Connecting Australia

Bright Futures: Laying the foundations for the workforce of tomorrow

A study into the way digital technology is transforming education and preparing the next generation of business leaders for the future workforce

nbn™

INTRODUCTION

> **TWENTY YEARS AGO, WE COULDN'T HAVE IMAGINED MANY OF THE JOBS WE DO TODAY**

When I reflect on my career, the only constant is change. As technology has advanced and become central to our everyday lives, the rate of change has only increased. Global connections can be made instantaneously, employees can work from anywhere in the world, and businesses know more than ever about their customers.

Twenty years ago, we couldn't have imagined many of the jobs we do today, and similarly, the jobs our children will perform tomorrow are yet to be imagined. We don't know what problems will need solving in the future, but we can equip ourselves and the next generation of workers with the right skills to be successful.

The latest phase of Connecting Australia research performed by economics and data analytics advisory firm AlphaBeta and commissioned by NBN Co, **Bright Futures**, shows how critical thinking, creativity, science, technology, engineering and maths (STEM) skills and digital literacy will be more important than ever for jobs of the future. In fact, three-quarters of Australians are expected to spend more time using STEM and entrepreneurial skills in their jobs by 2030.

It's pleasing to see the research has shown the **nbn**™ broadband access network is not only contributing to a boom in entrepreneurship and job creation in Australia, but also helping support Australians as they prepare for these new career opportunities.

Since 2014 the **nbn**™ access network has connected hundreds of thousands of children across regional and remote Australia in households that previously had below average[1] or no internet, and almost tripled average internet speeds[2] for households with children across Australia.

We remain committed to providing young students with the critical infrastructure they need to learn and connect in new and different ways, to strengthen their "future skills", and set them up for success.

KATHRINE DYER
CHIEF NETWORK DEPLOYMENT OFFICER
NBN CO

A NATION
IN TRANSITION

The 2016 Census undertaken by the Australian Bureau of Statistics (ABS) captured a snapshot of the social and economic impact of one of the largest nation-building projects in Australia's history: the **nbn**™ access network. It provided a baseline to measure how Australia's economy and society had changed in regions connected to the **nbn**™ access network and those that were not yet connected.

Over the course of 2018, we reported detailed results on the estimated impact of the **nbn**™ access network on jobs and growth, female entrepreneurship, social connection, industry, education and the economy.

This year, we continue exploring the socio-economic impact of the **nbn**™ access network, starting with a look at the future of work, and how access to fast broadband is helping educate young Australians, equipping them for the future workforce.

CONDUCTING
THE RESEARCH

Expanding on the 2018 study, economics and data-analytics advisory firm AlphaBeta has used multiple analytics techniques and data sources to gain further insight into the "**nbn**™ effect", and changing patterns in the way we work and learn.

The 2016 Census data, an Ipsos survey of a representative group of Australians, and **nbn**™ rollout data were again leveraged, while additional research drew on other ABS, a survey by research company Evolve, O*NET (United States Department of Labor data) and Organisation for Economic Co-operation and Development (OECD) data, and existing research about education and the future of work.

For a detailed methodology, please visit **www.alphabeta.com**.

THE TRANSFORMING WORLD OF WORK

Shifts in the economy, developments in technology and global patterns of supply and demand are changing the way we live and work. From how we access information, to how we consume media, to how we order food, there is barely an industry that has been untouched by this transformation.

