ADA Skills Taxonomy White Paper

01 Executive Summary

In recent years, the importance of skills in higher education has been widely discussed across the media, government policy, academic research, and industry practices. Skills, such as communication and critical thinking, are critical not only for academic outcomes at university but also for sustained personal and professional success in a rapidly changing world, particularly with developments in generative and agentic artificial intelligence (AI). Yet, feedback, research, and data from students, government and industry continue to highlight persistent challenges across the higher education sector: students are often not able to identify the skills that they have acquired through their courses and not confident in articulating them.

To address these challenges, UNSW Arts, Design, & Architecture (ADA) has committed to enhancing student success and graduate outcomes by adopting a more systematic, evidence-based and student-centred approach to how skills, holistically grounded alongside knowledge and attributes are embedded and articulated in our curricula and pedagogies. This includes a systematic and critical review of existing research and practices in this area, and consolidation of existing skills taxonomies and other approaches into a student-facing format that is flexible and interoperable across a diverse range of personal and professional contexts before, during, and after studies in higher education.

We are also creating evidence-based and co-designed resources and tools for students, educators, employers, and policy leaders. The proposed ADA Skills Taxonomy and corresponding skills mapping tools provide a common accessible language for identifying and articulating skills across our curricula. These tools are not intended as ends in themselves but serve as scaffolds to support students in skills development and self-efficacy.

As such, the rationale for this pilot project is to provide our students with the language and tools to reflect on, track, and articulate their skills development during and after their studies; to ensure our graduates are confident in demonstrating their skills in a diverse range of personal and professional contexts; and to enhance curricular coherence and our capacity by embedding and aligning skills to course and program learning outcomes.

Piloting this skills initiative within ADA makes strategic sense, as it is home to many diverse disciplines traditionally under-recognised and over-generalised in the skills literature and discourse but rich in learning outcomes across generalist, specialist, and professionally accredited programs. Importantly, this program-level initiative aligns with international and national agendas, including the upcoming Australian Skills Passport and the National Skills Taxonomy. This white paper is a basis for the discussion and feedback on the draft ADA Skills Taxonomy, and its development in upcoming skills mapping across ADA curricula and concomitant resources for students and educators. It first presents our findings from a review of relevant government, academic, and industry literature. We then move to describe the methodology employed to examine existing identified skills taxonomies, which leads to the proposed consolidated skills taxonomy for use in the ADA pilot project.

We welcome your input. If you have any questions or comments, feel free to email ada.skillspassport@unsw.edu.au.

02 Background

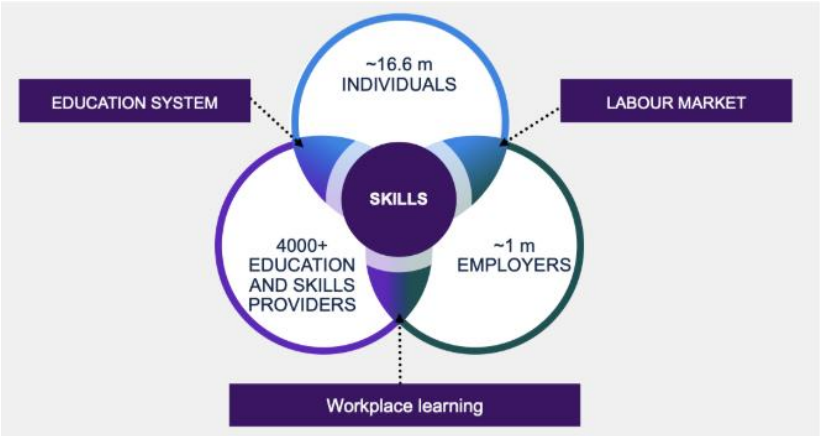
Skills development has emerged as a central goal in contemporary higher education alongside learning discipline-specific knowledge and developing attributes (e.g., Arum & Roksa, 2011; Baartman & De Bruikin, 2011; Shavelson et al., 2019; Tuononen et al., 2022). Skills, such as communication, critical thinking and digital literacy, are essential not only for students' academic success, but also for their sustained employability and lifelong learning after graduation (Hyytinen et al., 2019; Tuononen et al., 2019). As our graduates navigate increasingly complex and dynamic career pathways, especially in an age of generative and agentic AI, these skills are vital for them to succeed in competitive graduate markets and make meaningful societal contributions throughout their personal and professional lives. However, despite this broad consensus on the value of skills, the body of research on skills development in higher education remains fragmented, conceptually inconsistent, and methodologically limited (e.g., Barrie, 2006; Braun et al., 2012; El Soufi & See, 2019) with, what we argue, is limited data on actual student usage and perceptions.

2.1 Skills and skills taxonomies

While universities increasingly support graduate employability through skills-oriented teaching and employability metrics (see 2.2 below), there is arguably still little research or evidence-based practice that clearly shows how and why skills are taught in university curricula (Tuononen et al., 2022). There is also a lack of consistent models, frameworks, or pedagogies to help students recognise and articulate these skills in a sustainable, scalable and user-friendly way. Arguably, previous studies on university-based skills initiatives also typically lack a research-, evidence-, experience-, and/or data-driven approach to inform their design and usage, and do not include students' perceptions and actual behaviours (e.g., Martini et al., 2021; Succi & Canovi, 2020; Tymon, 2013) which has led to sparse application and a proliferation of complex, typically data-driven skills taxonomies intended for computational usage in industry (e.g., LinkedIn), rather than as a user-friendly tool or development resource.

