverse needs of First Nations learners.
- ensuring learners receive culturally appropriate guidance, opportunities and mentorship.
- engagement with industry partners and the creation of job opportunities for First Nations learners.

Key insights from priority cohorts

continued...

Women

Barriers and challenges include:

- a lack of mentors and role models for women in tech, which can hinder their career progression
- gender bias in the workplace, leading to unequal growth opportunities and pay disparities compared to their male counterparts
- inflexible learning options that can be particularly challenging for women balancing training with caregiving or work responsibilities
- limited support networks and feeling isolated in the classroom due to male-dominated teaching and training environments
- multiple layers of discrimination, which restricts their opportunities for equal participation

Strategies to address these include:

- using examples, case studies, and imagery that show women in leadership and technical roles
- offering part-time, self-paced, or online options to accommodate women balancing training with caregiving or work responsibilities
- fostering safe and supportive spaces

People with disability

Barriers and challenges include:

- multiple layers of discrimination, which restricts opportunities for equal participation in economic, social, educational, and political life
- a lack of adequate support services and reasonable accommodations in educational and workplace settings
- disadvantage in all measures of social and economic participation

Strategies to address these include:

- providing resources in multiple formats, such as screen-reader-friendly text, captioned videos, Braille, or large print
- ensuring compatibility with assistive technologies such as screen readers, voice-to-text software, and ergonomic tools
- allowing for reasonable adjustments in assessments and delivery, such as extended time, alternative formats, or modified tasks

Culturally and Linguistically Diverse (CALD) individuals

Barriers and challenges include:

- language barriers that can make it challenging for CALD individuals to engage in and benefit from ICT training
- training materials that may not reflect diverse cultural contexts, making content less relatable for CALD learners
- discrimination and exclusion which restricts opportunities for equal participation

Strategies to address these include:

- translating key training materials into multiple languages or providing bilingual support workers
- using examples and case studies that reflect diverse cultural contexts to make content relatable
- simplifying language and avoiding jargon to ensure materials are easy to understand for learners with diverse literacy, cultural, or language backgrounds

Key insights from State Training Authorities (STAs)

- The training package can be changed quickly and efficiently if the process is well-managed.
- Support for accredited training systems with shorter, flexible training options, that learners and employees can build on, or add to, over time e.g. stacked accredited skill sets resulting in a nationally recognised qualification.
- Technology can change in months, not years, and the training package needs to adapt quickly to these changes.
- The training package requires an overhaul to remove duplication of units, to improve clarity and be made more efficient.
- The training package addresses the skills needs across various industries, but there is a need for digital literacy from an early age. VET in Schools is a pathway to address the critical need for robotics, AI, and automation skills.
- Job roles are evolving, and need to focus on skills rather than specific job titles to maintain the relevance of the ICT Training Package.



Appendix C

Literature review

Research on the evolving ICT landscape:
skills, trends, and educational pathways

September 2024

Literature review approach overview

The research provides a robust evidence base on ICT¹-related skills, trends, and pathways across organisations, industries, and educational providers, both in Australia and globally.

This research aims to provide an overview of three focus areas critical to the review of the ICT Training Package, drawing from a review of recent literature and its findings. First, it examines current and future skills requirements, identifying the digital competencies needed within ICT and other industries, with a focus on both general and digital skills.

Second, it explores emerging trends, best practices, and educational innovations, highlighting shifts in how training is delivered and how skills are acquired across various industries, extending beyond the ICT industry.

Finally, the research investigates frameworks for skills, pathways, and job roles within the ICT industry, outlining structured approaches to digital skills development and workforce planning. The findings are presented from two perspectives: the industry perspective, which focuses on industry needs and workforce readiness, and the educational and training provider perspective², which includes the needs of teachers of digital technology, curriculum design, and training delivery.

The findings across those three focus areas will provide detailed insights into the needs and gaps of the Australian ICT industry, as well as highlight opportunities for enhancing training and skill development initiatives. Additionally, this research will assist in validating the findings collected through stakeholder consultations, ensuring that the perspectives of industry leaders and VET ICT teachers are reflected in the review. By integrating these insights, the report aims to contribute to a comprehensive understanding of the current and future digital needs and inform the ICT training package review.

Literature review methodology

1. Literature review criteria

- Recent: Published within the last 3 years (2021-2024), except for frameworks, which may not have been updated recently and are included if published from 2019 onwards.
- Reliable: A reliable (academic) article, public institution, or respected consultancy / agency / thinktank.

2. Focus areas

- Current and future skills requirements
- Trends, best practices and educational innovations
- Frameworks for skills, pathways and job roles

3. Relevant literature – see reference list for all sources reviewed

1 Acronym for Information and Communications Technology.

2 Information refers to VET in School ICT teachers, VET ICT teachers, and teachers of digital technologies from primary and secondary educational level.

Executive summary

From an industry perspective

Focus areas	Key insights	Detailed information	
<p>Current and future skills³ requirements</p>	<ul style="list-style-type: none"> • There is a critical need for digital skills, including information/data literacy, digital communication, content creation, and technical proficiency, as well as the ability to critically evaluate and use information. • Australian companies are increasingly trialing or using AI software to address issues such as labour shortages, high material costs, and global supply chain disruptions.⁴ • There are significant skill gaps in AI, machine learning, data analytics, and cybersecurity.⁵ • Looking ahead, the demand for skills in AI, big data, creative and analytical thinking, and overall digital and technological literacy is projected to grow across most, if not all, industries. 	<p>Current skill needs (Digital):⁶</p> <ol style="list-style-type: none"> 1. AI + Machine Learning 2. Data Analytics/Management 3. Cybersecurity 4. SQL 5. Software Engineering 6. Python 7. Cloud Based Management Software 8. Mobile Apps 9. Advanced Analytics (e.g., dashboards) 10. Data Fluency 	<p>Current skill needs (Digital and Employability):⁷</p> <ol style="list-style-type: none"> 1. AI + Machine Learning 2. Data Analytics/Management 3. Cybersecurity 4. Cloud-Based Management Software 5. Problem-Solving 6. Communication 7. Analytical Thinking 8. Creative Thinking 9. Resilience, Flexibility, and Agility 10. Technological Literacy
		<p>Future skill needs (Digital):⁸</p> <ol style="list-style-type: none"> 1. Digital Literacy 2. Drone Operation 3. Data Management 4. Data Monitoring, Analysis, and Interpretation 5. Digital Communication 6. AI and Big Data 7. Cybersecurity 8. Cloud-Based Management Software 9. Programming 10. Quantum literacy 	<p>Future skill needs (Digital and Employability):⁹</p> <ol style="list-style-type: none"> 1. AI and Big Data 2. Technological Literacy 3. Creative Thinking 4. Analytical Thinking 5. Curiosity and Lifelong Learning 6. Resilience, Flexibility and Agility 7. Systems Thinking 8. Motivation and Self-Awareness 9. Talent Management 10. Service Orientation and Customer Service

³ The current and future skill needs identified in the literature are relevant across various industries. However, in many instances, these skills are not explicitly defined in the sources reviewed.