Automation is having a significant impact on how we work and geography is becoming less of a barrier to job opportunities, leading to growth in high touch and high skill jobs.
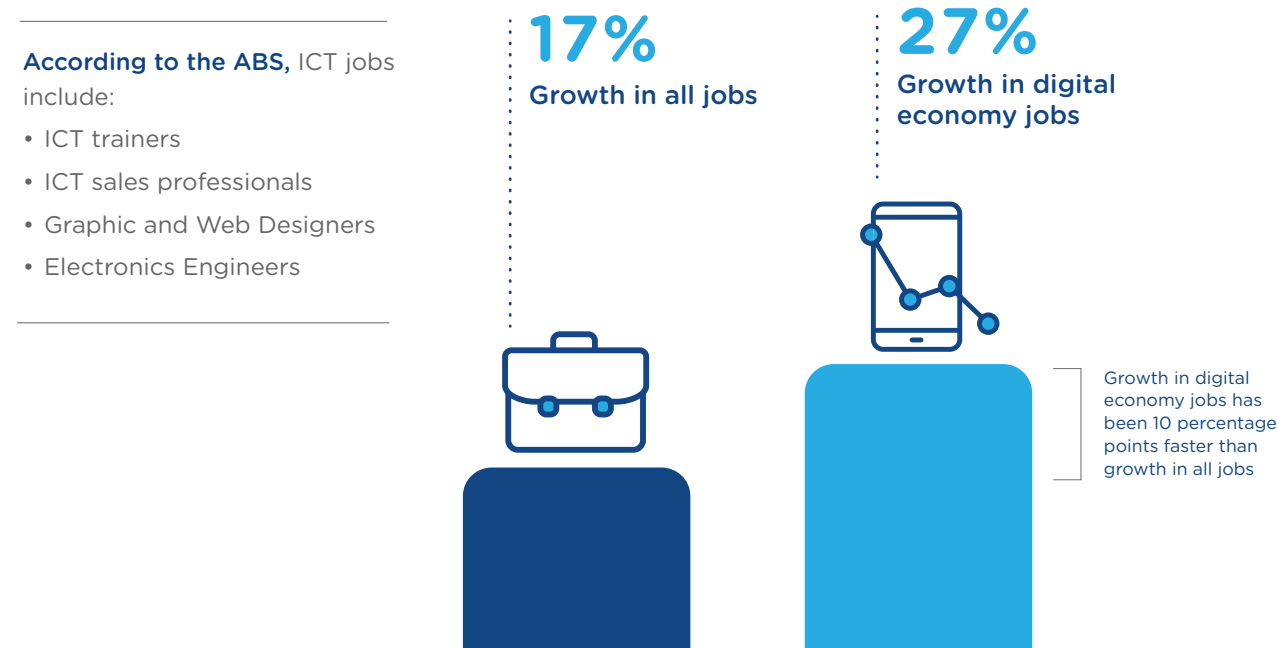
High-touch jobs, including those in community and personal services, involve a high level of interaction with people and soft skills such as strong communication. High touch jobs in Australia grew by 87 per cent in Australia from 1991-2015.[13]

High skill jobs, those that require tertiary education, have grown by 57 per cent in the same period while manual or routine jobs such as trades, technicians, machinery operators and labourers have decreased.

Technology has also facilitated a rise in the rapid growth of digital economy jobs — jobs in the Information Communications and Technology (ICT) sector, which have outpaced overall jobs growth by 10 per centage points nationwide.[14]
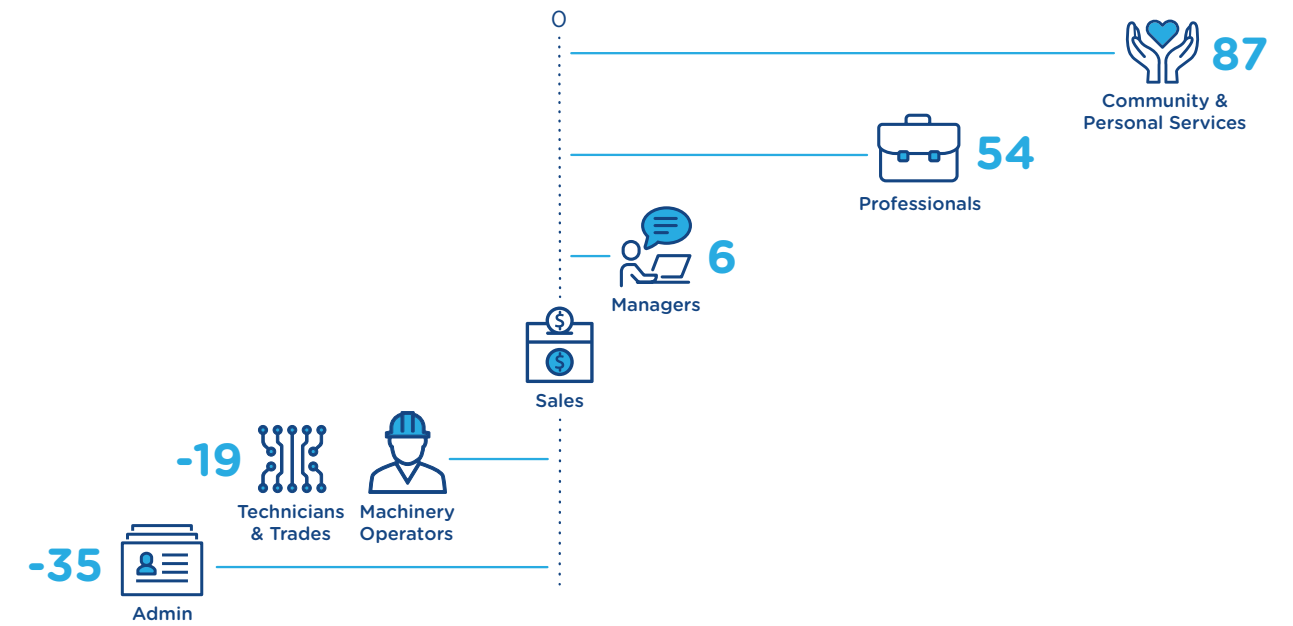
Growth in digital economy and all jobs in Australia

