ntuc LearningHub

INDUSTRY INSIGHTS 2022

CODING

Behind workplace digitisation and the seamless integration of processes in organisations across industries, are the architects of the digital world such as the dedicated software designers, engineers, coders, testers, system integrators and technicians. These job roles have one thing in common: the fundamental skill of coding. Experts[1,2] agree that basic coding skills are the baseline competency for professionals in the workplace to identify and measure problems and make data-driven decisions. This entails relying on stakeholders such as customers, suppliers, vendors as well as creators of data who collect and analyse the data ranging from customer experience to business operations[3]. In Singapore, demand for tech talent with coding skills continue to rise as the country pushes towards becoming an advanced digital economy[4,5].

While the talent crunch for tech-lite and tech-heavy skilled workers persists, those with Critical Core Skills, in addition to their technical skills, are said to have an edge over their peers. Problem Solving, Communication and Creative Thinking are some of the Critical Core Skills that employers seek in the candidates they hire even when it comes to coding-related job roles. Learning to code has many broad benefits, among them is the ability to give a person a new perspective in problem solving[6].

In this report, NTUC LearningHub (NTUC LHUB) surveyed 200 business leaders across various industries about the importance of acquiring coding knowledge, the challenges they face in hiring the right talent for tech roles as well the acceptance of organisations when it comes to hiring those with industry certification versus a traditional degree. The survey findings reveal some of the coveted tech roles that employers are looking for together with the Critical Core Skills which will give a competitive edge to employees seeking coding-related jobs.

Definitions[7]

Tech-lite roles are job roles that **require basic Information Technology (IT) skills** to facilitate the use of technology solutions to achieve business outcomes.

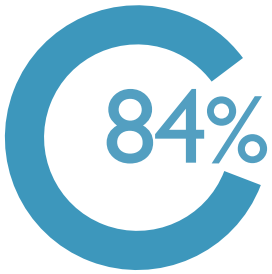
Tech-heavy roles refer to specialised job roles responsible for the development, implementation, scaling and maintenance of more complex technological solutions. These roles **require more advanced IT skills** in technology development and data engineering[8].

Critical Core Skills refer to **soft skills which are transferable** across job roles and industries to help workers develop new skills, think critically and interact with others.

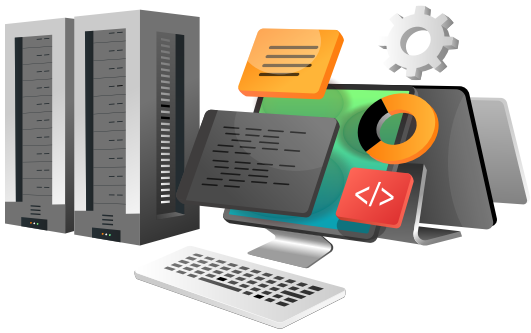
1 **CNBC. 2020.** A new technology skill every worker needs to be more valuable: Former Goldman Sachs CFO. [Accessed 11 April 2022].
2 **SMU. 2022.** SMU launches its first SkillsFuture Work-Study Degree to meet demand for software engineers. [Accessed 11 April 2022].
3 **Harvard Business Review. 2022.** Your Data Initiatives Can't Just Be for Data Scientists. [Accessed 12 April 2022].
4 **SkillsFuture Singapore. 2021.** Skills Demand for the Future Economy. [Accessed 7 April 2022].
5 **The Straits Times. 2021.** Tech talent most in demand as Singapore hiring picks up in 2022: Surveys. [Accessed 7 April 2022].
6 **The Straits Times. 2020.** Google and IMDA to expand free coding classes initiative to benefit more students. [Accessed 11 April 2022].
7 **SkillsFuture Singapore. 2021.** Skills Demand for the Future Economy. [Accessed 7 April 2022].
8 **ITE. 2022.** Speech - Address by Mr Chan Chun Sing, Minister for Education, at Launch of NVIDIA-ITE AI Workforce Readiness Programme on 19 January 2022, at ITE College Central. [Accessed 9 April 2022].

