Dr. James Curran
CEO and Director

3 November 2022

Dear Commissioners,

RE: Productivity Commission's Interim Report 2 – Australia's data and digital dividend

Thank you for the opportunity to respond to the Productivity Commission's interim report 2 on Australia's data and digital dividend.

Grok Academy Limited is an Australian edtech charity. Our purpose is to *educate all learners in transformative computing knowledge, skills, and dispositions, empowering them to meet the challenges and seize the opportunities of the future*. For us, *computing* encompasses basic digital literacy through to advanced computer science and related disciplines, and the application of these skills across all disciplines.

This interim report falls directly within Grok's singular focus and expertise. Our response to the report will focus on **Section 3.3. Developing digital, data and cyber security skills**. In Australian Curriculum terms, these are Digital Technologies and Digital Literacy skills (DT/DL). We will call these collectively *digital skills* below.

Recommendation 1: Recognise the impact of digital skills in roles across all industries.

The interim report focuses on the strong current and future demand for technical jobs in technology-related and -enabled ("other") industries and how to address this skills shortage. We agree that this is a major opportunity that Australia is yet to seize. Failure to do so risks our long-term prosperity and competitiveness in the knowledge economy. Covid has shown that we cannot rely on skilled migration and international students to solve this problem.

The report notes that "most Australians need some level of baseline digital skills" and that "[d]igital literacy was the second-largest skills gap reported by workers, with data analysis being the biggest identified gap." However, the **report does not emphasise the enormous productivity gains** in non-technical roles that enhanced digital skills (and dispositions) enable:

- Increased effectiveness with business, collaboration, and productivity tools – e.g., spreadsheet skills for budget modelling or cloud whiteboards to capture brainstorming effectively.
- systematisation of ad hoc/non-core processes and tasks in SMEs (or unsupported by enterprise software) – e.g., managing dietary requirements for an event;
- data collection and analysis in a SME – e.g., assessing increased building materials cost across multiple construction projects;
- automation of processes and creating custom apps with low-code tools – e.g., enabling a gym to register members' healthy eating goals and remind them in an app.

In many of these instances, the tasks are ad-hoc/non-core or the organisation is too small to have dedicated software, or technical staff, to solve them. The **tasks fall to non-technical staff who complete them manually** (on a computer, but in repetitive and error-prone ways) because they do not have the skills, nor the agency and dispositions, to find a better way.

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In most cases, employers expect them to solve these tasks manually. And in turn, the digital literacy skills reports tend to be deficit rather than opportunity focused, considering the requirements to perform a role adequately, rather than how a digitally skilled employee could excel in their role.

At the same time, cyber security affects all roles and all organisations. Everyone who has access to data and resources is a risk, regardless of their technical skills.

Better digital skills allow you to do your job better, no matter what your job is.

Recommendation 2: Recognise many digital employees come from non-digital degrees.

The report notes that many digital roles are outside the technology sector and the high proportion of domestic and international IT graduates in Australia. However, the report does not note that **many other STEM (and other) graduates end up in digital roles** (e.g., physics graduates working as software engineers, or business graduates working as data scientists).

Unfortunately, those degrees tend to focus on digital skills that are specific to their disciplines (e.g., computational physics skills rather than computer science) rather than recognising the destination of many of their graduates. Further, the competition for revenue across faculties means technical skills are increasingly taught in discipline-specific ways and students are rarely encouraged to study computer science in other degrees (except in double degrees).

Recommendation 3: Recognise (advanced) digital skills take time to develop.

The report recommends short courses for digital re/upskilling. However, many employers have found that short-form courses, e.g., coding bootcamps, provide students with shallower knowledge/skills and “walkthrough” hands-on experience compared to 3- to 4-year university degrees; and vendor certification is inherently narrow and vendor specific in its focus.

Unfortunately, universities have exacerbated this dichotomy by teaching fewer units of study in areas of high demand, e.g., front-end software development. The report also notes that IT VET graduate employment is 13% lower than other VET certificates, which possibly indicates the demand for higher technical skills.

This is not to say that part-time study + work is not a powerful career combination, e.g., co-op programmes, but more to recognise the value of investing in deeper digital skills over time.

As China and India graduate technical cohorts larger than our whole population each year, Australia needs to be smarter and more innovative, more productive with our technical people, and that comes from:

- deeper technical understanding and skills
- direct experience/intuition about challenges and opportunities requiring digital solutions.

This means technical employees need longer to mature and non-technical employees need digital skills and dispositions to identify opportunities and co-develop solutions.

As the report notes, the “digital divide” further exacerbates (and accelerates) socio-economic disadvantage for school students by taking away their earliest opportunities to develop technical skills and confidence.

A useful comparison to consider is the place of mathematics in our education system. NSW has just announced that students must study mathematics to Year 12. For example, (nearly) every high school in Australia is exposed to algebra (and other concepts beyond numeracy), even though only a percentage of students will need it later in life. In fact, many high school students will next use algebra when their own children bring it home for homework.

Despite this, it is (nearly) universally accepted that students should learn some algebra, even though many find it painful – in part because algebra is fundamental to further mathematics and the algebraic manipulation skills take time to develop.

Arguably, digital skills and concepts are more widely applicable for students, but we do not have the same universal expectation about developing digital skills over time at school.

Recommendation 4: Increase digital skills across all levels of education.

The consequences of observations 1-3 above is that learners at all stages of education must continue to develop fundamental digital skills, understanding and dispositions:

- school students from early primary school to Year 11-12;
- university and vocational students regardless of their degrees or career aspirations; and
- employees in need of specific just-in-time learning

to make them **most effective learners and workers in every discipline**. The dispositions, particularly digital confidence and agency, life-long learning and curiosity, and a dissatisfaction with repetitive or error-prone tasks, are especially important.

