



## International benchmarking and insights: bringing world-class skills to the UK





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Dr Neil Bentley-Gockman OBE CEO, WorldSkills UK

This report explains how international benchmarking works, sets out the key learnings we witnessed in priority skills areas, provides details on how educators can tap into WorldSkills UK's programmes to embed these insights, and the next steps needed to make sure we are capturing new global insights over the coming year

#### **CEO** Foreword

First-rate and up-to-date skills are now mission-critical to UK prosperity and our ability to seize the economic and social prizes on offer over the next decade. To win the race to net zero, attract inward investment to every region, and further firms' abilities to adopt new technologies, the UK needs a skills system firing on all cylinders and reaching world-class standards in delivery.

As the international arm of the UK skills system and a member of the WorldSkills global movement, WorldSkills UK is uniquely positioned to benchmark UK skills against global standards and diffuse innovative methods of training into classrooms and workshops nationwide.

Team UK's tenth place finish at last year's 'skills olympics', the WorldSkills Special Edition 2022, was vital in putting UK skills on the world map and our fourth position in digital skills reflects the investment that WorldSkills UK has put into skills that our diagnostic research shows are vital for the UK economy.

But there is no room for complacency: several other advanced economies including France, Japan, Korea and Switzerland outperformed the UK in many areas and with technological development and the needs of industry changing at a fast pace, we must learn as much as we can from these international events to make UK skills as competitive as they can be.

Compiled from insights gathered by our amazing network of skills experts during the international skills competitions, this report explains how international benchmarking works, sets out the key learnings we witnessed in priority skills areas (digital, manufacturing and engineering and life sciences), provides details on how educators can tap into WorldSkills UK's programmes to embed these insights and the next steps needed to make sure we are capturing new global insights over the coming year.

The insights we've uncovered from how other countries operate are relevant in three key ways. Firstly, in how we run our skills systems throughout the UK, such as the extent to which employers, further education and higher education can all work together to provide skills development. Secondly, in how we teach skills to young people eg the extent to which we focus on practical exercises over theory. Thirdly, in the technical changes that are occurring across skill areas such as the need for cloud computing skills across manufacturing. Whether you are an educator, employer or policy-maker I am sure you will find this report interesting and useful and everyone at WorldSkills UK looks forward to working with you to make sure our global insights can help young people, employers and the economy develop and succeed.

**Dr Neil Bentley-Gockmann OBE** CEO WorldSkills UK





#### Introduction

WorldSkills UK is an independent charity and a partnership between employers, education and governments. Together, we are raising standards and participation in apprenticeships and technical education so young people, businesses and the UK economy can succeed.

As a member of an 85 nation network, WorldSkills UK is able to witness how other countries are raising the bar in the delivery of technical skills as a route to growth. By benchmarking UK skills against global industry standards via biennial competitions with the rest of the world, we are uniquely positioned to identify innovative methods of training and assessment and mainstream international best practice into classrooms and workshops nationwide.

This report contains our cutting-edge insights on worldleading skills development techniques. By learning from and embedding these insights, educators, employers and governments have an opportunity to boost local economies with world-class skills, helping to propel productivity, pay, jobs and living standards across the UK. The report also reveals how WorldSkills UK is supporting these objectives by championing future skills, raising standards in technical education and apprenticeships, and empowering young people toward high-quality future careers.

The key areas covered by this report include:

#### 1. Benchmarking UK skills against international standards can support economic success

- World-class skills can help reboot the UK economy
- International benchmarking is integral to raising standards in UK skills
- WorldSkills Special Edition 2022 was a vital opportunity to identify international best practice

## 2. The UK can strengthen the competitiveness of its skills base in sectors key to growth

- Digital skills
- Skills for manufacturing and engineering
- Skills for the life sciences sector

## 3. WorldSkills UK insights can inform excellence in skills policy and practice

- Global insights: key takeaways
- Opportunities to engage in WorldSkills UK programmes
- WorldSkills UK's actions to stay on top of international skills developments



## Benchmarking UK skills against international standards can support economic success

# World-class skills can help reboot the UK economy

Teaching technical skills to internationally competitive standards is vital to the UK's economic success. To harness the benefits of the fourth industrial revolution, help solve the longstanding productivity puzzle, and create the jobs and industries that can accelerate progress to a net-zero future, the UK needs a world-class skills economy<sup>1</sup>, founded on excellence in technical and vocational education and training.