WHY BASIC CODING SKILLS WILL SOON BE UBIQUITOUS

The use of technology dominates our world today. Basic computer literacy is not enough to advance in the working world[9]. A strong majority of business leaders (84%) agree there is an increasing need for employees across various roles and departments to know basic coding.

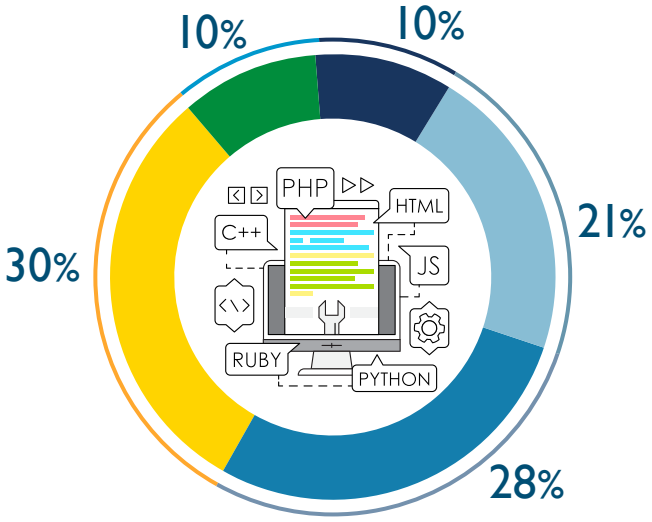


of **business leaders** either **'strongly agree'** or **'somewhat agree'** that there is an increasing **need for employees** across various roles and departments **to have basic coding knowledge.**



At the same time, nearly a third of business leaders share that a large proportion of job roles within their organisation requires some extent of coding knowledge.

To what extent are basic and advanced coding skills required for your organisation across different roles and departments?



- Very large extent (More than 75% of roles)
- Large extent (50% to 70% of roles)
- Moderate extent (25% to 50% of roles)
- Minimal extent (Less than 25% of roles)
- Negligent extent (Close to 0% of roles)

Figures are rounded to the nearest whole number.

Low code refers to a method of software and application development that allows workers to **create functioning business apps with little or no coding expertise[11].**

As companies automate their work processes and become increasingly reliant on technology, employees need to upskill themselves to remain relevant and to boost their employability with coding skills. In fact, the Singapore government remains strong in its support for the local workforce to be equipped with digital skills and encourages a culture of lifelong learning[10].

> *"The future of work doesn't exist in a vacuum. It will emerge from business processes and workflows that already exist; it will offer new solutions to old problems; it will involve new people, newly empowered. If you want to know the future of work, trace it back to its likely origins: automation and low code,"* says Wen-Ming Wong, Vice President and Managing Director, South-East Asia, at UiPath.

9 World Economic Forum. 2022. Why education must take a quantum leap. [Accessed 12 April 2022].
10 GovInsider, 2022. Why cyberskills are the bedrock of Singapore's public sector's services. [Accessed 11 April 2022].
11 Microsoft. N.d. Why low-code development matters right now. [Accessed 11 April 2022].

ACCORDING TO BUSINESS LEADERS, CODING SKILLS WILL…

- Help employees stay relevant in an increasingly digital and automated job market — **62%**
- Enhance the performance of employees (e.g., make data-driven decisions, increase productivity) — **60%**
- Increase the career prospects and growth of employees — **55%**
- Increase the number of jobs in the market (i.e., growth of tech-lite roles) — **53%**
- Lead to an increase in company expenditure on code-driven products and services (e.g., analytics and data-driven software) — **49%**

43% of **business leaders** believe that coding skills can enhance employees' **Creative Thinking and Problem Solving skills.**

"Even if a person is from a Science, Technology, Engineering and Math (STEM) background but is not a developer, they are well positioned to become a developer if they want to – all they have to do is to learn software development, programming skills and pick a language that is popular and progressively build their capability," says Mohammad Isa Nasser, Head of Information and Communication Technology (ICT) at NTUC LHUB.