⁴ Future Jobs (2023)

⁵ Digital Adoption (2024)

⁶ Digital Adoption (2024), ICT Industry, Future Jobs (2023), 2025 Skills Horizon (2024), Mining Future (2024), Real Estate - Blockchain (2022), India (2024a), India 2(2024b)

⁷ Digital Adoption (2024), 2025 Skills Horizon (2024)

⁸ Digital Adoption (2024), ICT Industry, Future Jobs (2023), 2025 Skills Horizon (2024), Mining Future (2024), Real Estate - Blockchain (2022), India (2024a), India (2024b)

⁹ Digital Adoption (2024), ICT Industry, Future Jobs (2023), 2025 Skills Horizon (2024), Mining Future (2024), Real Estate - Blockchain (2022), India (2024a), India (2024b)

Executive summary

From an industry perspective

continued...

Focus areas	Key insights	Detailed information
<p>Trends, best practices and educational innovations</p>	<ul style="list-style-type: none"> • In general businesses are increasingly investing in new technologies and hands-on training, focusing on digital skills development and strategic partnerships. • Globally, over 80% of businesses report prioritising learning on the job¹⁰, and automating processes to enhance efficiency. • Training is becoming faster and more flexible, driven by digital tools and lifelong learning initiatives. • Key technologies in use globally include data analytics (47%), cloud management software (43%), and mobile apps (41%)¹¹, with significant adoption of big data analytics, digital platforms, and workforce development technologies across industries¹². • Organisations in the Asia Pacific region are shifting towards more hands-on training delivery methods, with 42% providing direct digital skills training to employees¹³, which may be supported by partnerships with skill development councils¹⁴. 	<p>Examples:</p> <p><i>Asia Pacific region (Construction industry):</i>¹⁵</p> <ul style="list-style-type: none"> • 85% of businesses in the Asia Pacific region currently offer some form of digital skills training to existing employees, usually offered multiple times a year. <p><i>Singapore (Construction industry):</i>¹⁶</p> <ul style="list-style-type: none"> • Plan to implement an additional 7 technologies. • Investing more than 20% of expenditure in new technologies. • AI is considered important for business growth. <p><i>India:</i></p> <ul style="list-style-type: none"> • Standardised digital courses prepared in-house with the simulation model.¹⁷ • 25% of training programs expected to be of less than one month during 2023-2027.¹⁸ <p>Examples of successful initiatives:</p> <p><i>The Skill India Digital (SID):</i>¹⁹</p> <p>A comprehensive digital platform focusing on digital technology and Industry 4.0 skills. It aims to promote digital skills and digital literacy, facilitating lifelong learning and career advancement to ensure skilling the youth with future-ready skills.</p> <p><i>Tata Projects</i>²⁰ in India has an MoU with the Construction Skill Development Council of India (CSDCI), Hydrocarbon Sector Skill Council (HSSC), and the Construction Industry Development Council (CIDC).</p>

¹⁰ Future Jobs (2023) - Reference to surveyed businesses only.

¹¹ Digital Adoption (2024)

¹² Future Jobs (2023)

¹³ Digital Adoption (2024)

¹⁴ India (2021)

¹⁵ Digital Adoption (2024)

¹⁶ Digital Adoption (2024)

¹⁷ India (2021)

¹⁸ Digital Adoption (2024)

¹⁹ Skill India Digital (2023)

²⁰ India (2024c)

Executive summary

From an industry perspective

continued...

Focus areas	Key insights	Detailed information
<p>Frameworks for skills, pathways and job roles</p>	<ul style="list-style-type: none"> • Skills shortages are a significant barrier to technology adoption.²¹ • Only 23% of Australian construction businesses have a defined technology strategy, compared to 30% in the broader Asia Pacific region²², indicating a significant gap in digital adoption and investment planning. • There is growing demand for flexible, targeted training programs that address specific skills gaps while ensuring internationally recognised qualifications for talent mobility. • Frameworks focusing on tailored digital skill development, cross-industry competencies, and alignment with global standards are becoming increasingly essential. 	<p>Overarching topics addressed in frameworks (ADCF, SFIA, Jisc, MIL etc.):²³</p> <ul style="list-style-type: none"> • Importance of tailored skill sets, lifelong learning and adaptability. • Shared concern for protecting digital environments, personal privacy, and well-being. • Necessity for individuals to interact and work collaboratively through digital platforms. • Importance of measurable outcomes through assessing and guiding digital skills development. <p>Innovative aspects across frameworks:²⁴</p> <ul style="list-style-type: none"> • Emphasis on cross-industry competencies to address flexible skill sets, including digital skills, problem-solving, critical thinking, and communication. • Need for personalised learning pathways that adapt to individual needs and career goals. • Micro-credentials and modular learning options. • Emphasis on competency-based assessment. • Shared global competency standards that provide a common framework for skills and qualifications.

²¹ Digital Adoption (2024); Reference to the construction industry in the Asia-Pacific region.

²² Digital Adoption (2024); Reference to the construction industry in the Asia-Pacific region.

²³ India (2024c); ADCF (2022), SFIA, Jisc UK (2024), Digital Skills (2020), MIL: UNESCO (2021)

²⁴ ADCF (2022), SFIA, Jisc UK (2024), Digital Skills (2020), UNESCO (2021); 16. ADCF (2022), SFIA, Jisc UK (2024), Digital Skills (2020), MIL: UNESCO (2021)

Executive summary

From an education and training perspective

Focus areas	Key insights	Detailed information	
<p>Current and future skills²⁵ requirements of VET in school teachers</p>	<p>Addressing gaps in VET in School ICT teacher digital capability: many digital technology school teachers require additional support in building their capability in specialist ICT areas to effectively teach the subject, as they often lack the necessary foundational knowledge and skills²⁶</p>	<p>Current skill needs (Digital):²⁷</p> <ol style="list-style-type: none"> 1. Systems Thinking 2. Cybersecurity 3. Privacy (Data Privacy, Media Literacy) 4. Digital Fluency (Knowledge/Navigation/Digital Awareness) 5. Coding 6. Information/Data Management 7. Project Coordination 	<p>Current skill needs (Digital + Employability):²⁸</p> <ol style="list-style-type: none"> 1. Creative Problem Solving 2. Systems Thinking 3. Critical Thinking 4. Communication (Language/Etiquette) 5. Adaptability 6. Creativity (Troubleshooting) 7. Learning Autonomy (Independence) 8. Collaboration 9. Problem Solving 10. Empathy

²⁵ The current and future skill needs identified in the literature are relevant for (VET in School) digital technology teachers, including VET ICT. However, in many instances, these skills are not explicitly defined in the sources reviewed.

²⁶ Tech Skills (2024)

²⁷ Tech Skills (2024); Canada (2021)

²⁸ Tech Skills (2024); Canada (2021)

Executive summary

From an education and training perspective

continued...