<sup>1</sup> Exploring the skills economy (2022), WorldSkills UK





Developing a world-class skills economy would complement our world-leading knowledge economy, underpinned by universities and research institutions which have been jewels in the UK's economic crown in recent decades. As the Chancellor of the Exchequer said in his 2022 Autumn Statement; "I want to know the answer to one simple question: will every young person leave the education system with the skills they would get in Japan, Germany or Switzerland?"<sup>2</sup> The findings of this report help to answer that question and identify ways in which the UK's skills can become more competitive compared with other leading nations.

The importance of skills to economic prosperity is now explicit in the policy approaches of all four UK governments. The publication of the Skills for Jobs White Paper and passage of the Skills and Post-16 Education Act show HM Government's intent on "putting employers at the heart of post-16 skills"<sup>3</sup> and "improving our productivity and international competitiveness"<sup>4</sup>. The Scottish Government is targeting "increased [...] agility and employer responsiveness"<sup>5</sup> in skills reforms aimed at supporting Scotland's economic competitiveness in the years ahead. Meanwhile the Welsh Government has embarked on far-reaching post-16 education reform via the Tertiary Education and Research Bill and has talked up the importance of skills in responding to "the pandemic, Brexit, climate change, technological transformation, [and] demographic trends"<sup>6</sup>. In Northern Ireland, the last executive pledged to transform the skills system to deliver "an economy that is 10x stronger, 10x more prosperous, [and] 10x more resilient"<sup>7</sup>.

By benchmarking the UK's skills against global industry standards, WorldSkills UK can reveal how other economies are using high-quality technical skills to drive productivity and growth. By structurally linking employers and training providers to keep provision in lockstep with industry requirements and technological change<sup>8</sup>, these countries are becoming more competitive for foreign direct investment<sup>9</sup> and better able to create high-value, high-wage jobs.

- https://www.gov.uk/government/speeches/the-autumn-statement-2022-speech
  Skills for jobs: Lifelong learning for opportunity and growth (2021), Department for Education, p5.
- 4 Ibid, p.3.
- 5 Future Skills: Action Plan (2021), Scottish Government
- 6 https://www.gov.wales/vision-further-education
- 7 Skills for a 10x economy: Skills Strategy for Northern Ireland (2021), Department for Economy NI
- 8 Drivers of technical excellence in the skills economy (2021), WorldSkills UK
- 9 Promoting technical skills to win foreign investment (2022), OCO Global/WorldSkills UK

International occupational standards are now moving faster than ever before, with technological transformations fundamentally altering the knowledge and skills employers require



The 'WorldSkills UK Way' combines technical skills training, mindset training, and pressure testing into a framework for young people's continuous improvement

# International benchmarking is integral to raising standards in UK skills

With no global league table for vocational education, WorldSkills' international skills competitions provide a valuable mechanism for benchmarking the quality of skills being developed in the UK and around the world. Every two years, over 65 member countries prepare teams of young people to compete in the 'skills olympics' and competitors are tested against international occupational standards.

WorldSkills Occupational Standards are consulted on and updated with businesses biennially, leveraging the input of cutting-edge firms to remain in line with the needs of international markets and industries. These provide the baseline from which to reward young people's performance at international level and provide a benchmark for national standards in technical and vocational education and training.

International occupational standards are now moving faster than ever before, with technological transformations fundamentally altering the knowledge and skills employers require, creating an even bigger gap between the standards required for qualifications across the UK and international best practice.