DEMAND FOR TECH TALENT

The pace of technology is outpacing supply

89% of **business leaders** say that there is a **shortage of talent with the required coding skills** in the workforce to either a **'large extent'** or **'some extent'.**

According to The Straits Times, there are approximately 19,000 vacant roles amid Singapore's rising shortage of tech talent, particularly in tech-heavy roles such as software engineering and development[12].

12 The Straits Times. 2022. Budget debate: Poly, ITE students to get more help to start careers in tech. [Accessed 7 April 2022].

Due to the talent shortage, firms are facing fierce competition as they vie for candidates from a small tech talent pool in Singapore. Fintech services[13] — including digital banking, trading and financial planning portals — is one such industry where talent demand has outpaced supply.

TOP THREE REASONS FOR THE TECH TALENT SHORTAGE ACCORDING TO BUSINESS LEADERS

58%

1

Difficulty in finding talent with requisite skills

49%

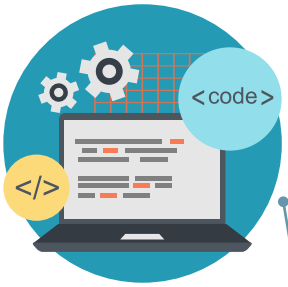
2

New technologies are outpacing supply of workers with the right skills

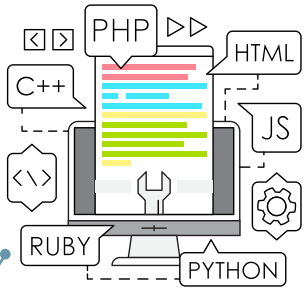
46%

3 Fierce competition among companies in hiring tech talent

Despite the shortage of tech talent, many business leaders are optimistic about the growth of technology-related job roles in the Singapore market, including the expansion of tech-heavy roles within their organisation.



53% of **business leaders** say that the number of **jobs requiring basic coding skills are growing** (i.e., tech-lite jobs).



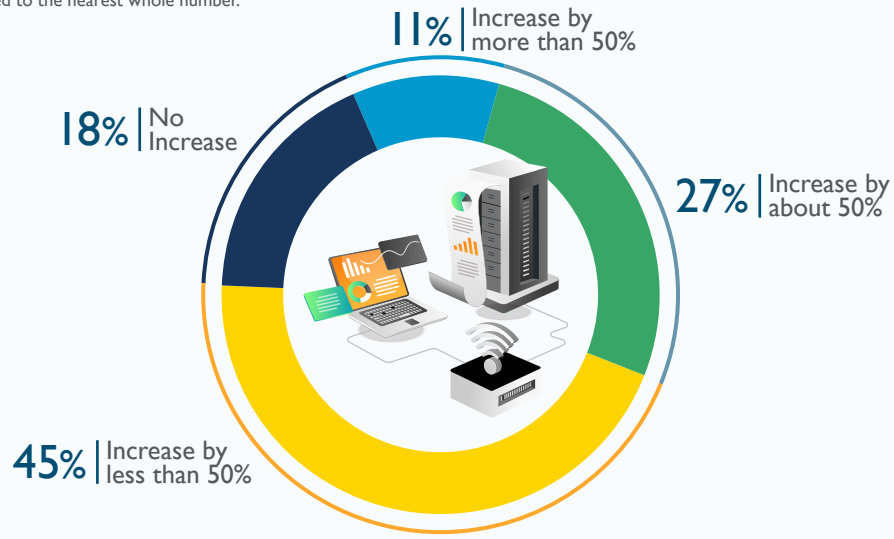
41% of **business leaders** say that the number of **jobs requiring advanced coding skills are growing** (i.e., tech-heavy jobs).