Focus areas	Key insights	Detailed information
<p>Trends, best practices and educational innovations</p>	<ul style="list-style-type: none"> Learners thrive in flexible, supportive learning environments that combine access to digital tools with structured guidance and strong social support from both home and educational settings.²⁹ Empowering students to be innovators: the future of education requires a shift from merely teaching students to use digital tools to empowering them to be innovators, capable of applying these tools creatively across various subject areas, across various industries, and in solving complex problems. 	<p>Best practices:³⁰</p> <ul style="list-style-type: none"> Engaging lessons and topics for students (19%) Hands-on activities (17%) Using robots and hardware (14%) Incorporating real-world relevance into activities (10%) Blended, tech-driven methods via video lessons, apps, podcasts, eBooks (e.g., interactive videos, educational apps) Dual studies (theoretical education combined with practical training in collaboration with various industries) <p>Educational innovations:</p> <p><i>Online self-assessment tools</i>³¹ aim to measure existing competences (based on knowledge, skills, attitude), identify competence gaps and provide training pathways for learners/users.</p> <p>Examples (available in multiple languages):</p> <ul style="list-style-type: none"> <i>DigCompSat</i> (EU) – for students and professionals³² SELFIE for teachers (EU)³³ IVADO (Canada)³⁴

²⁹ [Digital Inclusion](#)

³⁰ [Tech Skills \(2024\)](#), [DigEducation \(2022\)](#), [Dual Studies ICT \(2024\)](#)

³¹ [DigCompSat \(2020\)](#), [Europass](#), [DSO 2023](#), [IVADO \(2024\)](#)

³² [DigCompSat \(2020\)](#)

³³ [SELFIE](#)

³⁴ [IVADO \(2024\)](#)

Executive summary

From an education and training perspective

continued...

Focus areas	Key insights	Detailed information
<p>Frameworks for skills, pathways and job roles</p>	<ul style="list-style-type: none"> • Incorporating digital competence frameworks in curricula and educator training is essential for equipping VET ICT teachers to effectively teach and use digital technologies across learning environments. • VET ICT teachers need to stay current and be enabled to effectively translate new technological innovations into practical lesson plans and programs. 	<p>Common focus areas of frameworks:³⁵</p> <ul style="list-style-type: none"> • Enhancing teaching and learning outcomes • Supporting professional growth • Addressing the needs of diverse learners • Integrating technology into educational practices • Curriculum and assessment of competencies <p>Examples of Digital Competence Frameworks:</p> <p><i>UNESCO – ICT Competency Framework for Teachers (ICT CFT)</i>³⁶ provides guidelines for integrating technology into education, aiming to enhance teachers' abilities to use ICT effectively in their teaching practices and improve student outcomes.</p> <p><i>Skills Framework (Singapore)</i>³⁷ is co-created by Employers, Industry Associations, Education Institutions, Unions and Government for the Singapore workforce. It identifies</p> <ul style="list-style-type: none"> • 16 critical core skills across all industries • 145 technical skill competencies related to ICT³⁸ industry

³⁵ ADCF (2022), SFIA, UNESCO (2024), Jisc UK (2024), UNESCO (2021)

³⁶ UNESCO (2024)

³⁷ SSG (2024)

³⁸ Referred to as Infocomm Technology within the Singaporean system.

Key insights on the ICT landscape³⁹

From an industry perspective

Focus area 1: Current and future skills requirements and the importance of digital skills

The tech industry in Australia requires a blend of technical and employability skills, with key competencies like communication, teamwork, problem-solving, and proficiency in programming languages such as SQL, Java, and Python.⁴⁰ These skills are essential for roles in software engineering, development, and troubleshooting, where effective collaboration and project management are crucial. In contrast, industries like construction and manufacturing in countries such as India emphasise digital and technical skills tailored to their needs - data analytics, drone operation, and advanced equipment in construction⁴¹, and data analytics for production optimisation in manufacturing.⁴²

Global adoption of AI and machine learning (ML)

Globally, AI and ML are becoming integrated across various industries. In Australia, Japan, Singapore, Malaysia, and Hong Kong, the construction industry increasingly demands skills in AI, cybersecurity, and data analytics.⁴³ For instance, Malaysia's construction industry emphasises proficiency in

cloud-based construction management software⁴⁴, while Hong Kong focuses on AI, ML, and innovative methods like design for manufacture and assembly.⁴⁵

Cross-industry skills for the future

Across all industries, skills such as analytical thinking, creative thinking, resilience, flexibility, and agility are recognised for driving innovation and adaptability.⁴⁶ The short-term impact of technology adoption on jobs is expected to drive demand in areas such as big data analytics, climate change technologies, encryption and cybersecurity, agricultural technologies, digital platforms and apps, health technologies, augmented reality, and energy storage.⁴⁷

The growing importance of digital literacy is also evident in industries such as real estate, and mining⁴⁸, where advanced technologies are enhancing productivity and solving complex challenges. For instance, AI and problem-solving are used in mining to address complex extraction challenges⁴⁹, while blockchain is being explored in real estate to revolutionise property transactions.⁵⁰

While ICT requires specialised technical skills like software development, coding, and data management⁵¹, other industries are integrating these same digital competencies, such as AI, big data, and cybersecurity.⁵² This overlap underscores the convergence of technology across industries such as healthcare, agriculture, and transport, highlighting the need for a versatile, adaptable workforce. Emerging skills such as AI fluency, quantum literacy, digital ethics, and cybersecurity reflect the broader impact of technological advancements across various industries.⁵³

39 While the existing literature offers comprehensive information for this research, it is incomplete, as several industries and potential projects have not been fully covered.

40 [ICT Industry](#)

41 [India \(2024c\)](#)

42 [India \(2024b\)](#)

43 [Digital Adoption \(2024\)](#)

44 [Digital Adoption \(2024\)](#)

45 [Digital Adoption \(2024\)](#)

46 [Digital Adoption \(2024\)](#), [ICT Industry, Future Jobs \(2023\)](#), [2025 Skills Horizon \(2024\)](#), [Mining Future \(2024\)](#), [Real Estate - Blockchain \(2022\)](#), [India \(2024a\)](#), [India \(2024b\)](#)

47 [Future Jobs \(2023\)](#) - Reference period is 2023-2027.

48 [Oil & Gas \(2024\)](#), [Real Estate - Blockchain \(2022\)](#), [Mining Future \(2024\)](#)

49 [Mining Future \(2024\)](#)

50 [Real Estate - Blockchain \(2022\)](#)

51 [ICT Industry](#)

52 [Future Jobs \(2023\)](#)

53 [2025 Skills Horizon \(2024\)](#)

Current skills requirements:

- **Digital:** AI, machine learning, data analytics, cybersecurity, SQL, software engineering, Python, cloud-based management software, advanced analytics, and data fluency.
- **Generalist:** Problem-solving, communication, analytical thinking, creative thinking, resilience, flexibility, agility, and technological literacy.