WorldSkills UK's training manager for mechatronics explained that he was only expected to have half the knowledge that Team UK mechatronics competitors needed in 2022 when he competed for the UK in the same discipline less than ten years ago.

This only emphasises the need for countries to benchmark national standards against WorldSkills' international competition standards as a way to align domestic skills supply with the direction of global demand, and prevent the gap between the two widening further.

Preparing young people for international skills competitions is a rigorous process. WorldSkills UK's training methodology, known as the 'WorldSkills UK Way' combines technical skills training, mindset training, and pressure testing into a framework for young people's continuous improvement. This seeks to build upon what is taught at colleges and training centres across the UK and bridge the gap between national and international standards. By encouraging a focus on technical excellence and using applied principles of performance psychology, our training methodology stretches students and apprentices to develop higher quality skills and fulfil their potential on the world stage.

The process of international benchmarking, and preparing young people for international competitions, plays a critical role in helping national skills systems raise standards. Firstly, international benchmarking allows countries to identify what excellence looks like in skills vital to economic performance. Secondly, training for competitions provides a vital 'third space'<sup>10</sup> for teachers and students to experiment with innovative pedagogical approaches outside education or employment settings. This can enable an agile response to emerging skills needs, technological changes, and shifting industrial practices. By both fostering and showcasing cutting-edge standards, WorldSkills members can harness international benchmarking to embed excellence in technical education and apprenticeships, and champion the world-class skills young people and employers need to thrive in the global economy.

# WorldSkills Special Edition 2022 was a vital opportunity to identify international best practice

Last year's skills olympics, the 46th of its kind, was like no other before. Following the one-year postponement and eventual cancellation of WorldSkills Shanghai owing to Covid-19, WorldSkills 2022 Special Edition brought over 1,000 competitors to 15 countries, in 62 skill competitions over a 12 week period. WorldSkills Special Edition was truly international and featured the world's best skills – from first-rate digital skills in Korea, to cuttingedge life science skills in Salzburg. The change to a multi-nation

model demanded resilience and steadfastness
 from all involved, including the young people competing – who deserve enormous credit for making the event such a success.
 None more so than the members of Team UK who secured a 10th place finish in the medal table, with two golds, three bronze and twelve medallions of excellence\*. This improves on

the UK's 12th place finish at WorldSkills Kazan 2019. We also achieved a best ever 4th place finish in digital skills, ahead of countries like Germany and Singapore in future skill areas like Cyber Security and Web Technologies.

This matters because performing well at WorldSkills gives the UK an opportunity to show that it takes technical skills seriously and can help attract global firms looking to invest on the basis of talent. It is also vital for our skills systems so that we know what global

excellence in skills looks like and how to teach at that level, so that we can mainstream those skills throughout the UK's skills systems through programmes like WorldSkills UK's Centre of Excellence.

\*Medallions of excellence certify young people's attainment of world-class standards enshrined in WorldSkills International Occupational Standards

10 Drivers of technical excellence in the skills economy (2021), WorldSkills UK, p.22.

WorldSkills 2022 Special Edition brought over 1,000 competitors to 15 countries, in 62 skill competitions over a 12 week period