% growth between 2006 and 2016

According to the ABS, ICT jobs include:
• ICT trainers
• ICT sales professionals
• Graphic and Web Designers
• Electronics Engineers

17%
Growth in all jobs

27%
Growth in digital economy jobs

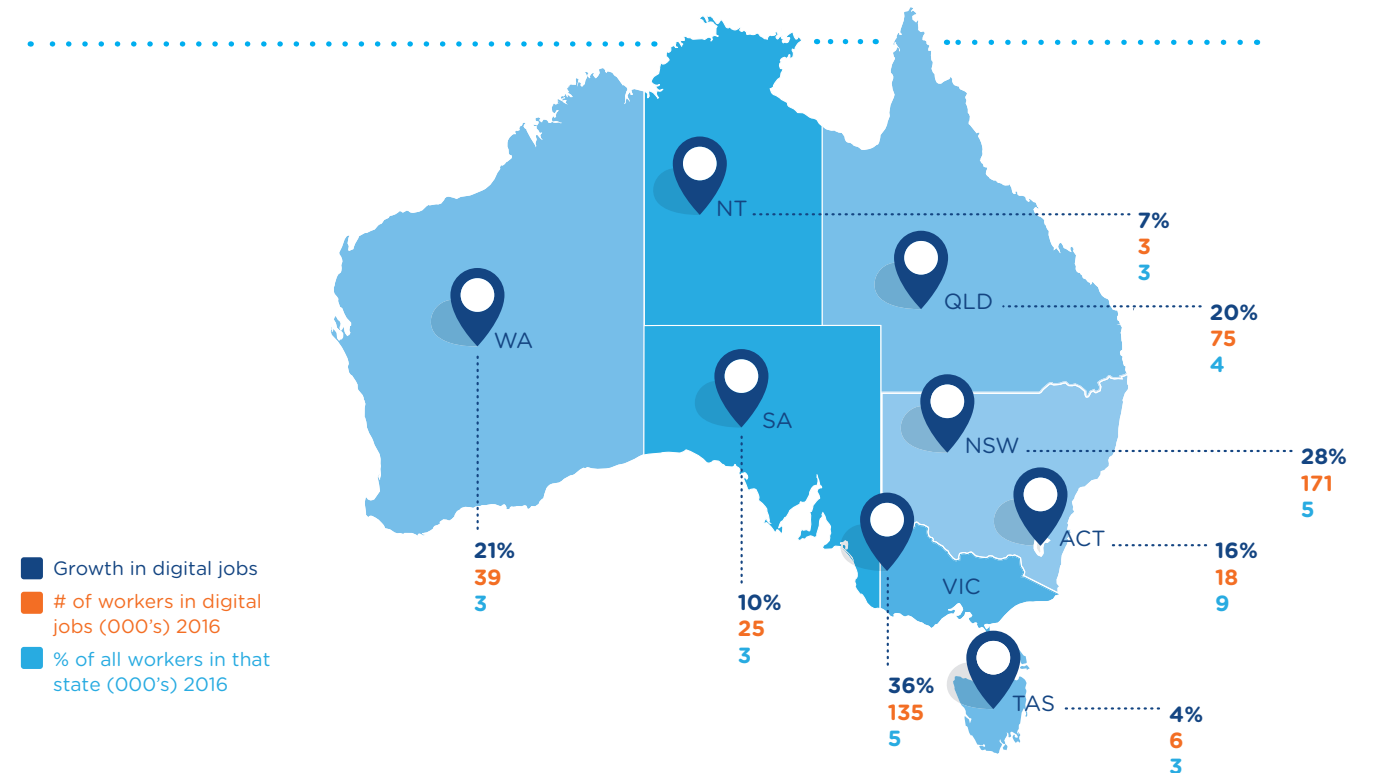Growth in digital economy jobs has been 10 percentage points faster than growth in all jobs