Future skills requirements:

- **Digital:** Digital literacy, drone operation, data management, data monitoring, analysis and interpretation, digital communication, AI and big data, cybersecurity, cloud-based management software, programming, and quantum literacy.
- **Generalist:** Creative thinking, analytical thinking, technological literacy, curiosity, lifelong learning, resilience, flexibility, agility, systems thinking, motivation and self-awareness, and customer service.

Looking forward, demand for skills in AI, big data, creative and analytical thinking, and overall digital and technological literacy is expected to grow across industries. Australian companies are increasingly adopting AI to address labour shortages, material costs, and supply chain disruptions, while significant skill gaps persist in AI, machine learning, data analytics, and cybersecurity.⁵⁴

Focus area 2: Trends, best practices and educational innovations

Digital technologies are reshaping industry practices globally, with AI, augmented and virtual reality (AR, VR), robotics, and IoT becoming integral⁵⁵ to industries such as construction, mining, health, and agriculture. In the Asia Pacific region, 85% of businesses provide digital skills training⁵⁶, highlighting a broad adoption of digital learning. For example, the Australian construction industry incorporates AI, robotics, and IoT to advance smart, resilient, and sustainable building practices⁵⁷, while the mining industry uses these technologies to enhance safety, operations, and supply chain management⁵⁸. Moreover, in agriculture and mining, robotics and AI are transforming traditional roles and creating new career pathways.⁵⁹

Emerging job roles and career pathways

The ICT industry in Australia is experiencing increased demand for roles pivotal to driving the adoption of digital technologies, such as Cybersecurity Specialists, Data Scientists, IT Support Engineers, and Front-end Developers.⁶⁰ Similarly, globally, industries are seeing a growing need for AI and ML Specialists, Business Intelligence Analysts, Robotics Engineers, Big Data Specialists, and Digital Transformation Specialists.⁶¹

Partnerships and crucial investments

Businesses worldwide are increasingly investing in new technologies and hands-on training, focusing on digital skills development and strategic partnerships. Over 80% of global businesses prioritise learning on the

job⁶² and automating processes to enhance efficiency. This shift is leading to faster, more flexible training programs driven by digital tools and lifelong learning initiatives. Key technologies currently in use include data analytics (47%), cloud management software (43%), and mobile apps (41%)⁶³, with significant adoption of big data analytics, digital platforms, and workforce development technologies across industries.⁶⁴

In the Asia Pacific region, 42% of organisations are offering direct digital skills training to employees.⁶⁵ Notably, India is demonstrating positive outcomes through partnerships with skill development councils, which facilitate hands-on training opportunities.⁶⁶ For instance, the Tata Projects in India also exemplifies success, with partnerships with the CSDCI and other industry-specific councils to boost digital and industry-specific skills development. Singapore's

54 Digital Adoption (2024)

55 Tech Con (2024), India (2024b), India (2024c), Tech Aged Care, Digital Adoption (2024)

56 Digital Adoption (2024)

57 Tech Con (2023)

58 Oil & Gas (2024)

59 Agri (2019), Mining Future (2024)

60 ICT Industry

61 Future Jobs (2023)

62 Future Jobs (2023)

63 Digital Adoption (2024)

64 Future Jobs (2023)

65 Digital Adoption (2024)

66 India (2021)

construction businesses are investing more than 20% of expenditures in new technologies, considering AI essential to business growth.⁶⁷ In India, the implementation of standardised digital courses with simulation models⁶⁸ and initiatives like Skill India Digital (SID) are promoting lifelong learning and future-ready skills.⁶⁹

Best practices for digital transformation and skills development

- Comprehensive digital skills training
- Leverage strategic partnerships
- Focus on hands-on training
- Invest in emerging technologies
- Encourage lifelong learning
- Utilise data analytics
- Standardise training programs
- Develop pathways for emerging roles
- Promote flexible learning models
- Measure and evaluate impact

By implementing these best practices⁷⁰, organisations can not only effectively navigate the digital transformation landscape, enhancing the capabilities of their employees, but also create new opportunities for growth and innovation. As organisations adapt to these changes, they are part of a broader global shift toward digital skills training and the adoption of advanced technology.

In this context, digital literacy has emerged as a critical component for future success, empowering businesses to adapt to evolving market demands and maintain a competitive edge in an increasingly digital world.

Focus area 3: Frameworks for skills, pathways and job roles

To effectively address workforce needs, skills shortages and facilitate digital transformation, frameworks for skills, pathways, and job roles are crucial. A recent study found that in Australia, only 23% of businesses have a defined technology strategy, which is below the 30% average in the Asia-Pacific region.⁷¹ This discrepancy indicates the urgent need for strategic planning and investment in digital skills development and adoption across the Australian market.

ICT related frameworks in comparison

Frameworks such as the Australian Digital Capability Framework (ADCF)⁷², Skills Framework for the Information Age (SFIA)⁷³, UNESCO ICT Competency Framework for Teachers (ICT CFT)⁷⁴, Skills Framework (Singapore)⁷⁵, and Jisc Digital Capabilities Framework⁷⁶ play a vital role in shaping digital skills development. They emphasise tailored skill sets for various roles and industries, promote lifelong learning, and ensure that digital skills development is guided by measurable outcomes. For instance, both ADCF and SFIA employ competency-based assessments with portfolios for skills such as cybersecurity⁷⁷, while Jisc utilises performance-based assessments through real-world scenarios⁷⁸. SFIA further enhances assessment by using

project rubrics to evaluate criteria such as innovation and effectiveness.⁷⁹

The Skills Framework (Singapore)⁸⁰ provides an integrated approach that links skills development with career pathways and job roles across industries. This national initiative defines the skills and competencies required for various occupations, offering a clear mapping of job roles, relevant skills, career progression opportunities, and training programs. By promoting cross-industry mobility, this framework facilitates the transfer of skills across different industries, which is particularly relevant in the context of digital transformation and talent mobility.

Across these frameworks, tracking progress and aligning with industry standards are central objectives. They advocate for flexible, targeted training programs that are aligned with industry needs and meet specific skills gaps while ensuring internationally recognised qualifications for talent mobility.

67 Digital Adoption (2024)
 68 [India \(2021\)](#)
 69 [Skill India Digital \(2023\)](#)
 70 Overview/summary of best practices leveraged from intel gathered through the literature review.
 71 Digital Adoption (2024)
 72 ADCF (2022)
 73 [SFIA](#)
 74 UNESCO (2024)
 75 [SSG \(2024\)](#)
 76 [Jisc UK \(2024\)](#)
 77 [ADCF \(2022\)](#), [SFIA](#)
 78 [Jisc UK \(2024\)](#)
 79 [SFIA](#)
 80 [SSG \(2024\)](#)

Key overarching topics

- The importance of tailored skill sets, lifelong learning, and adaptability.
- Shared concerns for protecting digital environments, personal privacy, and well-being.
- The necessity for individuals to interact and collaborate effectively through digital platforms.
- The significance of measurable outcomes in assessing and guiding digital skills development.