Our recent systematic review of relevant literature identifies that there has been increasing local, national and international discourse on why and how tertiary and higher education providers should prepare graduates for employment, as evident by the tens of thousands of search results in Web of Science and Scopus using keywords such as skills in higher education. The supply and demand model between education, skills and professions is by far the most prominent topic in this debate, particularly in Australia (Moore & Morton, 2017). In short, the argument for doing so is to: improve access and success in the workforce as part of broader personal, societal, and economic development; improve the balance between the supply and demand of skills in a society; and prepare people for increasing disruption and change throughout their personal and professional lives (e.g., Australian Association of Graduate Employers, 2025; Education Design Lab, 2021a; Jobs and Skills Australia, 2023).

Figure 1. The interplay between learners, skills, and employment in Australia (Jobs and Skills Australia, 2023)



Relatedly, employability is typically defined as a set of knowledge, skills, and attributes that are embedded into educational design and delivery to enable graduates to become more likely to gain and sustain employment and success (Boden & Nedeva, 2010; Cranmer, 2006; Yorke & Knight, 2004). As a result, there is an increasing focus across the higher education sector on making practical skills more explicit in our curricula, as an extension of traditional curricular design in which course, specialisation, and program learning outcomes are formalised and hierarchically aligned by means of a taxonomy, e.g., Bloom's Taxonomy (Krathwohl, 2002), and UNSW's Integrated Curriculum Framework (UNSW, 2025). The terminology used to describe skills, and clusters thereof, has grown in tandem into overly simplified dichotomies, for instance: generic and specialised skills, fixed and transferrable skills, job ready skills, hard and soft skills, life skills, academic skills, professional skills, critical thinking skills, and technical skills, etc (cf. Smith & Bath, 2006). There is also a growing overlap in the frameworks used to conceptualise skills, which are typically defined in these contexts as the application of acquired knowledge linked to (graduate) attributes (cf. Bridgstock, 2009; Cranmer, 2006; Education Design Lab, 2021; Yorke, 2006).

Increasingly, technological developments are also causing significant disruption and opportunities in how and why we teach such skills to our students and how graduates navigate an increasingly complex and uncertain graduate market and lifelong trajectory, especially given the broadening and deepening of artificial intelligence (AI), among other technologies. The Organisation for Economic Co-operation and Development (OECD) argues that traditional education is already losing this race against AI (OECD, 2024). Further, we already see established industry education gaining significant global market share in educational offerings informed by the growing gaps between supply and demand in skills particularly due to generative AI (e.g., Gartner, 2024; Lightcast, 2024; LinkedIn, 2024), which continues to cause widespread concern amongst students, graduates, parents, employers, regulators, and educators alike.

In Australia, and other countries, government bodies are being tasked with engaging and collaborating with a wide range of stakeholders, particularly with tertiary education providers and employers, to raise the profile and perceived value of skills, improve knowledge and usage of skills in educational offerings, and improve the overall employability of graduates and their engagement within the workforce and society, more broadly. Most prominently, Jobs and Skills Australia (JSA) is currently undertaking significant work in this endeavour and has begun engaging with tertiary and higher education providers on key initiatives, including the development of a National Skills Taxonomy. The National Skills Taxonomy aims to improve Australia's ability to identify and navigate a rapidly changing national skills landscape by formalising how employers, educational providers, and government describe skills in order to improve occupational and professional success in line with national workforce needs and capabilities.

Further, recent government initiatives have clearly demonstrated a focus on skills in all aspects of education in Australia. A National Skills Passport (Department of Education, Department of Employment and Workplace Relations) is being proposed as an online platform in which skills would be stored and shared by learners throughout their lifespan, much like LinkedIn (2024) and other private providers already store, match, and share skills between learners, job seekers, employees and employers across their networks. This is coupled with a significant focus on skills in the Universities Accord, in which skills are identified as being paramount to national success and a requisite for future funding for both students and educational providers.

Finally, it is noteworthy that these initiatives and indeed the national discourse on skills has consistently developed across multiple federal and state governments despite (and perhaps in response to) recent social and economic crises – as is the case internationally. It is therefore evident that a sharpening focus on skills will become more embedded in policy and practice across the sector.

Given the critical role that skills play across educational, professional, and societal domains, there is a clear need for structured ways to describe, organise, and connect them. Skills taxonomies and mapping tools are essential for making skills more visible, comparable, and actionable, both within curriculum design and across learning and employment contexts.

2.2 Student empowerment

More importantly, skills taxonomies and mapping tools are just an essential starting point to a more urgent task regarding students' ability to clearly and confidently identify and articulate the skills they have developed in their learning. Previous work (e.g., Martini et al., 2021) has shown that students not only lack the ability to recognise and communicate their skills effectively in their resumes or job interviews, but also tend to underestimate their academic performance, including knowledge and skills, obtained from courses, compared to how lecturers and employers perceive their performance. At the core of this current project is the empowerment of students. A critical issue to be handled is whether students have access to tools, resources, and support to recognise their skills and communicate clearly their skills with others in different settings.