Occupations that are high skill or high touch have grown, while more routine occupations have shed jobs

% growth in # of jobs by occupation — growth in total labour force, 1991-2015

0

87 Community & Personal Services

54 Professionals

6 Managers

Sales

-19 Technicians & Trades   Machinery Operators

-35 Admin

VICTORIA, NSW AND QLD HAVE SEEN THE GREATEST GROWTH IN DIGITAL ECONOMY JOBS

% growth between 2011 and 2016 in digital economy jobs

NT

WA

QLD
7%
3
3

20%
75
4

SA

NSW

ACT

28%
171
5

21%
39
3

10%
25
3

VIC

16%
18
9

TAS

36%
135
5

4%
6
3

Legend:
■ Growth in digital jobs
■ # of workers in digital jobs (000's) 2016
■ % of all workers in that state (000's) 2016

the nbn™

AND ENTREPRENEURS

"

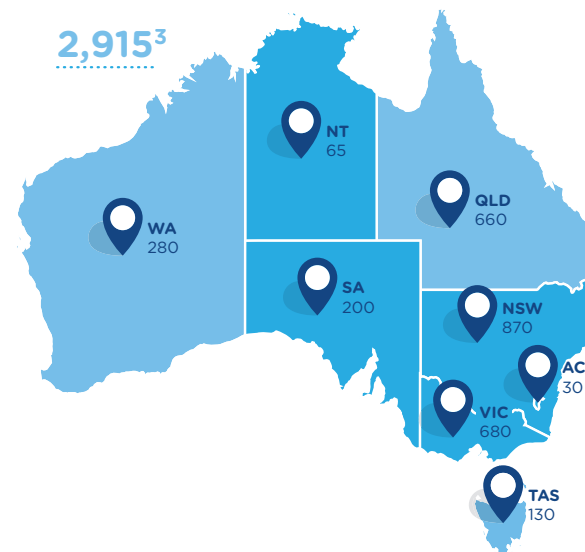**THE NBN™ ACCESS NETWORK CREATED CLOSE TO AN ESTIMATED 3,000 JOBS IN 2017**

AlphaBeta's analysis has shown the **nbn**™ access network is contributing to job creation at a time when the world of work is relying more and more on connectivity.

The **nbn**™ access network created close to an estimated 3,000 jobs in 2017 and is expected to create an additional 31,000 jobs by 2021.

It's also powering a rise in entrepreneurship, driving an additional 3,400-6,400 self-employed Australians in 2017, estimated to drive more than an additional 48,600-92,600 by 2021.

Additional employment estimated to be enabled by nbn™ access network

Number of additional employees delivered in FY17, by state

2,915[3]

NT 65
WA 280
QLD 660
SA 200
NSW 870
ACT 30
VIC 680
TAS 130

Additional employment estimated to be enabled by nbn™ access network

Number of additional employees delivered in FY21, by state

31,000[3]

NT 1,000
WA 3,000
QLD 7,000
SA 2,000
NSW 9,000
ACT 300
VIC 7,000
TAS 1,000

THE NBN™ ACCESS NETWORK CREATED AN ESTIMATED 6,400 ADDITIONAL SELF-EMPLOYED PEOPLE IN 2017, 2,500 OF WHOM WERE WOMEN

Additional self-employed[4] people enabled by the **nbn**™ access network

Self-employed people

Up to 6,400   Up to 92,600
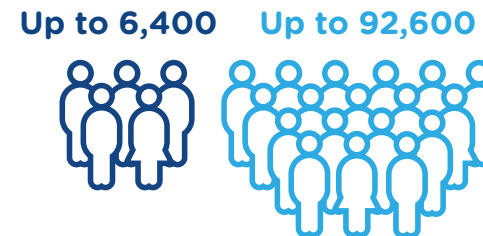
Self-employed women

Up to 3,500   Up to 52,200

● 2012   ● 2021 (estimated)

WHAT WILL EMPLOYERS WANT?

The skills businesses require from employees are changing.