83% of **business leaders** foresee an **increase in tech-heavy roles within their organisation** in the next two years.

13 Channel NewsAsia. 2021. Financial tech workers in demand in Singapore, getting multiple job offers and pay increments. [Accessed 7 April 2022].

Do you foresee an increase in tech-heavy roles within your organisation in the next two years?

Figures are rounded to the nearest whole number.



"Low code platforms are ushering in the future of work, one that's democratic, efficient, and automated. Adoption of low code tools increases business output on all sides, from IT teams and software developers pushing out the latest innovative technology to employees in non-technical roles in need of a productivity boost to support their workloads. It takes the responsibility of developing lower-level applications from IT teams and hands it to employees who are already craving the opportunity to work more with automation," says Wen-Ming.

Business leaders agree that Data Analysis is a job task with the highest proportion of work driven by code, where 60% of Data Analysis requires coding skills.

What percentage of tasks do you think requires coding skills?

EXTENT OF CODING SKILLS REQUIRED IN TASKS

Data Analysis	60%
Statistical Analysis	58%
Financial Modeling / Financial Analysis	55%
Data-Driven Decision-Making	55%
Business Analysis	52%
Data Visualisation & Storytelling	51%
Customer Behavior Analysis	48%
Digital Marketing	48%
Market Research / Market Trend Analysis	48%
Product Management	42%

Statistical Analyst as well as Data Mining and Modelling Specialist are the top tech-lite job roles that require basic coding skills, whereas Technology Development Specialist and Software Engineers are the top tech-heavy job roles which requires advanced coding skills.

TOP FIVE TECH-LITE JOB ROLES REQUIRING BASIC CODING SKILLS

TOP FIVE TECH-HEAVY JOB ROLES REQUIRING ADVANCED CODING SKILLS

As more companies rely on data to understand and analyse problems[14], Isa comments, *"Data Analytics can only be two things, mathematics or programming. Mathematics is understanding what is happening behind the analytics. For you to execute it, it has to be in code because you're running it on your computer. At the end of it, you still have to write a bit of code. Coding is going to become very important for the average worker because we are moving towards a more agile way of work."*

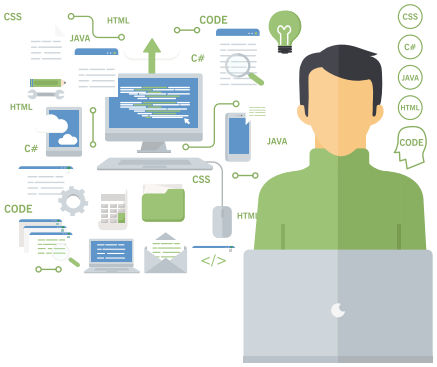
"The adoption of low code trend has accelerated especially in the democratisation process among business users. Low code automation extends the practice of software development to less technically inclined individuals so that they can easily build web applications—complex ones, at that—without IT intervention. With the power to help organisations operate more strategically and maximise their teams' potential, low code automation stands at the forefront of software development," comments Wen-Ming.

14 Harvard Business Review. 2022. Your Data Initiatives Can't Just Be for Data Scientists. [Accessed 12 April 2022].

HIRING SENTIMENTS

Academic qualifications versus skills-based hiring

73% of **business leaders** say that they are **looking to hire tech-lite roles** in the next two years.



74% of **business leaders** say that they are **looking to hire tech-heavy roles** in the next two years.

The different levels of digital demand would require workers with varying levels of tech skills in specific sectors and industries. Business leaders are looking to hire a mix of tech-lite and tech-heavy roles where the percentages of business leaders looking to hire both roles are equal in the next two years.