Innovative aspects

- An emphasis on cross-industry competencies that address flexible skill sets, such as digital skills, problem-solving, critical thinking, and communication.
- The need for personalised learning pathways that adapt to individual needs and career goals.
- The integration of micro-credentials and modular learning options.
- A strong focus on competency-based assessment.
- Shared global competency standards that provide a common framework for skills and qualifications.

The growing demand for frameworks that emphasise tailored digital skill development, cross-industry competencies, and alignment with global standards is becoming increasingly essential. As such, these frameworks not only require continuous review and adaptation but also necessitate that organisations prioritise their implementation. By doing so, they can enhance their workforce's digital capabilities and ensure that employees are well-prepared for the challenges of the evolving digital landscape.

From an education and training provider perspective**Focus area 1: Current and future skills requirements and the importance of digital skills for VET ICT teachers**

From an educational perspective, a significant challenge is the gap in foundational knowledge and skills among teachers utilising digital technologies.⁸¹ This gap may hinder their ability to effectively teach these critical competencies to students as outlined in recent studies.⁸² Looking ahead, it is essential for VET ICT teachers to not only be proficient in using a wide range of digital software, platforms, and tools but also to apply design thinking, computational thinking, and systems thinking in their teaching. This approach is considered critical for ensuring students are equipped to become creators and innovators in a digital world, rather than merely consumers of technology.⁸³ The shift in educational priorities aligns with industry demands for skills that go beyond basic digital literacy, emphasising the need for students to navigate complex digital environments, think critically, and solve problems creatively.⁸⁴

A recent Australian study identified creative problem solving, systems thinking, cybersecurity, and privacy

as the four key competencies for teachers engaged in digital technologies. These competencies are crucial for equipping students with the skills needed to navigate complex digital environments.⁸⁵ Similarly, a Canadian study emphasised data privacy/media literacy, digital fluency, coding, and information/data management as the top skills needed for effective ICT training delivery.⁸⁶ In addition to these technical competencies, broader digital employability skills such as critical thinking, adaptability, and creativity in problem solving and troubleshooting appear equally important for VET ICT teachers. These skills facilitate the delivery of training that encourages students to think critically and work effectively in teams, thereby, preparing them to navigate and operate within complex digital environments and systems.⁸⁷

81 Digital Adoption (2024)

82 Digital Adoption (2024); Tech Skills (2024)

83 Tech Skills (2024) - reference to VET in School ICT teachers.

84 Canada (2021)

85 Tech Skills (2024)

86 Canada (2021)

87 Tech Skills (2024); Canada (2021)

Focus area 2: Trends, best practices and educational innovations

Educational institutions are increasingly aligning their curricula with global trends in digital skills development, responding to the growing need for roles in AI, and digital transformation, reflecting the diverse applications and impacts of digital technologies across industries.⁸⁸

Educational focus and global trends

While Australia's ICT industry primarily focuses on technical and specialised positions like engineers and technicians, global trends highlight a broader range of roles spanning various industries.⁸⁹ Educational institutions are adapting to these industry trends by integrating relevant digital skills into their curricula. In Australia, the Digital Technologies Curriculum (DTC) for example, focuses on developing school student's computational thinking, equipping them to design, implement, and evaluate digital solutions with attention to data security, user experience, and ethical implications.⁹⁰ Moreover, VET in School ICT teachers emphasise hands-on activities by integrating robots, hardware, and project-based learning with software programs, fostering student engagement and connecting classroom concepts to real-world applications.⁹¹ These efforts mirror global best practices, such as UNESCO's Media and Information Literacy Framework, which promotes interactive, game-based learning.⁹²

Self-assessment tools as part of skill development

Globally, tools like the European Union's DigCompSat and SELFIE have emerged as key resources for both teachers and students.⁹³ DigCompSat offers reliable assessments across various skill levels, allowing teachers to evaluate their digital capabilities and identify areas of growth. Meanwhile, SELFIE assists teachers and educational institutions evaluate and strengthen their digital practices. By utilising these self-assessment tools, both teachers and learners can continuously adapt to industry standards, fostering a culture of lifelong learning and skill development.

Bridging education and industry practices

Both Germany and India share a commitment to bridging the gap between education and industry needs. Germany's dual training system directly integrates industry projects into educational curricula, giving students hands-on experience in practical environments.⁹⁴ In India, simulation-based training uses digital tools to replicate industry conditions, ensuring students gain practical skills alongside theoretical knowledge.⁹⁵ Both models reflect a broader shift towards ensuring education stays relevant to real-world industry demands, preparing students for immediate workforce readiness.

A vital shift in education is the need to not only teach students how to use digital tools but to empower them to be innovators. Research shows that students thrive in learning environments that are both flexible

and supportive, combining access to digital tools with structured guidance and strong social support.⁹⁶ Key best practices for fostering innovation include engaging lessons (19%), hands-on activities (17%), the use of robots and hardware (14%), and incorporating real-world relevance (10%). Additionally, blended, tech-driven methods such as video lessons, apps, podcasts, and eBooks are proving effective in improving student engagement and training outcomes.⁹⁷

Best practices and innovations

- Engaging and flexible learning environment
- Hands-on activities and project-based learning
- Interactive, game-based approaches
- Blended learning methods
- Continuous assessment to identify gaps in teaching and student outcomes aligned with industry needs

88 [ICT Industry, Future Jobs \(2023\)](#)

89 [ICT Industry, Future Jobs \(2023\)](#)

90 From foundation through to year 10, [DTC V8.4](#)

91 [Tech Skills \(2024\)](#) - reference to VET in School ICT teachers.

92 [UNESCO \(2021\)](#)

93 [DigCompSat \(2020\)](#), [SELFIE](#)

94 [Dual Studies ICT \(2024\)](#)

94 [India \(2021\)](#)

96 [Digital Inclusion](#)

97 [Tech Skills \(2024\)](#), [DigEducation \(2022\)](#), [Dual Studies ICT \(2024\)](#)

Focus area 3: Frameworks for skills, pathways and job roles

From an educator's perspective, digital competence frameworks guide teaching strategies and curricula by integrating digital skills into educational programs and aligning with industry benchmarks. These frameworks emphasise the importance of privacy, security, and inclusive design, ensuring that learning environments are supportive and adaptable to diverse needs. Additionally, they promote the use of adaptive technologies, personalised learning pathways, and self-assessment tools, which enable both learners and teachers to track progress and identify areas for improvement and training programs.⁹⁸

To meet future demands, it is essential to focus on emerging technologies such as AI, digital literacy, cybersecurity, sustainable practices and remote work skills, while also considering the needs of diverse learner cohorts. To meet these future demands, VET ICT teachers need the opportunity to develop their own personalised learning pathways, interdisciplinary skills, lifelong learning, and digital transformation to ensure their digital skills are relevant and aligned with evolving industry needs, both nationally and globally. Incorporating digital competence frameworks into curricula and educator training is key to enabling VET ICT teachers to effectively integrate new technologies into practical lesson plans.