| Position | Member               | Total<br>Medal<br>Points | Number<br>of Teams /<br>Competitors | Gold | Silver | Bronze | Medallion<br>of<br>Excellence |
|----------|----------------------|--------------------------|-------------------------------------|------|--------|--------|-------------------------------|
| 1        | China                | 106.00                   | 34                                  | 21   | 3      | 4      | 5                             |
| 2        | Korea                | 102.00                   | 46                                  | 11   | 8      | 9      | 16                            |
| 3        | Chinese Taipei       | 92.00                    | 50                                  | 6    | 13     | 6      | 17                            |
| 4        | Japan                | 73.00                    | 51                                  | 8    | 5      | 5      | 16                            |
| 5        | France               | 69.00                    | 50                                  | 6    | 3      | 7      | 22                            |
| 6        | Switzerland          | 65.00                    | 34                                  | 5    | 5      | 9      | 12                            |
| 7        | Austria              | 54.00                    | 38                                  | 5    | 2      | 4      | 20                            |
| 8        | Germany              | 40.00                    | 31                                  | 3    | 5      | 2      | 9                             |
| 9        | Singapore            | 38.00                    | 26                                  | 3    | 3      | 2      | 13                            |
| 10       | United Kingdom       | 26.00                    | 29                                  | 2    | 0      | 3      | 12                            |
| 11       | India                | 25.00                    | 50                                  | 0    | 2      | 3      | 13                            |
| 12       | Hungary              | 20.00                    | 23                                  | 0    | 2      | 1      | 12                            |
| 13       | Portugal             | 18.00                    | 12                                  | 2    | 2      | 0      | 4                             |
| 14       | Hong Kong, China     | 16.00                    | 26                                  | 1    | 0      | 0      | 12                            |
| 14       | South Tyrol, Italy   | 16.00                    | 10                                  | 1    | 2      | 1      | 4                             |
| 16       | United Arab Emirates | 13.00                    | 15                                  | 1    | 0      | 0      | 9                             |
| 17       | Canada               | 12.00                    | 26                                  | 1    | 0      | 2      | 4                             |
| 18       | Iran                 | 11.00                    | 13                                  | 1    | 0      | 1      | 5                             |
| 19       | Thailand             | 9.00                     | 11                                  | 0    | 1      | 0      | 6                             |
| 20       | Australia            | 6.00                     | 15                                  | 0    | 0      | 0      | 6                             |

#### Member Results Comparison by Total Medal Points WorldSkills 2022 Special Edition

Team UK secured a 10th place finish in the medal table, with two golds, three bronze and twelve medallions of excellence The global standings from 2022 show that the UK still has room to improve and is being outpaced by countries like Japan, Korea, Germany and Singapore, who are adept at linking skills success to economic strategy. So while we are incredibly proud of Team UK's performance last year it is vital that we use the learnings in this report to embed excellence and raise standards in technical education and apprenticeships for the next generation.

For the first time in 2022, WorldSkills UK established a robust process to gather insights on education and training methods being pioneered globally alongside the competition to improve policy and practice in technical skills development across the UK.

These insights have been gathered by our elite team of skills experts or Training Managers (TMs) who have extensive experience benchmarking UK skills against international occupational standards and training successive Team UK members for international competitions. TMs play a key role in 'bridging the divide'<sup>11</sup> between international best practice and domestic delivery of technical education and apprenticeships – both by training Team UK to world-class standards, but also in witnessing how other countries are innovating to raise the bar in their skills systems and competition preparation. Our TMs also help reflect emerging innovations in teaching, assessment, and learning right across the UK, helping young people move from competence to excellence<sup>12</sup> in their technical skills.

For this report, we have focused on gathering insights for skills where world-class standards are key to the UK's economic performance. These include digital, manufacturing and engineering, and life sciences, cross-cutting sectors prioritised by HM Government for holding high-growth potential<sup>13</sup>. As found by research commissioned by WorldSkills UK, these are also industries where developing world-class skills can increase the UK's ability to compete for foreign direct investment (FDI)<sup>14</sup>, and reach net zero<sup>15</sup>, and ensure young people can thrive in the labour market of the future<sup>16</sup>.

The learnings from participating in skill areas not explicitly mentioned in this report are also vital in developing high standards in our national competition programme and helping us understand what it takes to demonstrate excellence. These insights inform our national benchmarking programmes and continuing professional development content for educators, all of which helps us raise standards in technical education for thousands of young people every year.