TOP TECH-LITE JOB ROLES COVETED BY BUSINESS LEADERS

Business Analyst	Statistical Analyst	Data Mining & Modelling Specialist
23%	22%	21%

TOP TECH-HEAVY JOB ROLES COVETED BY BUSINESS LEADERS

Artificial Intelligence (AI) Engineer	Data Engineer	Data Scientist / Analyst
25%	23%	23%

Although half of business leaders (51%) believe that a traditional education degree is either 'very important' or 'important' when hiring candidates with coding skills, a strong majority of business leaders are also open to those who have undergone training and attained certifications that attest to their coding abilities. The Singapore Government's SGUnited Mid-Career Pathways Programme, for example, supports full-time attachment programmes which encourage workers to reskill while gaining hands-on experience[15].

67%

of **business leaders** are either **'very open' or 'open'** to hiring candidates who **may not have the relevant education degree** but have **undergone skills training in coding.**

65%

of **business leaders** are either **'very open' or 'open'** to hiring candidates who **lack relevant job experience** but have **undergone skills training in coding.**

> *"With massive changes to the global economy, organisations now need to look beyond academic qualifications and adopt a skills-based approach when hiring and developing talent. Recruitment is more objective when candidates are assessed by their hard skills proficiency and soft skills prowess. For a fast-evolving workforce and job market, a skills-focused approach can be a viable solution and an essential ingredient for success,"* says Wen-Ming.

> Isa adds, *"We have so many programmes that help individuals close that skills gap and be able to develop requisite skills. Now companies are able to hire and offer them on-the-job training as well. These companies will reap the benefits because they will have a pipeline of talent development."*

According to business leaders, Python is the top programming language that would be an advantage for roles which requires some level of coding skills.

TOP FIVE PROGRAMMING LANGUAGES

Python	**72%**
JavaScript	**52%**
SQL	**48%**
Java	**46%**
C++	**35%**

> *"Python is useful not only for developer types of job, but also for any kind of job. If you're able to use Python, you can leverage upon it to analyse data. You can expand upon existing software like Power BI, for example, it's a business intelligence tool that can use Python to deepen its capability,"* says Isa.

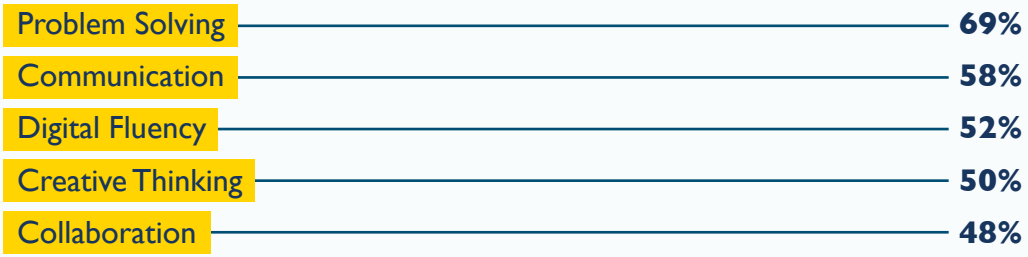
15 WSG Workforce Singapore. 2022. SGUnited Mid-Career Pathways Programme for Mid-Career Individuals. [Accessed 12 April 2022].

The survey found that Data Analysis is the top technology skill required for job roles where there is a need to report and analyse data in order to derive business insights to make informed decisions. This was followed by Project Management, where certain level of technology skills are involved in the planning, scheduling, and management of projects.

TOP FIVE TECHNOLOGY SKILLS

The top Critical Core Skills that business leaders look for are Problem Solving, Communication and Digital Fluency. The increase in new technology and innovation at the workplace requires Effective Communication and Problem Solving skills. Having skills in these areas would boost one's employability as employers perceive them as complementary to the technical skills of an effective coder.

TOP CRITICAL CORE SKILLS



> *"The way you solve problems in code is by writing specific stack steps in code and then code when you write programs. It is very unforgiving. Use any of it inaccurately, you can ruin the code. When you learn how to code, you learn how to think clearly as well at the end, differently,"* says Isa.