Analysis of key terms used in job advertisements over the three years from 2012 to 2015 showed demand for digital literacy was up 212 per cent, while critical thinking was sought 157 per cent more often.[6]
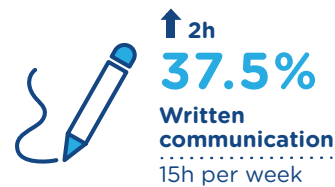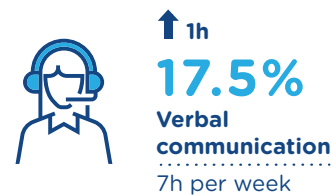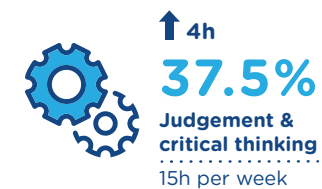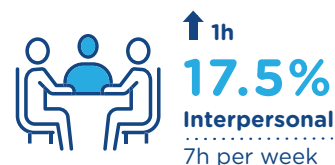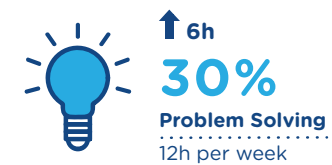
The research also predicts that by 2030, the amount of time we spend using STEM and entrepreneurial skills at work will significantly increase.[7]

THERE WILL BE AN INCREASE IN TIME SPENT ON STEM AND ENTREPRENEURIAL SKILLS IN 2030
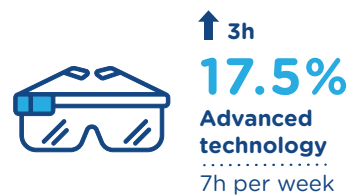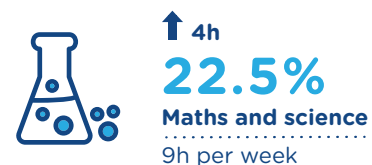
In 2030, Australian workers will use these skills on average:

Percentages represent the proportion of the working week people are estimated to spend using that skill.

Entrepreneurial skills

↑ 6h
30%
Problem Solving
12h per week

↑ 4h
37.5%
Judgement & critical thinking
15h per week

↑ 2h
37.5%
Written communication
15h per week

↑ 1h
17.5%
Interpersonal
7h per week

↑ 1h
17.5%
Verbal communication
7h per week

STEM skills

↑ 4h
22.5%
Maths and science
9h per week

↑ 3h
17.5%
Advanced technology
7h per week

WHAT WILL AUSTRALIA'S DIGITAL WORKFORCE LOOK LIKE?

Analysis of digital literacy in Australia identified that more than 90 per cent of Australia's workforce across both metro and regional areas will be either using, configuring or building digital technology at work by 2030, with digital skills divided into four key categories.

AUSTRALIA'S LABOUR FORCE IS LIKELY TO HAVE HIGH DIGITAL LITERACY NEEDS OVER THE NEXT 10 YEARS

Digital skill level needs, Australia

% of employed persons (2030 estimate)[8], Australia

9%
Digital maker
Builds digital technology

45%
Digital worker
Configures and uses systems

39%
Digital citizen
Uses technology to communicate and to find information

**7%**
Digital novice
No digital skills required

the nbn™
AND EDUCATION

Improving connectivity for Australian students across the country in metro, regional and rural areas is important to help ensure the next generation of Australians are prepared for the workforce of the future, regardless of where they live.
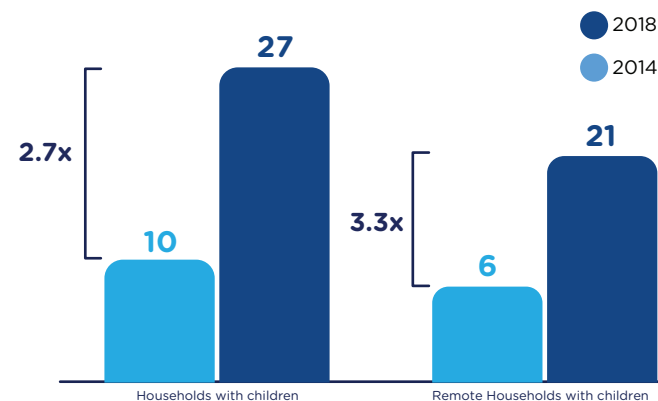