Frameworks such as UNESCO's ICT Competency Framework for Teachers (ICT CFT) and Singapore's Skills Framework bridge the gap between educational practices and industry requirements, ensuring both teachers and students are equipped for the digital future. The ICT CFT provides guidelines for integrating technology into education, strengthening teachers' capability to use digital technologies effectively and improve student outcomes.⁹⁹ Similarly, Singapore's Skills Framework, co-created by various stakeholders¹⁰⁰, aligns educational practices with real-world industry needs by identifying 16 critical core skills across various industries and 145 technical skill competencies specific to the ICT industry.¹⁰¹

Common focus areas of frameworks

- Improving learner outcomes
- Supporting professional growth
- Integrating technology into teaching practices

⁹⁸ DigCompSat (2020), [SELFIE](#)

⁹⁹ UNESCO (2024)

¹⁰⁰ Including employers, industry associations, educational institutions, unions, and the government.

¹⁰¹ [SSG \(2024\)](#); Referred to as Infocomm Technology within the Singaporean system.



Reference list

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
State of Digital Adoption in Construction, 2024	The report highlights significant progress in integrating digital technologies within the construction industry, with a focus on overcoming barriers to implementation, such as cost and skills gaps., while exploring emerging technology trends.	<ul style="list-style-type: none"> - Digital tools like AI, BIM, and IoT are driving efficiency and sustainability in construction. - High costs, skills gaps, and resistance to change are key challenges in digital adoption. - Emerging trends include data-driven decision-making and smart construction practices. 	Digital Adoption (2024)			
ICT Industry Landscape Report	The report provides an overview of the current state and future trends of the ICT industry, highlighting the growth of emerging technologies like AI and cloud computing, along with the rising demand for skilled professionals.	<ul style="list-style-type: none"> - Rapid growth in AI, cloud computing, and cybersecurity is transforming the ICT industry. - Rising demand for skilled professionals is crucial to support industry advancements. - Adaptive workforce strategies are needed to address evolving challenges in the ICT industry. 	ICT Industry			
Shri Dharmendra Pradhan launches Skill India Digital, 2023	The press release announces the launch of Skill India Digital, a comprehensive platform aimed at unifying skilling initiatives across India, making digital skill development accessible to all. The platform integrates advanced technologies to enhance learning experiences, secure verification processes, and foster industry collaboration.	<ul style="list-style-type: none"> - Skill India Digital centralises skilling initiatives for broader access across India. - Utilises AI, machine learning, and Aadhaar-based verification for enhanced learning and security. - Collaborates with major organisations to support digital skilling and workforce readiness. 	Skill India Digital (2023)			
Tata Projects: Upskilling Workers & Embracing Technology in Construction, 2024	The project is investing in upskilling programs, technology adoption, and partnerships with skill development councils to empower workers, improve safety, and drive innovation in the construction industry. It focuses on evolving technologies, safety training using VR devices, and forming partnerships to provide hands-on training opportunities.	<ul style="list-style-type: none"> - Workers are upskilled from helpers to semi-skilled categories through internal trainers certified by the Construction Skill Development Council of India (CSDCI) - The project has formed partnerships with skill development councils like CSDCI, Hydrocarbon Industry Skill Council (HSSC), and Construction Industry Development Council (CIDC) to facilitate hands-on training opportunities. 	India (2024c)			
Future of Jobs Report, 2023	The report explores how emerging technologies and shifting workforce trends are reshaping job markets globally, highlighting increased demand for digital and soft skills. It also emphasises the need for proactive workforce planning and continuous skill development.	<ul style="list-style-type: none"> - Emerging technologies are driving demand for digital and soft skills across various industries. - Workforce trends require proactive planning and continuous skill development. - Adapting to evolving job markets is essential for maintaining employment and growth opportunities. 	Future Jobs (2023)			

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
The 2025 Skills Horizon: What Leaders Need to Know Next	The report outlines future skill requirements and trends that leaders must anticipate, focusing on the growing importance of digital literacy, adaptability, and interdisciplinary skills. It emphasises the need for strategic planning in workforce development	<ul style="list-style-type: none"> - Future skills will prioritise digital literacy, adaptability, and interdisciplinary expertise. - Leaders must plan strategically for evolving workforce needs to remain competitive. - Anticipating and addressing skill gaps is crucial for navigating a changing job market. 	2025 Skills Horizon (2024)			
The Future of Mining Engineering: Trends and Innovations, 2024	The news article discusses the evolution of the mining engineering industry driven by technological advancements and the need for sustainable practices. It highlights emerging trends such as automation, robotics, and green mining practices that are shaping the future of the industry.	<ul style="list-style-type: none"> - The mining industry is adopting new technologies like automation, AI, and data analytics. - Drones and advanced imaging are transforming exploration by enabling more accurate and efficient mineral deposit identification. - Mining engineers play a crucial role in implementing these innovations to enhance efficiency and sustainability. 	Mining Future (2024)			
Top 15 Innovations in the Oil & Gas Industry Affecting Construction	The news article highlights the significant technological advancements in the oil and gas industry that are impacting construction.	<ul style="list-style-type: none"> - Innovations include the Internet of Things (IoT), Artificial Intelligence (AI), Big Data & Analytics, Robotics & Automation, 3D modelling, and digital twin technology. 	Oil & Gas (2024)			
Revolutionizing theory in Real Estate industry: Blockchain Technology, 2022	The news article explains how blockchain is transforming real estate by securely tracking and transferring ownership, making transactions more transparent and efficient. It also highlights how such ICT advancements improve industry processes and build trust by reducing fraud.	<ul style="list-style-type: none"> - Blockchain provides secure, decentralised tracking and transfer of real estate assets. - Technology advancement enhances transparency, reduces fraud, and improves transaction efficiency. 	Real Estate - Blockchain (2022)			
Adani Group: Driving Construction Innovation with Digital Solutions & AI, 2024	The news article outlines how Adani Group is leveraging digitalisation and AI-driven strategies to enhance customer service and operational efficiency.	<ul style="list-style-type: none"> - Their initiatives include the development of a NexGen Sales & Reward Platform, the 'Plants of the Future' program, and advanced logistics and fleet management tools. 	India (2024a)			