It also means that developing digital skills in non-technical tertiary education and short-course career re/upskilling and just-in-time digital learning can build on a solid base of fundamental digital skills and an understanding of digital key concepts.

Our education system increasingly lets students down rather than increasing digital skills. For example, National Assessment Program – Information and Communication Technology Literacy (NAP–ICTL), which samples the digital literacy of students in Year 6 and 10, has shown that skills have regressed or stagnated over the last decade.

At the same time, there is an assumption that because students are immersed in technology, that they are now “digital natives”. While it is true that many students develop some digital skills that didn’t exist previously, such as navigating social media and communicating online, they are in fact getting worse at basic digital skills, such as typing and managing files.

Despite the fact that digital technology has remade, and continues to remake every aspect of our lives, we (educators, parents, and employers) are not taking it seriously enough.

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Recommendation 5: Invest in educators' digital skills, confidence, and pedagogy.

Educators are central to Recommendation 4. This means that Australia (both government and industry) must invest heavily in:

- **training and supporting school teachers** to deliver the Australian Curriculum: Digital Technologies effectively (especially since most never learned DT at school or university);
- **training educators in school, VET, and university** to integrate authentic, sophisticated digital skills (e.g., Digital Literacy capability in schools) across all disciplines.

This requires **developing the technical skills of educators first rather than assuming (incorrectly) that they have the skills already**, then the specific pedagogical approaches for digital skills, and finally integrating digital skills deeply and authentically in their own disciplines.

Students, especially in primary school and especially under-represented groups, must see their educators and role models use digital technology confidently and proactively, and be resilient to troubleshooting technical problems when they inevitable arise. Unfortunately, this is rarely the case in schools right now.

This would allow students to see digital skills as being central to whatever they want to achieve in their lives, rather than skills that only budding software engineers need to develop.

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If you have any further queries about Grok's response to the interim report, feel free to contact me at james.r.curran@grokacademy.org

Yours sincerely,

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About Grok Academy

Grok Academy is a not-for-profit with an outstanding record of creating scalable, engaging, curriculum-aligned classroom-ready content and technology in close collaboration with education, industry, and government partners.

We are award-winning educators, curriculum leaders, and software engineers dedicated to *educating all learners in transformative computing knowledge, skills, and dispositions, empowering them to meet the challenges and seize the opportunities of the future. Computing encompasses basic digital literacy through to advanced computer science and related disciplines, and the application of these skills across all disciplines*.

Grok Academy is a merger of Grok Learning Pty Ltd (founded in 2013) and the Australian Computing Academy (started in 2016) at the University of Sydney. Grok's original activities, the NCSS Challenges, were first created at the University in 2005 to support students learning at school and independently. **Grok is a pioneer of online education with over 17 years' experience providing online curriculum content for Digital Technologies**. Since 2013, 45,000 NSW students and 1700 teachers have participated in the NCSS Challenges.

Grok delivers highly interactive online courses and competitions ("Challenges") that explicitly teach coding and other technical skills and allow students to practice these skills online with real-world problems and projects. They receive immediate intelligent, automated feedback allowing them to work at their own pace. We provide teachers with detailed learning analytics on student progress and a range of tools to support remote learning.

Grok has been a vendor to government/industry school/tertiary education projects, including:

- **$10M DT Challenges project** (2017-2020, Department of Education, Skills and Employment). Over 262k students and 9,000 teachers with 500k enrolments; 2600 teachers in 1- and 2-day DT F2F PL workshops and 2200 in PL webinars.
- **$4.1M Schools Cyber Security Challenges** (2019-now, ASD, AWS, BT, big-4 banks, Federal Department of Industry). Over 200k students and 5800 teachers enrolled.

In total, over 625,000 Australian primary/secondary students enrolled in our courses (1.9 million enrolments) with over 22,000 teachers and 6,200 schools participating.

In addition to developing content for DT, we also support Departments of Education with research/consulting services and curriculum authorities with authoring/reviewing, including:

- **ACARA**: AC:DT v8 and v9 and AC: Digital Literacy capability v9 authoring;
- **ACT BSSS** and **QCAA** curriculum validation and reviewing;
- **NSW Dept. of Education**: *Coding and Computational Thinking: What is the Evidence?*;
- **WA Department of Education**: *Digital Capability Framework* to allow school leaders to self-assess digital skills in their school.

Grok is the pre-eminent leader of DT curriculum implementation across Australia.

Grok Academy content is designed and created by a team of award-winning senior classroom teachers and education leaders who have taught DT and DL across stages, jurisdictions, and sectors.

Our team includes the four authors of the AC:DT v8 and AC:DT/DL v9 with curriculum expertise across four states and territories.

We also authored/edited DT content within the Science and Technology (K-6) and Technologies Mandatory (Year 7-8) syllabuses and drafted the Computing Technology (Year 9-10) syllabus for NESA that will replace IST. Our ability to produce content directly aligned with the current and future NSW syllabuses is unparalleled.

About James Curran

Dr James Curran founded Grok Learning, and as an Associate Professor of Computer Science at the University of Sydney, ran the National Computer Science School (from 2001), and started the NCSS Challenge (2005), Girls' Programming Network (2010), and the Australian Computing Academy (2017) – all now in Grok Academy.

He was an author of AC:DT (v8-9) and AC:DL (v9) and DT content in NSW syllabuses.

James has been awarded:

- ICTENSW (2013) and ACCE (2014) ICT Leader of the Year;
- CORE Chris Wallace Research Excellence Award (2014);
- Professional Teachers' Council NSW Outstanding Professional Service Award (2011);
- ALTC national citation for Outstanding Student Learning (2010);
- Engineers Australia and AIIA awards for NCSS, including online learning (2010).