Clear evidence has shown that students struggle to identify their skills and also lack the training needed to articulate those skills to employers (Rahman & Lakey, 2023). This skill articulation issue among students is not just happening in Australia, but also around the globe, such as the UK (Pollard et al., 2015; Wilton, 2012), the US (Kovalcik, 2019), and Canada (Tomasson Goodwin et al., 2019). Students often possess relevant skills from their coursework, but they are unsure how to explain what they have learned in terms of employability. They also need to improve their abilities to relate their experience, such as their work-integrated learning experience (Jackson & Edgar, 2019), to specific job selection criteria and communicate clearly to employers. The universities are not doing enough to educate their students in these aspects, which contribute to the misconceptions about students' employability. Indeed, Bridgstock (2009) highlighted the importance of career management skills, including the ability for students and graduates to market themselves. This is a key attribute that has been overlooked. Without proper resources, tools, and training, students may not know how to present their skills in a way that is attractive to employers or clients. They may struggle to excel in their resumes, job applications, and networking.

Students may also lack confidence in their skills, leading to a tendency to underestimate their skills compared to the assessment of academics or employers. Students' accurate self-assessment of their educational performance has positive outcomes for students, including improved performance (Rolheiser & Ross, 2001; Ross, 2006), enhanced lifelong and deep learning, increased social competencies, learning motivation (McMillan & Hearn, 2008; Rolheiser & Ross, 2001) and self-efficacy (Rolheiser & Ross, 2001), and reduced anxiety. Furthermore, self-assessment strengthens cognitive (Wride, 2017) and metacognitive abilities (Topping, 2003; Wride, 2017). However, Jackson (2014) found that students' self-assessed employability skills did not align with those of their instructors, with clear instances of underrating. Factors such as years of study, gender, and academic performance play a significant role. This underrating also stands in contrast to the consistently strong feedback from employers that students do indeed have these skills and are well placed to succeed in professional settings after their program of study. The Graduate Outcomes Survey – Longitudinal and the Employer Satisfaction Survey, two government-endorsed surveys for higher education in Australia by Quality Indicators of Learning & Teaching (QILT), each year ask graduates of Australian higher education institutions and their employers to answer questions regarding employment. One of the questions in both surveys asks graduates and their direct supervisors to rate how graduates' qualifications have prepared them for their jobs in terms of foundational skills, adaptive skills and collaborative skills. The results were synthesised in Figure 2, Figure 3, and Figure 4. As shown in Figure 2, the graduates, particularly those from undergraduate and postgraduate coursework programs, consistently rated their foundational skills lower than their direct supervisors did between 2017 and 2023. A similar pattern is evident for adaptive skills, as indicated in Figure 3, and collaborative skills in Figure 4 over the same period.

Figure 2. Graduates' foundational skills rated by employers and graduates of undergraduate, postgraduate coursework and postgraduate research programs

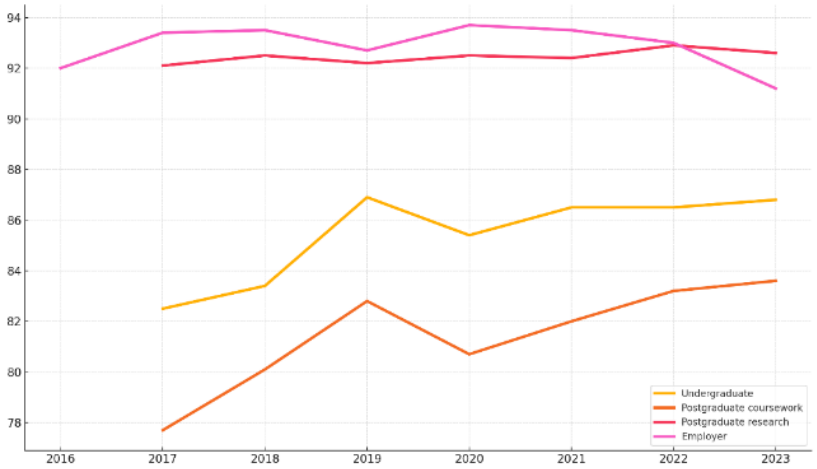


Figure 3. Graduates' adaptive skills rated by employers and graduates of undergraduate, postgraduate coursework and postgraduate research programs

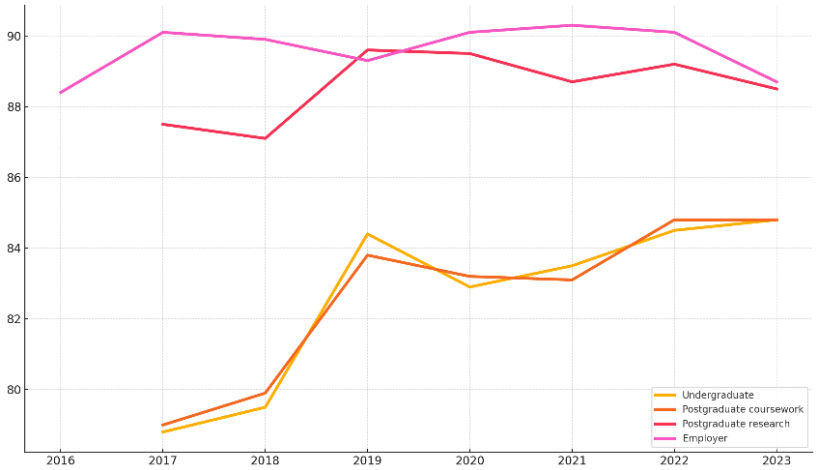
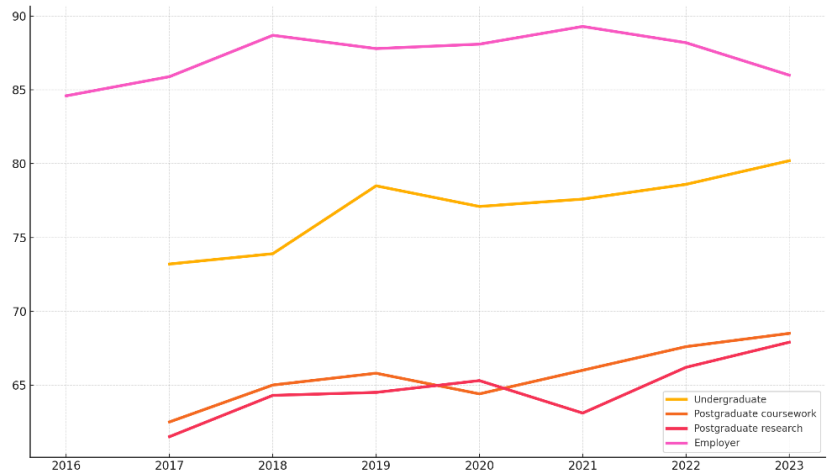