THE NBN™ ACCESS NETWORK IS ALREADY HAVING A POSITIVE IMPACT

### Number and percentage of households by regional location

Outer regional 51,000 (23%)

Remote 8,000 (4%)

220,000

Inner regional 161,000 (73%)
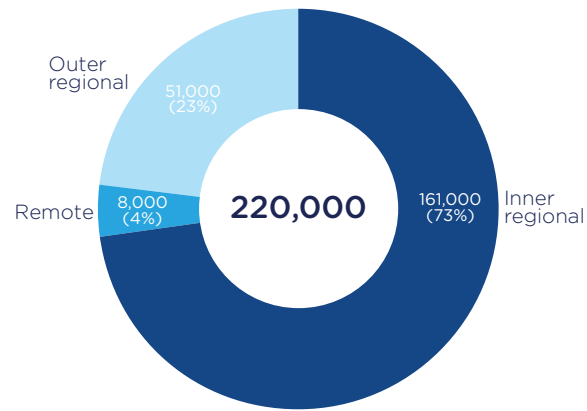
Around 220,000 regional[9] households with children that had below average or no internet[1] in 2014 are now connected to the nbn™ access network.

The nbn™ access network has increased average speeds[2] experienced by 2.7 times for households with children since 2014, with even higher increases for remote[10] households with children (3.3 times faster).

Change in available internet speeds from 2014-2018 mbps

● 2018
● 2014

2.7x
10 → 27
Households with children

3.3x
6 → 21
Remote Households with children
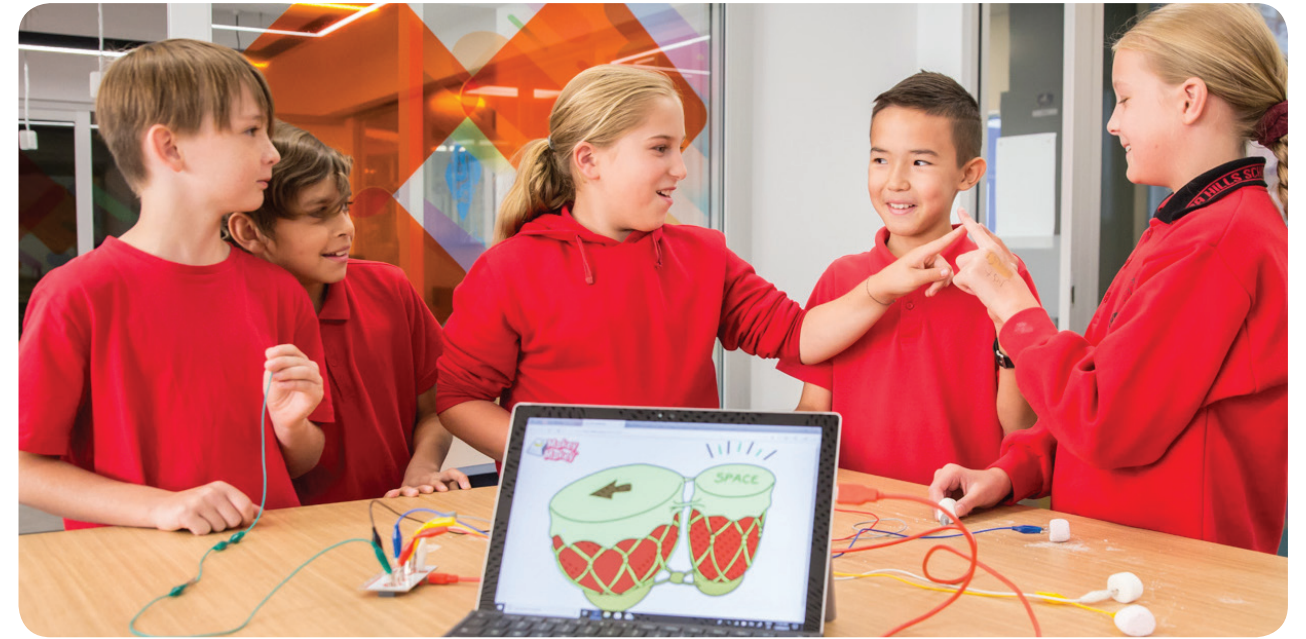
Estimated average hours primary school students spent on homework online per weekday (2016)