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
JCB LiveLink & Industry 4.0 for Connected Machines & Smart Manufacturing, 2024	The news article explains how JCB India is successfully leading digital construction with JCB LiveLink, offering real-time data and improved efficiency for their machines. The integration of Industry 4.0 technology enhances smart manufacturing and customer engagement	<ul style="list-style-type: none"> - JCB LiveLink connects machines with users, dealers, and JCB in real-time for improved productivity, cost control, and asset safety. - JCB is developing an Industry 4.0 ecosystem for real-time monitoring of manufacturing processes across its plants. - Continuous improvements in JCB machines focus on productivity, reliability, efficiency, and enhanced safety and ease of operation. 	India (2024b)			
Raipath Infracon: Transformative Technologies Driving Growth Opportunities, 2024	The news article discusses how Rajpath Infracon is leveraging transformative technologies to drive growth in the road construction industry.	<ul style="list-style-type: none"> - By adopting advanced materials, automation, and digital tools like Building Information Modelling (BIM) and drones, the company aims to build more sustainable, efficient, and durable roads. 	India (2024c)			
Tech Skills for the Next Generation – Digital Technologies Education in Australian Schools, 2024	The report highlights the increasing emphasis on digital technologies education in Australian schools, aiming to equip students with essential tech skills for future careers. It underscores the need for curriculum updates and VET in School ICT teacher training to prepare students for a technology-driven workforce.	<ul style="list-style-type: none"> - Australian schools are focusing more on digital technologies education to prepare students for future tech careers. - Curriculum updates and enhanced VET in School ICT teacher training are essential for effective tech skills development. - Preparing students for a technology-driven workforce requires integrating current tech trends into education. 	Tech Skills (2024)			
21st Century Digital Skills – Competencies, Innovations and Curriculum in Canada, 2021	The document provides an overview on essential digital competencies, innovations, and curriculum developments in Canada, focusing on preparing students for a technology-centric world. It emphasises integrating advanced digital skills into education.	<ul style="list-style-type: none"> - Essential digital competencies and curriculum updates are critical for preparing students for a technology-driven future in Canada. - Innovations in digital skills education are needed to align with evolving industry demands. - Integrating advanced digital skills into the curriculum ensures students are equipped for future challenges and opportunities. 	Canada (2021)			
Growing Australia's digital workforce, 2023	The report outlines strategies to expand and enhance the country's digital talent pool, focusing on education, upskilling, and industry collaboration. It emphasises the need for targeted initiatives to address skill gaps and support the growth of a robust digital economy.	<ul style="list-style-type: none"> - Expanding Australia's digital workforce requires enhanced education and upskilling programs. - Industry collaboration is crucial for addressing digital skill gaps. - Targeted initiatives are needed to support the growth of a robust digital economy. 	DSO 2023			

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
Building the future: The role of digital adoption and integration for construction resilience, 2023	The news article elaborates on the significant transformation the construction industry has undergone in the past 5-10 years, driven by digital adoption and tech integration.	<ul style="list-style-type: none"> - Building Information Modeling (BIM), IoT, and cloud computing are key digital tools. - Overcoming challenges like change management, legacy system integration, and increasing costs is crucial for successful digital adoption in construction. 	Tech Con (2023)			
How digital technology is changing the construction industry, 2024	The report explores how digital technology is transforming the construction industry by enhancing efficiency, improving project management, and enabling innovative construction methods. It highlights the integration of tools like BIM, AI, and IoT in reshaping industry practices and driving future growth.	<ul style="list-style-type: none"> - Digital technologies are boosting efficiency and project management in construction. - Tools like BIM, AI, and IoT are revolutionising industry practices. - Innovation and growth in construction are driven by the integration of advanced digital tools. 	Tech Con (2024)			
Inclusive Online Learning in Australia: Barriers and Enablers	The paper examines barriers and enablers to inclusive online learning in Australia, based on a pilot with three Western Australian schools. It offers strategies to improve access and participation for diverse learners.	<ul style="list-style-type: none"> - Common barriers are technological limitations and lack of support. - Enablers that facilitate accessibility include adaptive technologies and flexible learning options. 	Digital Inclusion			
Simulation, digitized and standardized curriculum in TVET can ensure teaching-learning continuity: Manisha Verma, 2021	Published by Economic Times Government, the article explores how simulation, digital tools, and standardised curricula can boost continuity and effectiveness in Technical and Vocational Education and Training (TVET), ensuring quality education even during disruptions.	<ul style="list-style-type: none"> - Simulation and digital tools enhance learning experiences and ensure continuity in TVET. - Standardised curricula maintain consistency and quality in vocational education. 	India (2021)			
DigCompSAT – A Self-reflection Tool for the European Digital Competence Framework for Citizens, 2020	The initiative offers a self-reflection tool designed to help individuals evaluate their digital skills against the European Digital Competence Framework for Citizens. It aims to enhance self-assessment and personal development in digital competencies, supporting lifelong learning and digital literacy.	<ul style="list-style-type: none"> - Aids in self-assessment of digital skills for a wide audience, including students and professionals. - Supports personal development and lifelong learning across various contexts. - Helps users enhance their digital literacy and competencies for both personal and professional growth. 	DigCompSat (2020)			

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
SELFIE for TEACHERS – Supporting teachers in building their digital competencies	The initiative is designed to help educators assess and improve their digital competencies, supporting their integration of technology into teaching practices. It provides a framework for teachers to reflect on and enhance their digital skills to better support student learning.	<ul style="list-style-type: none"> - Helps educators assess and improve their digital skills. - Supports the integration of technology into teaching practices. - Provides a framework for teachers to enhance their digital competencies and support student learning. 	SELFIE			
Understanding the role of digital technologies in education: A review, 2022	The report reviews how digital technologies are transforming educational practices, focusing on their impact on teaching, learning, and student engagement. It highlights the benefits and challenges of integrating technology into education and offers insights into effective implementation strategies.	<ul style="list-style-type: none"> - Digital technologies are significantly transforming teaching, learning, and student engagement. - Highlights both the benefits and challenges of technology integration in education. - Provides insights into effective strategies for implementing digital tools in educational settings. 	DigEducation (2022)			
Dual Studies Information and Communication Technology in Germany, 2024	The report examines the integration of practical and academic learning in ICT education, highlighting the benefits of combining on-the-job experience with formal education. It provides insights into how this dual approach enhances skill development and prepares students for the ICT industry.	<ul style="list-style-type: none"> - Dual studies programs in ICT combine practical work experience with academic education. - This approach enhances skill development and industry readiness. - The integration of on-the-job training with formal education benefits students in preparing for ICT careers. 	Dual Studies ICT (2024)			
Future Skills Centre – Project: From data to decision: AI training and professional certification, 2024	The project focuses on providing AI training and professional certification to equip individuals with essential skills for data-driven decision-making. It aims to enhance career opportunities by bridging the gap between data analysis and practical AI applications.	<ul style="list-style-type: none"> - Offers AI training and professional certification for data-driven decision-making. - Aims to bridge the gap between data analysis and practical AI applications. - Strengthens career opportunities by equipping individuals with essential AI skills. 	IVADO (2024)			
Dual Studies Information and Communication Technology in Germany, 2024	The news article highlights Germany's dual studies program in ICT, which integrates academic learning with practical training.	<ul style="list-style-type: none"> - The program is supported by major companies like SAP and Siemens. - It equips students with both theoretical knowledge and hands-on experience. - Graduates of the program are more employable and career-ready compared to their peers. 	Dual Studies ICT (2024)			