Figure 4. Graduates' collaborative skills rated by employers and graduates of undergraduate, postgraduate coursework and postgraduate research programs



Further, a survey by Youth Insight (Denejkina, 2023) also revealed that only one in five students is very confident in writing a job application in Australia and New Zealand. The impostor syndrome phenomenon could be the reason for such underestimation, in which, despite evident skill development and academic performance, students doubt their accomplishments and fear being exposed as a 'fraud' (Clance & Imes, 1978). The implication is clear: Besides resources, tools, and training on skill articulation, universities and educators must also implement strategies to help students believe in their skills and assess them more realistically.

Research on students' ability to identify and articulate skills is particularly crucial as employability-related skills, such as critical thinking and communication, are often central to the curriculum but not always explicitly framed as such (Rahman & Lakey, 2023). Many disciplines, particularly generalist programs, have not traditionally been linked to skills-based education, and there may even be resistance among educators or students to framing learning in terms of employability or skills. As a result, both pedagogical practice and research on skills development and articulation remain underdeveloped. Yet, it is precisely in these disciplines through which students gain a broad and adaptable skillset that is increasingly valued in the modern workforce, especially in the age of AI and future technical developments.

2.3 Aims and objectives

The lack of ability to articulate skills and the underestimation of skill acquisition among students highlight the need for universities to take action. The ADA Skills Project is, therefore, a future-focused project that aims to position UNSW to be the first Australian higher education provider to align its educational offerings with government and industry skills platforms (e.g., LinkedIn, Seek) and taxonomies, including the upcoming National Skills Taxonomy and National Skills Passport in Australia. Specifically, the project aims to address growing sector-wide gaps: 1) systematically embedding and demonstrating transferable and future-facing skills across higher education curricula, and 2) empowering students to articulate the skills acquired from these curricula in a critical, confident and humanistic manner.

As a starting point to address these gaps, this project will systematically review existing research and government and industry data to consolidate into a student-centred skills taxonomy of enduring human skills. A suite of mapping tools will then be developed to explicate the connections between existing UNSW ADA courses and the skills that our students develop in them. The taxonomy, mapping tools and accompanying resources will eventually contribute to students' ability to identify and articulate their skills.

03 Methodology

The skills in our skills taxonomy are determined by a comprehensive synthesis of existing 17 skills taxonomies (see Appendix), noting that the terminology used varies from taxonomy, framework, model, survey, benchmark, etc. Data on existing skills taxonomies were collected from multiple sources to ensure a broad and representative coverage of existing skills taxonomies. The primary method involved an extensive review of academic and grey literature, including journal articles, policy documents, and technical reports that explicitly outline or discuss skills frameworks. Additionally, consultations with stakeholders were conducted to identify the taxonomies currently in use or referenced in their professional practice. A third pathway involved examining institutional sources, such as university strategic plans, governmental white papers, workforce development initiatives, and national or international surveys related to skills assessment. These diverse sources capture both formal and emergent classifications of skills across multiple domains. Where appropriate, supplementary searches were conducted through organisational websites and official repositories to locate publicly available skills documentation.

We included only those taxonomies that are currently in use or have been used by government or industry and that define a fixed set of skills. A taxonomy adopted by government or industry tends to be more credible, stable, and widely accepted. The skills are more likely to reflect real-world needs. Additionally, we require that the taxonomy be closed, with the skill list

pre-defined and stable. These criteria ensure that comparison among taxonomies is meaningful by counting frequencies and comparing overlaps.

Platforms with open-ended or user-tailored skill clustering and listing were excluded, with a list of exclusions provided in the Appendix, because the skills within the same taxonomy often overlap and lack clear definitions. This process yielded the following 17 taxonomies to be included:

1. Australian Skills Classification (Australia)
2. SkillsFuture Singapore (Singapore)
3. Skills and Competencies Taxonomy (Canada)
4. Skills for Success (Canada)
5. European Skills, Competences, Qualifications and Occupations (European Union)
6. O*NET Skills Taxonomy (USA)
7. SCANS Competencies (USA)
8. OECD Core Competency Framework (International)
9. Digital Competence Framework (European Union)
10. Fundamental Competencies for Working Persons (Japan)
11. Future Skills Framework (Germany)
12. NACE Career Readiness Competencies (USA)
13. World Economic Forum Global Skills Taxonomy (International)
14. SHL Skills Benchmark (International)
15. A Skills Classification for the UK (UK)
16. LifeComp (European Union)
17. Durable skills Lightcast (International)

The skills in each existing taxonomy are coded under broader skill categories. The underlying rationale is to identify the frequency and prominence of skill categories across a diverse range of existing taxonomies. By mapping each skill in each existing taxonomy to a defined skill category, we can quantify the representation of various skill categories and discern which are most frequently emphasised and which receive comparatively less attention across different sources.