15mins
1hr13mins
1hr28mins

Primary school students

● nbn™ connected areas
● Non-nbn™ connected areas
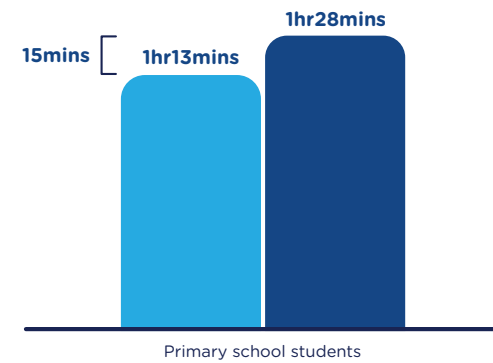
On average, primary school students in nbn™ connected areas spend 15 more minutes per weekday completing homework online compared to students in non-nbn™ connected areas.

Estimated percentage of young Australians (16-24 years) using internet for non-formal learning

1.5x
63
95

Aged 16-24, Regional

● nbn™ connected areas
● Non-nbn™ connected areas
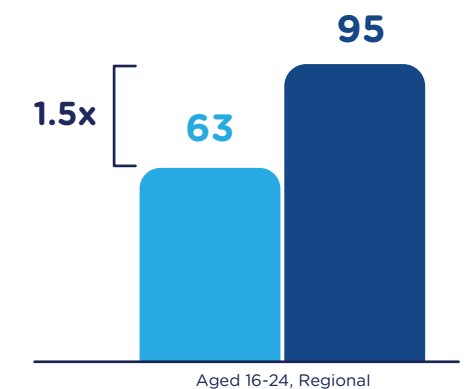
Young Australians in nbn™ connected areas are 1.2 times more likely to use the internet for non-formal learning[11] than young Australians in non-nbn™ connected areas. This is higher for young Australians in regional areas, who are 1.5 times more likely to use the internet for non-formal learning than their non-connected peers.

INNOVATIVE EDUCATION TECHNIQUES

School students are beginning to work with technology in new and different ways to develop skills they will need for the future workforce. New online learning techniques that are helping children to develop STEM and entrepreneurial skills include:

Real-time assessment – real-time analytics are used to proactively guide the learning process and are shown to foster creativity and problem-solving.
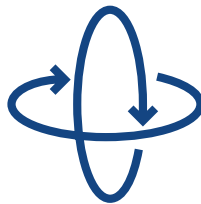
Virtual Learning – helps students connect with subject matter experts and engage in virtual science experiments, and helps improve learning outcomes for complex topics.

Personalised learning – teachers are supported by technology to design and track individual learning plans, helping students to learn at their own pace and improving learning outcomes.

Mobile learning – helps enable learning via a connected device, promoting improved access to education, but also performance and efficiencies.

HIGH SPEED LEARNING IN ACTION

ABCN AND NBN CO HELP STUDENTS DEVELOP STEM SKILLS

The Australian Business Council Network (ABCN), a purpose-led, not-for-profit organisation bringing business and school students together, ran an interactive STEM learning program in collaboration with NBN Co for the second year. The 'STEMpreneur' initiative saw students from eight schools across the country tasked with developing an idea to help brighten their community's or Australia's future by attempting to solve real-world challenges.

The program gave students the chance to learn how to develop a entrepreneurial idea and use technology to bring their idea to life. Students participated in a combination of face-to-face workshops to help inspire their creativity and interactive mentoring sessions online that connect them with business leaders as they refine their ideas.

According to ABCN the program has already had a significant impact. After creativity workshops were held at each of the schools the ABCN found that:

• **96 per cent** of students understood that learning STEM and entrepreneurial skills are vital for their future (compared to just **43 per cent** prior to taking part)

• **86 per cent** of students said they know what an entrepreneur is (compared to **21 per cent** of students prior to taking part)

• **92 per cent** of students said they knew what the 6 D's of design are (compared to **24 per cent** of students prior)

" The NBN Co STEMpreneur program uses a combination of mobile and virtual learning to help engage and inspire students in schools to engage in STEM subjects. The impact of the program and the shift in attitudes to STEM has been outstanding and much-needed. We have been delighted to partner with NBN Co on the program over the past two years.

ALLEGRA SPENDER, ABCN CEO

SKOOLBO HELPS STUDENTS TO PROGRESS AT THEIR OWN PACE THROUGH PERSONALISED LEARNING

Skoolbo is a personalised online learning program for 4-10 year olds that covers multiple subjects including literacy and numeracy.