- 12 Good people in a flawed system: The challenges of mainstreaming excellence in technical education (2020), WorldSkills UK/SKOPE/University of Oxford (S. Relly)
- 13 https://www.gov.uk/government/news/industry-experts-appointed-to-accelerate-
- development-of-future-tech-as-chancellor-sets-out-vision-for-21st-century-silicon-valleys 14 Wanted: Skills for inward investors (2022), Skills Taskforce for Global Britain (J. Buscombe)
- 15 Skills for net zero economy (2022), Learning & Work Institute/WorldSkills UK
- 16 Disconnected: Exploring the digital skills gap (2021), Learning & Work Institute/WorldSkills UK



# The UK can strengthen the competitiveness of its skills base in sectors key to growth

WorldSkills UK has been investing in world-class digital skills development

#### **Digital skills**

Digital skills are vital for the UK economy. The UK's core digital technology sector accounts for 6.3% of the total UK workforce<sup>17</sup> and diagnostic research commissioned by WorldSkills UK revealed that three in four firms citing a lack of digital skills were struggling to grow their business as a result<sup>18</sup>. There have been more digital FDI projects in the UK than in any other sector since 2013, with 40% of global investors identifying digital technology as the key driver of UK growth last year<sup>19</sup>. The Skills Taskforce for Global Britain accordingly concluded that deploying technical skills to capture greater investment from the globally mobile digital sector will be imperative "if the UK is going to 'go for growth"<sup>20</sup>.

For all these reasons WorldSkills UK has been investing in world-class digital skills development and this was reflected in Team UK's fourth place finish across digital skills competitions, including cyber security, web technology, 3D game art and digital construction.

<sup>17</sup> State of the Tech Workforce UK (2022), CompTIA, p.5.

<sup>18</sup> Ibid.

<sup>19</sup> EY 2022 UK Attractiveness Survey

<sup>20</sup> Wanted: Skills for inward investors (2022), Skills Taskforce for Global Britain (J. Buscombe)

Korea has a strong focus on helping educators remain cognisant of industry needs and trends



#### **Cyber Security**

Cyber Security is a global market valued at \$200bn in 2022 and anticipated to be worth \$900bn in 2032<sup>21</sup>. The UK achieved fourth place and a medallion of excellence in this discipline at Special Edition, demonstrating excellence in firewall installation and the use of data encryption software. In addition to monitoring and investigating security violations, the competition also tested young people's ability to design and execute a recovery plan to restore IT systems and networks after an attack. This required young people to analyse and resolve problems, an area where Team UK excelled across a range of different skill areas.

Our key international insights in cyber security come from Gold medal winners Korea. Firstly, Korea is developing talent in cyber security from early in young people's educational journey by providing foundational skills in schools. Secondly, they are strengthening relationships between secondary and tertiary education providers to ensure educators at all levels benefit from up-to-date knowledge of what industry requires. Indeed, across all skill areas, Korea has a strong focus on helping educators remain cognisant of industry needs and trends, providing skills instructors with at least 12 hours of training and development on knowledge and technical proficiency annually<sup>22</sup>.

WorldSkills UK has already been helping to raise standards in cyber security skills through our TM who has authored approved level three to seven cyber security qualifications being used across the UK and worked with the Institute for Apprenticeships and Technical Education (IfATE) digital route panel to help bridge the gap between national standards and global best practice.

#### Web Technologies

Korea are also world-leaders in web technologies and successfully cross-fertilise innovations in industry and training thanks to partnerships with tech firms such as Samsung. At the Special Edition Competition, hosted in Korea, they out-competed other nations by introducing competition-based training into apprentice software development training from age 16, and focusing on lightning speed in coding.

More generally our insights from the WorldSkills competition confirm that, as the industry evolves, designers and developers will need a strong knowledge base in not only HTML and CSS, but also JavaScript, PHP and LINUX. WorldSkills International's Occupational Standard is being updated to reflect these changes and will in future include TKL keyboards for better and faster coding.

<sup>21</sup> Global Market Insights Report (2022), Aon

<sup>22</sup> Drivers of technical excellence in the skills economy (2021), WorldSkills UK, p.54.