A combined top-down and bottom-up approach was adopted to analyse the skills in the skills taxonomies. The top-down dimension drew upon a set of skill categories identified in the initial scoping review, such as communication, collaboration and digital literacy. During the coding process, individual skills extracted from the collected taxonomies were mapped to these predefined skill categories. We carefully examined the definition of each skill extracted before coding it under one or more skill categories. At the same time, the bottom-up process allowed for the inductive identification of new skills that did not fit into existing categories, for example, technical skills, thus prompting iterative refinement and expansion of the coding framework.

To enhance the reliability and validity of the coding outcomes, the entire process was conducted in two iterative cycles. Following the initial round of coding, a secondary round was conducted to review, cross-check, and refine category assignments. Discrepancies and ambiguous cases were discussed and resolved through collaborative deliberation. This repeated procedure allowed for consistency checks and the validation of coding decisions, thereby ensuring the overall robustness and replicability of the resulting skills taxonomy.

Section 4 presents the nine skill categories that each skill in the existing taxonomies has been coded under and the presence of each skill across various skill taxonomies.

04 Proposed ADA Skills Taxonomy

Informed by the above process, the UNSW ADA Skills Taxonomy is a set of 9 key skills every student needs to thrive and succeed in their learning, future work and life. The order of the skills is based on the frequency of each skill identified in the data analysis. As these skills are based on existing taxonomies, models, and discourse, they can function as an interoperable universal language.

Table 1. Proposed skills taxonomy

Skill	Consolidated Definition
Critical Thinking	Understand and evaluate information, evidence, observations, and arguments in a clear and logical manner.
Communication	Effectively express ideas and information and respond to people of diverse cultures and backgrounds through modes of listening, reading, writing, and other forms of interaction.
Creativity	Innovate, develop, and produce original and novel ideas, approaches and solutions.
Collaboration	Work effectively and cooperatively with diverse individuals or teams and/or take the initiative to lead, guide and motivate others.
Problem-solving	Identify problems, develop and evaluate possible solutions, and select and implement effective and efficient solutions, including analysis of their impact and iteration.
Digital Literacy	Critically, effectively and ethically use digital technologies.
Organisational	Develop specific goals and plans and manage and coordinate various resources to prioritise, organise and accomplish work.
Self-regulation	Monitor and control one's own psycho-social resources and behaviours, including self-awareness, attention, emotions and values.
Technical	Apply practical techniques to effectively operate and maintain physical and digital tools and related content/material.

In addition to the nine skills outlined above, we also consider how skill levels might be reflected when mapping program learning outcomes (PLO) and course learning outcomes (CLOs) to skills in the overall context of curriculum design and delivery at UNSW. UNSW's Integrated Curriculum Framework (UNSW, 2025) provides a standardised structure for the alignment (see Kandlbinder, 2014) of courses (the units of study) and their overall program which takes the form of CLOs and PLOs. These learning outcomes are typically based on Bloom's Revised Taxonomy (Krathwohl, 2002) and embed the acquisition and development of skills and their generic and/or discipline-specific application. Professionally accredited programs may also align their learning outcomes with the relevant professional, national, or international standards. The PLOs prescribe the knowledge and skills that students will gain from the program, with each CLO articulating clear links to one or more PLOs. Once the CLOs are defined, the course components and assessments are developed, again articulating a clear alignment between each component and the CLOs, as well as knowledge and those skills.

In addition to PLOs and CLOs, the essential consideration in mapping is whether courses at different levels and students' assessment outcomes should be linked to varying skill levels. To support this discussion, we have proposed possible approaches to mapping. The rationale is to keep the mapping and its results as simple as possible. First, too many factors of consideration could result in too many levels, making the taxonomy too complex for students and employers to use – a noted issue across the literature and in government and industry usage. Second, when a skill is divided into too many levels, drawing clear boundaries or providing meaningful definitions for each level can be challenging, as is seen in the case of the Australian Skills Classification, where the ten skill levels were not defined clearly. Third, we aim to ensure that the mapping

process is as automatic as possible, thus reducing the maintenance cost and ensuring sustainability and feasibility. We argue that the solution in Option 1 is manageable and scalable given the resources available, but we would welcome feedback on the identified options below, which have been informed by the work detailed in the previous sections.