With the growing emphasis on the digitalisation of business processes to enhance workflow efficacy, companies have been increasingly adopting technology which involves basic to advanced coding skills. It has been reported that out of the 19,000 tech job vacancies in Singapore, many require coding expertise such as software engineering and development[16]. However, we have uncovered that the demand for coding talent is fast outpacing the supply.

Due to this talent crunch, employers are willing to hire inexperienced candidates who have undergone skills training, rather than fixating on formal education or other academic qualifications. Hence, while individuals with the right skills and know-how have a competitive edge over their peers, this certainly levels the playing field for career switchers who are new to the world of coding. On the other hand, to plug skills gaps, employers should consider continuous training for their current workforce as an investment, particularly in tech-lite coding skills, which are easier to master even for beginners in technology.

All in all, opportunities abound especially for those who upskill themselves in the in-demand coding languages. It is key that individuals continuously stay abreast of industry trends to understand the highly sought-after competencies of a coder and upgrade their skill sets accordingly, in order to future proof their careers.

16 The Straits Times. 2022. Budget debate: Poly, ITE students to get more help to start careers in tech. [Accessed 7 April 2022].

LEVEL UP YOUR CAREER IN CODING WITH ADVICE FROM PRACTITIONERS

Cindy Li Xin,
Associate Trainer at
NTUC LHUB

FOR BEGINNER CODERS

GETTING YOURSELF STARTED WITH CODING

Aspiring coders should recognise that there are many facets of coding – ranging from interface and software development, data management to even logic design. Individuals without prior coding experience should **experiment with the different applications of coding** to help them figure out whether they have the passion and determination to dive into this sector.

I encourage my trainees to **embark on their coding journey by learning Python** due to its ease of use and versatile nature. I would suggest beginners **start off with online courses to learn the fundamentals** and syntaxes of a particular coding language. Instructor-led courses can subsequently overcome the initial challenge of formidable topics, where trainers can guide learners, thereby cultivating their interest in this field.

I strongly believes that **anyone can learn coding**. However, **passion will be the ultimate factor of consideration when moving into this line of work**. Regardless of whether an individual has formal education in IT-related fields, they will need to enjoy the process of coding to thrive in the long run.

> *"If you are at a crossroads in your career, consider taking the time and effort to reflect and dabble with various arms in the tech space. By doing so, you can cultivate your interest to pursue a career further."*

Chandra Sekhar,
Associate Trainer at
NTUC LHUB

FOR EXPERIENCED CODERS

CODING YOUR WAY TO THE TOP

In terms of career trajectory, Chandra shares that there are several pathways coders can embark on for successful and meaningful careers. The first is the **technical route where coders can progress to become designers and later architects**. The second is the **people route where coders assume the roles of team leaders** and get into people management. The third is the **entrepreneurial route, where coders form start-ups to manifest their ideas, and create their own products** to achieve their vision.

No matter the chosen career path, I believe that it is important to **gain an in-depth understanding of the job requirements, identify the skills gap and map out the learning and career milestones** accordingly. Once coders have the 'what to build' in place, they can then proceed to acquire the 'how to'. This is what will propel coders to success.

> *"Coders today should advocate the best coding practices, grasp the bigger picture and gain a thorough understanding of the requirements. This way, coders will create applications that last; something companies are looking for and what only the best coders achieve."*

LEVEL UP YOUR CAREER IN CODING WITH ADVICE FROM PRACTITIONERS

Maya Novelita,
Associate Trainer at
NTUC LHUB

FOR ALL CODERS

SUPPLEMENT YOUR CODING SKILLS TO SET YOURSELF APART

Due to the ebb and flow of the tech industry, it would take more than simply coding skills to become successful. Besides having the practical knowledge of coding, it has become **increasingly salient for coders to equip themselves with Critical Core Skills** like Problem Solving, Collaboration and Communication.