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
Types of technology in aged care	The website provides an overview of various digital technologies used to enhance the care of older people. It includes summaries of common products.	<ul style="list-style-type: none"> - Common products are AI, assistive technology, and telehealth. - The overview aims to show the impact of the offered products on improving care and operational efficiency. 	Tech Aged Care			
Digital Skills: Frameworks and Programs, 2020	The framework outlines various approaches to developing digital competencies, focusing on structured frameworks and educational programs. It aims to provide guidelines for effectively building digital skills across different industries and educational levels.	<ul style="list-style-type: none"> - Emphasises the importance of aligning digital skills training with industry needs and technological advancements. - Advocates for integrating digital skills into existing curricula to ensure comprehensive skill development. - Highlights the need for continuous updates and adaptations of frameworks to keep pace with evolving digital technologies. 	Digital Skills (2020)			
Australian Digital Capability Framework, Version 1.0, 2022	The framework provides a comprehensive model for assessing and enhancing digital skills across various industries. It offers structured guidelines for developing digital competencies to support workforce readiness and effective technology use.	<ul style="list-style-type: none"> - Focuses on creating a standardised approach to evaluate digital capabilities and identify skill gaps. - Emphasises the importance of integrating digital skills development into professional training and education. - Includes metrics for measuring progress and effectiveness in enhancing digital competencies. 	ADCF (2022)			
The global skills and competency framework for the digital world (SFIA)	The framework provides a comprehensive model for defining and assessing digital skills and competencies across various industries. It offers a standardised approach to mapping skills requirements and supporting career development.	<ul style="list-style-type: none"> - Provides detailed competency descriptions for a wide range of digital roles. - Helps organisations identify skill gaps and plan targeted training programs. - Facilitates benchmarking and comparisons of digital skills across different regions and industries. 	SFIA			
Building digital capabilities framework: The six elements defined – Jisc data analytics, 2024	The framework details six critical elements for building digital capabilities, including data literacy, technological infrastructure, and leadership. It aims to guide organisations in systematically enhancing their digital skills and adapting to technological advancements.	<ul style="list-style-type: none"> - Focuses on the importance of leadership in driving digital capability development. - Highlights the need for continuous learning and adaptation to evolving technologies. - Provides a structured approach for assessing and enhancing digital capabilities across various organisational levels. 	Jisc UK (2024)			

Title	Summary	Key insights	Source/weblink	Focus areas		
				Skills	Trends	Frameworks
Australian Digital Technologies Curriculum, Version 8.4	The curriculum outlines educational standards for teaching digital skills and knowledge from primary to secondary education. It aims to equip students with essential competencies in areas like coding, data analysis, and digital problem-solving.	<ul style="list-style-type: none"> - Emphasises the integration of digital technologies into various subject areas and learning contexts. - Supports the development of critical thinking and problem-solving skills through technology. - Provides a framework for educators to deliver comprehensive digital education and track student progress. 	DTC V8.4			
UNESCO: Think Critically, Click Wisely – Media & Information Literacy – Curriculum for Educators & Learners, 2021	The curriculum focuses on media and information literacy for educators and learners, aiming to enhance critical thinking and responsible digital engagement. It provides guidelines and resources to help individuals evaluate and interact with media and information effectively.	<ul style="list-style-type: none"> - Provides guidelines and resources for evaluating and interacting with media and information. - Offers practical tools and activities to integrate media literacy into educational settings. - Helps developing strategies for evaluating media sources, recognising biases, and engaging thoughtfully with digital content. 	UNESCO (2021)			
UNESCO ICT Competency Framework for Teachers (2018 - updated 2024)	The framework is intended for the global audience, and provides guidance for educators, policymakers, and educational institutions to enhance digital competencies and integrate technology into teaching. It outlines key competencies and strategies for improving educational outcomes through effective ICT use.	<ul style="list-style-type: none"> - Includes specific competencies for using technology to support teaching and learning processes, such as <ul style="list-style-type: none"> • Designing and Implementing Digital Learning Activities • Assessing and Evaluating Digital Learning - Addresses diverse educational settings by providing adaptable frameworks for different regional needs. - Focuses on continuous professional development to keep educators updated with evolving ICT tools and practices. 	UNESCO (2024)			
Skills Framework (Singapore), 2024	The framework provides a comprehensive model for identifying and developing key skills required across various industries and job roles. It offers detailed competency standards and career pathways to support workforce planning and professional development.	<ul style="list-style-type: none"> - Provides a detailed model for identifying essential skills across industries and job roles. - Offers competency standards and career pathways to guide workforce planning. - Supports professional development by aligning skills with industry needs and career advancement. 	SSG (2024)			

Title	Summary	Key insights	Source/weblink	Focus areas		
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DigCompSAT – A Self-reflection Tool for the European Digital Competence Framework for Citizens, 2020	This initiative is a self-reflection tool designed to help individuals evaluate their digital skills based on the European Digital Competence Framework for Citizens. It facilitates personal assessment and development of digital competencies to enhance overall digital literacy.	<ul style="list-style-type: none"> - Supports lifelong learning by identifying areas for improvement and growth in digital competencies. - Encourages proactive engagement with personal digital development and literacy. - Aligns self-assessment with European digital competency standards to ensure relevant skill evaluation, e.g., <ul style="list-style-type: none"> • Information and data literacy • Digital security, privacy, and responsible online behaviour 	DigCompSat (2020)			
Europass – Test your digital Skills	This initiative offers an online tool for individuals to assess their digital competencies against European standards. It aims to help users identify strengths and areas for improvement in their digital skills to support career development and lifelong learning.	<ul style="list-style-type: none"> - Offers a standardised framework for evaluating digital skills across different competency levels. - Enables users to track their digital skill progress over time. - Facilitates personalised recommendations for improving digital competencies. 	Europass			
Growing Australia's digital workforce, 2023	The report explores strategies to expand and enhance the digital skills of Australia's workforce. It focuses on addressing skill gaps, fostering talent development, and promoting the growth of digital roles in Australia.	<ul style="list-style-type: none"> - Recommends initiatives for increasing the pipeline of skilled digital professionals. - Discusses the role of industry collaboration in shaping effective digital skills programs. - Focuses on the need for updated curricula and training programs to meet emerging technology trends. 	DSO 2023			
Agriculture workforce digital capability framework, 2019	The framework outlines essential digital skills and competencies required for the agriculture industry. It aims to enhance workforce capabilities by integrating digital technologies into agricultural practices and supporting effective skill development in this industry.	<ul style="list-style-type: none"> - Identifies key areas where digital tools can improve agricultural productivity and efficiency, such as <ul style="list-style-type: none"> • Farm Management Software • Data Analytics • Robotic Systems - Provides a framework for developing training programs tailored to agricultural needs. - Encourages ongoing adaptation and skill enhancement to keep pace with technological advancements in agriculture. 	Agri (2019)			



APPENDICES

**Towards effective
ICT training:** A needs
and gaps analysis of the
ICT Training Package

MAY 2025