Table 2. Options for involving skill levels in mapping

Options	**Advantages**	**Disadvantages**
1. Skills are mapped to CLOs with no specific levels: Each of the 9 skills has a consistent definition across all courses. CLOs are mapped directly to the relevant skills without specifying levels of proficiency. Students acquire skills through course completion.	- Easy to map skills to CLOs. - Simple to maintain as BAU. - Fast to scale across multiple programs.	- Limited recognition of progression or depth of skill development.
2. Skills are mapped to CLOs with levels of proficiency linked to UNSW course levels or AQF levels. CLOs are mapped directly to relevant skills, and the level of proficiency is automatically mapped to the UNSW course level. Skills mapped to courses with codes starting with 1–9 are given the corresponding level 1–9 of proficiency.	- Easy to map skills to CLOs. - Align levels of proficiency with existing UNSW/AQF levels. - Though the definition of the levels, such as level 1 communication, may not be clear to some, the low to high levels can be a good indicator of low to high proficiency.	- Prioritise course levels over students' individual assessments - UNSW/AQF levels may be confusing to students.
3. Skills are mapped to CLOs, with skill proficiency defined by students' assessment outcomes: CLOs are mapped to the relevant skills without assigning a level during mapping. Students' skill proficiency is later determined by assessment outcomes: • Fail = Skill not acquired • Pass = Skill acquired at Foundational level • Distinction / High Distinction = Skill acquired at Proficient level	- Simple to implement with no complex mapping or level judgement required. - A two-level model, 'Foundational' and 'Proficient', rather than three-level or more levels, makes the skill levels simple, clear, and meaningful for students and employers. It avoids confusing terms like 'Developing' or 'Emerging' that may not resonate in the job market. This also helps students present a confident, professional narrative about their skills, showing either basic capability	- May misrepresent skill complexity (same assessment grade can reflect very different cognitive demands across courses. For example, a Distinction in a first-year course might indicate basic skills, while a Distinction in a final-year course could reflect advanced, complex capabilities.) - No recognition of curriculum design

	(Foundational) or job-ready mastery (Proficient). It also simplifies decision-making during mapping, reduces system and reporting complexity, and ensures the model can be scaled consistently across programs.	intent regarding skill level. - Oversimplifies the relationship between assessment and skill proficiency. - Requires on-going additional resourcing to manage outside of BAU.
4. Skills are mapped to CLOs with two levels, 'Foundational' and 'Proficient'. Skill acquisition is determined by assessment outcomes: CLOs are mapped to one of two levels for each skill: Foundational or Proficient. Students' skill acquisition is reported with simplified finer gradation by grouping grades. • For Foundational skills: Pass = Foundational; Distinction / High Distinction = Foundational (Advanced) • For Proficient skills: Pass = Proficient; Distinction / High Distinction = Proficient (Advanced)	- Retains simplicity while offering additional recognition for stronger achievement. - Simple for students and employers to interpret. - Align levels with performance standards already in place.	- Still depends on consistent application of grade standards across courses. - Could blur nuance between Distinction and High Distinction. - Adds a layer of complexity to reporting compared to a flat two-level model.

In light of the growing global recognition of generic skills, the ADA Skills Project has proposed a synthesised Skills Taxonomy and corresponding mapping methods. Guided by international frameworks and local research, we emphasised clarity, usability, and reliability of the taxonomy. We position the taxonomy and mapping as foundational tools, and together with other resources and support, we aim to empower students to clearly and confidently identify and articulate their skills, addressing known gaps in student self-awareness and confidence in their skills highlighted in prior studies. By piloting this initiative within ADA, we aim to build a robust model that embeds skills into learning outcomes, eventually equipping students with the language, resources, and reflective capacity needed to navigate their academic learning and future career.

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06 Appendix: Summary of analysis of existing skills taxonomies

Skill	Country	Year	Communication	Collaboration	Problem Solving	Critical Thinking	Digital Literacy	Creativity	Self-Regulation	Organisational	Technical
Count			17	17	15	16	13	13	13	12	9
Coverage			100%	100%	88%	94%	76%	76%	76%	71%	53%
Australian Skills Classification	Australia	2021	✓ Reading ✓ Writing ✓Oral communication	✓ Teamwork	✓ Problem solving		✓ Digital literacy	✓ Initiative and Innovation		✓ Organising and planning	
SkillsFuture Singapore	Singapore	2015	✓ Communication ✓ Influence ✓ Global Perspective ✓ Customer orientation ✓ Sense making	✓ Collaboration ✓ Building inclusivity ✓ Developing people	✓ Problem solving ✓ Decision making	✓ Sense making ✓ Customer orientation	✓ Digital fluency	✓ Creative thinking ✓ Transdisciplinary thinking	✓ Adaptability ✓ Self-management		
Skills and Competencies Taxonomy (Canada)	Canada	2019	✓ Foundational skills – Reading comprehension ✓ Foundational skills – Writing ✓ Foundational skills – Oral communication: active listening ✓ Foundational skills – Oral communication: oral comprehension	✓ Interpersonal skills – Coordinating ✓ Interpersonal skills – Instructing	✓ Analytical skills – Problem solving ✓ Analytical skills – Decision making	✓ Analytical skills – Critical thinking ✓ Analytical skills – Evaluation ✓ Analytical skills – Requirements analysis ✓ Analytical skills – Systems analysis ✓ Analytical skills – Evaluation	✓ Foundational skills – Digital literacy ✓ Analytical skills – Researching and investigating			✓ Resource Management skills – Management of financial resources ✓ Resource Management skills – Management of material resources ✓ Resource Management skills –	✓ Technical skills – Equipment and Tool Selection ✓ Technical skills – Preventative Maintenance ✓ Technical skills – Setting Up ✓ Technical skills – Operation and Control ✓ Technical skills – Operation Monitoring of