Problem Solving remains the topmost competency that will give aspiring or existing coders an edge in their career. My love for coding was born out of the satisfaction that comes with successfully delivering a code according to business needs. When technical bugs arise during development, **Problem Solving skills enables coders to explore the most optimal solutions**. In the process of resolving these bugs, coders can also gain new knowledge which can make them a better coder.

I believe that Collaboration skills is also a close second, as most projects require coders to collaborate and work together to develop functioning business software and applications. At the same time, coders need to be mindful when interacting with their business counterparts who may not be familiar with the terminologies. **By building one's Communication skills, a coder can achieve more efficient outcomes within and outside of their immediate teams**.

> *"Coders need to pick up transferrable skills to supplement their technical competency to distinguish themselves from others in the field."*

UPSKILLING TOWARDS TECH-LITE AND TECH-HEAVY ROLES

Stevanus Satria, 29,
Product Manager

UPSKILLING TO EXPAND HIS PORTFOLIO AND EARNING POTENTIAL

Stevanus had already built up an impressive portfolio of tech skills before he turned 30 years old. Still, it was not enough for his ambitions. To command a higher salary and fuel his keen interest in product development, he signed up for the 'Project Management' and 'Agile Product Ownership' courses at NTUC LHUB.

He enjoyed the challenges of writing clean and scalable code as a software developer. However, what interests him more is the decision-making process in implementing and rolling out features to users. Coming from a design background, he firmly believes that understanding users' needs is the key to a successful product. Solving users' problems with the simplest possible solution brought great satisfaction to him. He soon realised that his passion was more in line with the responsibilities of a Product Manager, which requires extensive knowledge of business, technology, and design.

Currently, Stevanus is in a tech-lite role where his job requires him to write simple code in JavaScript to automate user-acceptance testing. It requires him to have a strong foundation in coding and software development. He has also signed up for courses such as UI/UX foundation and DevOps, which were strongly influenced by his new job role. Stevanus' strategy to reskill himself with additional IT knowledge has proven to be a strategic move; increasing his earning power and making his career profile stand out among others as employers are looking for those with cross-platform skills.

> *"Tinker with the skills picked up from your training and find your calling by experimenting with different focus areas such as automation and data."*

Andrew Tan, 55,
Java Developer

A PASSION FOR PROGRAMMING AND IMPROVING WORK-LIFE BALANCE

The stress from having to hit sales targets and the travelling meant Andrew was constantly away from his family for a good part of his career as a Regional Corporate Manager. In 2020, Andrew decided to quit his job and take time off, allowing him to evaluate his skillsets and passions. He then decided to return to the IT industry and, more specifically, to his first love, programming. However, he only knew C-programming and needed to update his knowledge and knowhow. Hence, he signed up for the 'Java Developer, SGUnited Skills programme' at NTUC LHUB.

Andrew persevered through the course even though he found it challenging initially. Fortunately, his trainers were friendly and helpful, and the course was well-paced.

After nine months of training with NTUC LHUB, he joined an IT consulting and recruiting firm as a Java Developer. In his new tech-heavy role, Andrew helped to develop the in-house Java application and a grades-tracking software for trainees with other colleagues. He also contributed as a mentor, coaching new trainees to learn Java with their online training programmes. The new path has afforded him the work-life balance he needed to spend more time with his family.

At his age, most would not have taken the risk of switching industries. However, Andrew's desire to upskill himself has been a rewarding journey, and age is not a barrier when the desire to acquire new knowledge is strong.

> *"Although learning can take time and effort, in the end it will always be worth it."*

To find out more about how you or your company can tap on training schemes and grants to upskill in Coding, contact NTUC LearningHub here.