The UK's ability to upskill educators in these technologies and incorporate them into curriculum will be a key driver of our competitiveness in this area moving forward, as well as our ability to meet industry's fast-changing demand for skills. Looking ahead, WorldSkills UK's training managers emphasised the importance of developing skills at levels 4 and 5, with firms expecting entrants to be multiskilled in interface design, database design, and full stack development. The University of Portsmouth is an example of good practice in this area, providing an extended level four gualification in software development with competition facilities to develop young people to world-class standards.

#### **3D Digital Game Art**

China and Singapore which won gold and silver medals respectively are setting new standards in animation The UK's video games sector is already the largest in Europe<sup>23</sup> and the UK's medallion of excellence in this area shows that we know what it takes to achieve global excellence in this discipline, having demonstrated high quality skills in each aspect of the journey from designer's brief to a marketable game. In the best skills providers, project-based training is maximising the potential of existing UK curriculum approaches that tend to favour breadth over depth, and move us nearer to international best practice in this area.

China and Singapore which won gold and silver medals respectively are setting new standards in animation and using game engine software in modelling, coding, and design from the training outset. Our TMs also noted the importance of targeting higher technical standards in concept art, and enabling young people to model with tools and move beyond theory as soon as is practicable. WorldSkills UK's national competition programmes will increasingly focus on these areas, as well as global changes in game engines and the possibilities they create for industry.

#### **Digital Construction**

The UK construction industry "is set for a new era of skills demands and job opportunities"<sup>24</sup>, as it begins to reverse its historical underinvestment in digital technologies<sup>25</sup>. Digitalisation presents significant opportunities for businesses to construct more efficiently and to higher-standards.

<sup>23</sup> UK Independent Game Developers Association (TIGA)

<sup>24</sup> The Skills Construction Needs: Five year outlook (2022), Construction Skills Network, p.7.

<sup>25</sup> Point of view on Digital Construction: The business case for incorporating digital technologies into the construction industry (2019), Deloitte

In the first-ever international digital construction competition Team UK demonstrated world-class skills and was awarded a medallion for excellence



In the first-ever international digital construction competition Team UK demonstrated world-class skills and was awarded a medallion for excellence, reinforcing the UK's reputation as a leader in modelling and designing different types of buildings. With building specifications anticipated to become increasingly technical in the years ahead, this is a major asset.

Finishing one place above the UK, Austria offers a good example of how to reach world-class standards in digital construction skills. Their performance attests to the importance of young people accessing specialist facilities with industry standard equipment at key stages of training. As outlined in research on vocational pedagogy "this can enable learners move between expert instruction, collaborative investigation and practising a skill"<sup>26</sup> more easily.

Austria's strong performance across Special Edition reflects the high-quality technical pathway taken by approximately 70% of young people from aged 15. This provides more teaching hours than many international post-16 education routes and promotes collaboration amongst employers to diffuse knowledge and skills. The 'Ausbildungsverbund'<sup>27</sup> approach secures secondments for apprentices where skills are lacking within their existing firm or education setting, helping to spread world-class standards in training and facilitate skill transfers between organisations.

The boost to teaching hours and importance of industry placements within T Level qualification design in England could offer opportunities to secure similar strengths and consolidate a strong pipeline of talent for this sector in the years ahead.

WorldSkills UK has already used its international insights to influence UK qualification design and apprenticeship standards in this discipline, supported by large employers such as Autodesk, Balfour Beatty and Baker Hicks who use WorldSkills competitions to identify talent, drive up standards, and recruit the very best young professionals. WorldSkills UK's TM for digital construction also authored the Level 4 & 5 qualifications approved by the Scottish Qualifications Authority, which currently uphold a 100% employment rate, equipping young people of all backgrounds with the skills they need to succeed in the labour market.

Looking ahead to the next WorldSkills event in Lyon in 2024, WorldSkills Occupational Standards will integrate 4D planning and place a greater emphasis on the role of BIM coordinator.

<sup>26</sup> Vocational pedagogy; what it is and why it matters (2016), Skills Development Scotland/ Edge Foundation, p.10.

<sup>27</sup> Drivers of technical excellence in the skills economy (2021), WorldSkills UK, p.52.