			✓ Foundational skills – Oral communication: oral expression ✓ Interpersonal skills – Social perceptiveness ✓ Interpersonal skills – Managing conversation ✓ Interpersonal skills – Negotiating ✓ Interpersonal skills – Persuading ✓ Interpersonal skills – Cross-cultural sensitivity							Management of personal resources ✓ Resource Management skills – Operational planning ✓ Resource Management skills – Project outcomes ✓ Resource Management skills – Risk management ✓ Resource Management skills – Strategic planning ✓ Resource Management skills – Time management ✓ Resource Management skills – Monitoring ✓ Resource Management skills – Change management ✓ Resource Management skills – Crisis management	Machinery and Equipment ✓ Technical skills – Troubleshooting ✓ Technical skills – Repairing ✓ Technical skills – Quality Control Testing ✓ Technical skills – Product Design ✓ Technical skills – Digital Production
Skills for Success (Canada) - foundational skills	Canada	2021	✓ Reading ✓ Writing ✓ Communication	✓ Collaboration	✓ Problem solving		✓ Digital (both digital literacy and information literacy)	✓ Creativity and innovation	✓ Adaptability		

European Skills, Competences, Qualifications and Occupations (ESCO)	European Union	2013	✓ Transversal skills and competences - Social and communication skills and competences ✓ Transversal skills and competences - Core skills and competences	✓ Transversal skills and competences - social and communication skills and competences	✓ Transversal skills and competences - Thinking skills and competences	✓ Transversal skills and competences - Thinking skills and competences	✓ Transversal skills and competences - Core skills and competences	✓ Transversal skills and competences - Thinking skills and competences	✓ Transversal skills and competences - Self-management skills and competences		✓ Transversal skills and competences - Physical and manual skills and competences
O*NET Skills Taxonomy	United States	1998	✓ Cross-functional skills - Social skills	✓ Cross-functional skills - Social skills	✓ Cross-functional skills - Complex problem-solving skills	✓ Cross-functional skills - Complex problem-solving skills	✓ Cross-functional skills - System skills			✓ Cross-functional skills - Resource management skills	✓ Cross-functional skills - Technical skills
SCANS Competencies	United States	1991	✓ BASIC SKILLS F1 Reading ✓ BASIC SKILLS F2 Writing ✓ INFORMATION C7 Interprets and Communicates Information ✓ INTERPERSONAL C11 Serves Clients / Customers ✓ BASIC SKILLS F5 Listening ✓ THINKING SKILLS F6 Speaking ✓ INTERPERSONAL C14 Works with Cultural Diversity	✓ INTERPERSONAL C9 Participates as a Member of a Team ✓ INTERPERSONAL C10 Teaches Others - Helps others learn ✓ INTERPERSONAL C12 Exercises Leadership ✓ INTERPERSONAL C13 Negotiates to Arrive at a Decision	✓ THINKING SKILLS F8 Decision Making ✓ THINKING SKILLS F9 Problem Solving	✓ INFORMATION C7 Interprets and Communicates Information ✓ INFORMATION C5 Acquires and Evaluates Information ✓ THINKING SKILLS F10 Seeing Things in the Mind's Eye	✓ INFORMATION C6 Organises and Maintains Information	✓ THINKING SKILLS F7 Creative Thinking	✓ PERSONAL QUALITIES F13 Responsibility ✓ PERSONAL QUALITIES F15 Social ✓ PERSONAL QUALITIES F16 Self-Management	✓ RESOURCES C1 Allocates Time ✓ RESOURCES C2 Allocates Money ✓ RESOURCES C3 Allocates Material and Facility Resources ✓ RESOURCES C4 Allocates Human Resources	✓ INFORMATION C8 Uses Computers to Process Information SYSTEMS C15 derstands Systems ✓ SYSTEMS C16 Monitors and Corrects Performance ✓ SYSTEMS C17 Improves and Designs Systems ✓ TECHNOLOGY C18 Selects Technology ✓ TECHNOLOGY C19 Applies Technology to Task ✓ TECHNOLOGY C20 Maintains and

											Troubleshoots Technology
OECD Core Competency Framework	International (OECD)	2005	✓ 2. To Enable People ✓ 4. Collaboration and Horizontality	✓ 2. To Enable People ✓ 4. Collaboration and Horizontality	✓ 5. To Achieve Results	✓ 5. To Achieve Results		✓ 6. Innovate and Embrace Change	✓ 3. Ethics and Integrity ✓ 6. Innovate and Embrace Change	✓ 1. Vision and Strategy ✓ 5. To Achieve Results	
Digital Competence Framework (DigComp)	European Union	2013	✓ Communication and collaboration	✓ Communication and collaboration	✓ Problem solving	✓ Digital content creation	✓ Information and data literacy ✓ Safety	✓ Problem solving	✓ Safety		✓ Digital content creation ✓ Safety
Fundamental Competencies for Working Persons (Japan)	Japan	2006	✓ 3) Ability to work in teams (Teamwork)	✓ 3) Ability to work in teams (Teamwork)	✓ 2) Ability to think things through	✓ 2) Ability to think things through		✓ 2) Ability to think things through	✓ 3) Ability to work in teams (Teamwork)	✓ 2) Ability to think things through	
Future Skills Framework (NextSkills)	Germany	2019	✓ Co-creation - Sensemaking ✓ Co-creatioin - Communication competence	✓ Co-creation - Cooperation competence	✓ Learning - Decision competence ✓Development - Design-thinking competence	✓ Learning - Decision competence ✓ Learning - Reflective competence	✓ Development - Digital literacy	✓ Development - Innovation competence	✓ Learning - Self-efficacy ✓ Learning - Self-determination ✓ Learning - Self-competence ✓ Learning - Reflective competence ✓ Learning - Initiative and performance competence ✓ Learning - Ethical competence ✓ Learning - Ambiguity competence	✓ Learning - Initiative and performance competence	✓ Development - System competence