Skoolbo recognises not all children learn at the same pace. Their algorithm assesses students' understanding and tailors the pace of learning accordingly, helping to keep students better engaged.

When using Skoolbo, 66 per cent of students' early performance in literacy and numeracy challenges were in the low or moderate range[12]; after 20 minutes completing online challenges, there was a 27 percentage point improvement in performance.

" At Skoolbo, we are passionate in our drive to ensure that every child learns to read and becomes confident with numbers. Analysis of data allows us to optimise learning both at an individual and collective level and as more people gain access to fast broadband the possibilities for personalised learning are growing.

SHANE HILL, SKOOLBO CEO

JUNE 2019

This report was published by NBN Co, the company building Australia's broadband access network. The research was performed by economics and data-analytics advisory firm AlphaBeta, which serves clients across Australia and Asia. AlphaBeta worked with a number of data providers, including global market research company Ipsos, to support the analysis. Please visit www.alphabeta.com, for detailed methodology.

^This document is provided for information purposes only and is a summary only of research from AlphaBeta. Any third parties must make and rely on their own inquiries and review of the AlphaBeta report.

*An end user's experience, including the speeds actually achieved over the **nbn**™ access network, depends on the **nbn**™ access network technology and configuration over which services are delivered to their premises, whether they are using the internet during the busy period, and some factors outside of nbn's control (like their equipment quality, software, chosen broadband plan, signal reception, or how their provider designs its network). Speeds may also be impacted by network congestion on the **nbn**™ Fixed Wireless network, including during busy periods. Sky Muster™ satellite end users may also experience latency.

Any third parties must make and rely on their own inquiries and review of the AlphaBeta research. The methodology is available at http://www.alphabeta.com/wp-content/uploads/2018/04/AlphaBeta-Connecting-Australia-Project-Summary-methodology.pdf. For more information about Connecting Australia visitwww.connectingaustralia.com

1   Below average internet refers to ADSL internet ranked as below average as well as dial up and alternative broadband (not fibre to the node/premises, satellite, fixed wireless or other ADSL).
2   Average internet speeds are based on an estimate of households per non-mobile technology per postcode in 2014 and 2018, comprising fibre to the node / premises, satellite, fixed wireless and ADSL.
3   Numbers may not sum to total due to rounding
4   Self-employed defined as the sum of people who identified themselves as Owner Managers of incorporated enterprises, Owner Managers of unincorporated enterprises and contributing family workers. Numbers on graph are rounded to 1 decimal point, and may result in a 0.1 difference in the presentation of the nbn effect.
5   Areas (n=642) without nbn are those SA2s where the nbn hasn't started in 2016 (449 areas); areas with nbn are those SA2s that have a roll-out index that is greater than or equal to 2 (193 areas). The roll-out index is a function of the percentage rolled out in the SA2 and the duration that nbn has been in the area. In this regression, missing observations are dropped, which results in a sample size of 586 areas. All data are weighted by the area's population in 2016. SOURCE: Census (2006, 2011, 2016), nbnco roll-out data, AlphaBeta analysis
6   FYA, The New Basics (2015), Burning Glass (2012-2015) job ads, AlphaBeta analysis
7   FYA, The New Work Smarts (2017), O*NET, ABS, AlphaBeta analysis
8   The spread of digital skills required for each occupation has been obtained from a parallel study for the UK workforce by the UK Digital Taskforce. This spread was then applied to the distribution of employment for Australia at the 4 digit ANZSCO level to determine the spread of digital skills required across the entire Australian workforce. Employment estimates are based on extending the 10 year % growth trend at the 4 digit ANZSCO level from 2006 to 2016. SOURCE: AlphaBeta, Census 2006 and 2016, UK Digital Taskforce (2014)
9   Regional areas are defined as areas that are not classified as "Major Capital Cities of Australia" by the Australian Bureau of Statistics
10 Remote areas include Remote and Very Remote postcodes under the Australian Bureau of Statistics' Remoteness Index
11 OECD defines non-formal learning as learning that lies between formal and informal learning i.e. somewhat organised and can have learning objectives. It includes using the internet to search for information, watch online tutorials, and learn new languages.
12 Low scoring refers to students who score 8 or less correct answers per minute, moderate scores between 9-17, fluent between 18-23 and high scoring are 24 and above.
13 ABS, AlphaBeta analysis
14 Census (2006, 2016), AlphaBeta analysis