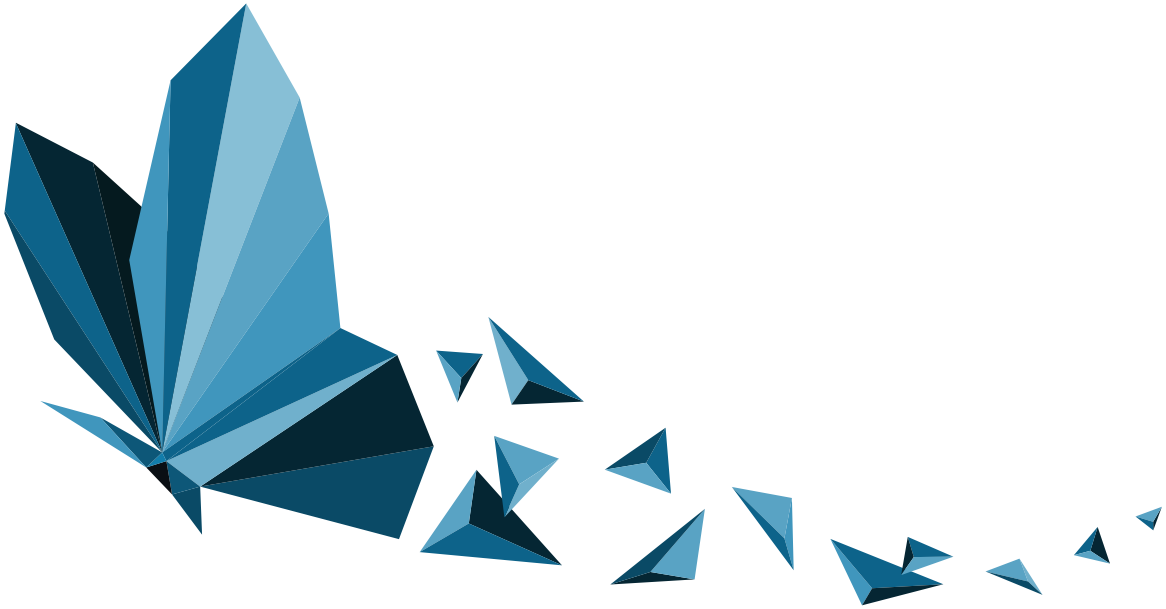
Survey Background

RESEARCH METHODOLOGY

NTUC LearningHub ran an online poll with 200 business leaders to uncover the importance of acquiring coding knowledge, the demand for tech-lite and tech-heavy roles as well as the priority skills required of employees.

RESPONDENT PROFILE

The survey gathered a total of 200 respondents who are business leaders or team managers who make hiring decisions. Of this, 88% respondents report that they have some knowledge of the coding needs of their organisation. The respondents consists of 60% male and 40% female: 16 to 24 (5%), 25 to 34 (26%), 35 to 44 (35%), 45 to 54 (23%), 55 and above (11%). The respondents came from various industries including Financial Services (12%), Infocomm Technology (12%) and others (11%).



ABOUT NTUC LEARNINGHUB

NTUC LearningHub is the leading Continuing Education and Training provider in Singapore which aims to transform the lifelong employability of working people. Since our corporatisation in 2004, we have been working with employers and individual learners to provide learning solutions in areas such as Cloud, Infocomm Technology, Healthcare, Employability & Literacy, Business Excellence, Workplace Safety & Health, Security, Human Resources and Foreign Worker Training.

To date, **NTUC LearningHub** has helped over 26,000 organisations and achieved close to 2.6 million training places across more than 2,900 courses with a pool of about 900 certified trainers. As a Total Learning Solutions provider to organisations, we also forge partnerships to offer a wide range of relevant end-to-end training. Besides in-person training, we also offer instructor-led virtual live classes (VLCs) and asynchronous online learning. The **NTUC LearningHub Learning eXperience Platform (LXP)** — a one-stop online learning mobile application — offers timely, bite-sized and quality content for learners to upskill anytime and anywhere. Beyond learning, LXP also serves as a platform for jobs and skills development for both workers and companies.

For more information, visit www.ntuclearninghub.com.