									✓ Co-creation - Future and design competence		
NACE Career Readiness Competencies	United States	2015	✓ Communication ✓ Equity & Inclusion	✓ Leadership ✓ Teamwork		✓ Critical thinking	✓ Technology		✓ Career & self-development ✓ Professionalism ✓ Professionalism ✓ Equity & Inclusion	✓ Professionalism	✓ Technology
World Economic Forum Global Skills Taxonomy	International (WEF)	2020	✓ Cognitive skills (Speaking, writing and languages) ✓ Engagement skills (Marketing and media) ✓ Engagement skills (Customer experience) ✓ Working with others (Empathy and active listening; service orientation; teaching, mentoring and coaching; leadership and social influence)	✓ Working with others (Empathy and active listening; service orientation; teaching, mentoring and coaching; leadership and social influence)	✓ Cognitive skills (Creativity and problem solving)	✓ Cognitive skills (Creativity and problem solving)	✓ Technology skills (Technology literacy)	✓ Cognitive skills (Creativity and problem solving)	✓ Self-efficacy (Motivation and self-awareness; dependability and attention to detail) ✓ Ethics (Environmental stewardship) ✓ Self-efficacy (Resilience, flexibility and agility) ✓ Ethics (civic responsibility)	✓ Management skills (Talent management; operation and logistics; financial management; quality management)	✓ Technology skills (Programming; design and user experience; networks and cybersecurity; artificial intelligence and big data)
SHL Universal Competency Framework	International (SHL)	2015	✓ 3 Interacting and presenting	✓ 1 Leading and deciding ✓ 2 Supporting and co-operating;	✓ 1 Leading and deciding	✓ 4 Analysing and interpreting	✓ 4 Analysing and interpreting	✓ 5 Creating and conceptualising	✓ 2. Supporting and cooperating ✓ 7 Adapting and coping	✓ 6 Organising and executing	✓ 4 Analysing and interpreting
A Skills Classification for the UK	United Kingdom	2023	Oral communication Active listening	Working with ers ✓ Leadership	✓ Learning and researching	✓ Learning and researching	✓ Digital literacy	✓ Creativity and innovation		✓ Planning and organising	

			Numeracy ✓ Writing								
LifeComp	European Union	2018	✓ Communication Empathy	Collaboration		✓ Critical thinking			✓ Self-regulation ✓ Flexibility ✓ Wellbeing ✓ Empathy ✓ Growth mindset ✓ Managing learning	✓ Managing learning	
Durable skills Lightcast	International	2025	✓ Communication	Leadership Collaboration	✓ Leadership ✓ Critical thinking	✓ Critical thinking		✓ Creativitiy	✓ Character ✓ Metacognition ✓ Mindfulness ✓ Growth Mindset ✓ Fortitude		

Notes on taxonomies not included:

1. UNESCO Global Skills Academy: A specific skills framework is not identified. (https://www.unesco.org/en/global-education-coalition/skills-academy/skills-future/about)

2. Graduate Capitals Model: No specific skills are mentioned. (https://www.southampton.ac.uk/careers/staff/employability-exchange/curriculum-development.page)

3. Lightcast Open Skills Taxonomy: No specific skills taxonomy or skill levels are adopted. It is a library of skills. (https://lightcast.io/open-skills)

4. LinkedIn Skills Graph: No specific skills taxonomy is identified. It adopts a tailored personalised taxonomy. (https://www.linkedin.com/blog/engineering/skills-graph/building-linkedin-s-skills-graph-to-power-a-skills-first-world)

5. Microsoft “People” Skills Taxonomy: A flexible skill taxonomy approach is adopted. (https://techcommunity.microsoft.com/blog/microsoft365copilotblog/announcing-people-skills-general-availability-and-new-skills-agent/4406364)

6. 21st Century Skills Competency Framework: A conceptual framework contains a list of non-exhaustive skills. Different organisations may have adopted the framework with various skills.

7. Australian Core Skills Framework: Only five core skills are mentioned, including learning, reading, writing, oral communication and numeracy. (https://www.dewr.gov.au/skills-information-training-providers/australian-core-skills-framework)

8. Australian Signals Directorate (ASD) Cyber Skills Framework: This framework is specifically dedicated to cybersecurity. (https://www.asd.gov.au/careers/how-apply/cyber-skills-framework)

9. Open Skills Network: Skills categories are not found. (https://www.openskillsnetwork.org/)

10. Australian Digital Capability Framework (ADCF): A framework adapted and based on DigComp, which has been included in the above data analysis. (https://www.dewr.gov.au/skills-reform/resources/australian-digital-capability-framework)

11. Nesta's "A UK Skills Taxonomy": A data-driven skills taxonomy contains many skills groups and several layers. It varies across different occupations and sectors. (https://data-viz.nesta.org.uk/skills-taxonomy/index.html)

12. Skills Framework for the Information Age (SFIA): SFIA began as a framework for the ICT community and is now a framework that defines the skills and competencies needed by business and technology professionals who design, develop, implement, manage and protect the data and technology that power the digital world. It is a specialised skills taxonomy, not a generic one. (https://sfia-online.org/en/sfia-9)