#### Key insights across digital skills

- the UK's strong performance in digital skills in the WorldSkills Competition gives WorldSkills UK and UK skills providers a fantastic platform to promote digital skills to the next generation
- mirroring fast-moving technological change in educator training and qualification design can help safeguard UK competitiveness
- access to specialist equipment at key stages of training will increase the quality of skills being developed
- broadening young people's knowledge and skills base, and increasing progression to higher technical study can enable the UK to meet the direction of business demand in web technologies and 3D digital game art
- 4D Planning and the role of BIM coordinator are growing in importance in digital construction as building specifications become increasingly technical.

#### Skills for manufacturing and engineering

The UK's ability to level up, reach net zero, and attract greater inward investment all require a thriving manufacturing industry. The sector delivers a large share of output and high productivity jobs in underperforming areas<sup>28</sup>, holding significant potential for regional rebalancing of the UK economy. Sectoral growth can be supported through FDI, with revamping of global supply chains and near-shoring presenting opportunities for the UK to capture rising numbers of jobs-rich investment projects and cement a competitive advantage in the manufacture of clean tech<sup>29</sup>. This in turn can accelerate the UK's journey to net zero, and drive decarbonisation in the UK's third most polluting industry<sup>30</sup>. Our insights from the WorldSkills Special Edition competition shine a light on how other countries are delivering the engineering and manufacturing skills to help employers in these sectors thrive.

#### Welding

The UK has a critical shortage of skilled welders, leading the role to be placed on the shortage occupation list relaxing visa rules for overseas workers. Industry and government are also working in partnership to build a future pipeline of welders trained in the UK. The Welding Trailblazer Group of employers is working with IfATE to review the general welding apprenticeship occupational standard in England to ensure it continues to meet the latest skills needs.



<sup>28</sup> Making a comeback: How a manufacturing renaissance can level up the country (2021), Onward

<sup>29 2022</sup> Europe Attractiveness Survey, EY

<sup>30 2021</sup> Progress Report to Parliament, Climate Change Committee

The difference between Swiss national standards and international best practice is far less than it is in the UK



Our insights from WorldSkills Special Edition show the importance of a complementary focus on high-integrity highskilled welding. This would help meet industry demand for high-integrity fabrication and welding skills in the nuclear sector, with new nuclear fusion welding technologies being developed by the Advanced Manufacturing Research Centre. Rolls-Royce and TWI Ltd are already making steps to support the training pathway beyond Level three through a welding engineering diploma.

In recent years, Japan, which won the gold-medal in welding, have highlighted the benefits of leveraging input from cutting-edge multinational firms such as Toyota, both in harmonising training with industry standards and raising the esteem of technical education. Japan's gold medal in welding and wider success at WorldSkills competitions indicates the value of the Japanese 'cross appointment' system allowing educators to retain a foot in private sector companies while teaching and researching<sup>31</sup>. Institutes of Technology (IoT) could play an important role in cross-fertilising skills and expertise between business, FE, and HE to similar effect, boosting the supply of higher technical skills the manufacturing sector needs to thrive.

#### Industry 4.0 & mechatronics

Competition programmes in industry 4.0 and mechatronics include the skills needed to navigate and embrace the fourth industrial revolution, with the industry 4.0 competition in particular focusing on the role of the digital production systems technician in designing and implementing efficient automation systems.

Our insights from the WorldSkills event show that Switzerland is adept at delivering these advanced manufacturing skills to world-class standards, winning gold in Industry 4.0, and bronze in mechatronics. Our TMs identified the quality of the Swiss skills system as an advantage for their competitors as the difference between Swiss national standards and international best practice is far less than it is in the UK. Swiss competitors consequently excelled in building automated systems using mechanics, electronics, pneumatics and computer technology at pace.

Strong performance at international competitions is in part founded in the Swiss system's<sup>32</sup> ability to keep pace with future industry developments. Systemic partnership between education, industry and government is underpinned by collaborative governance arrangements, enabling training to remain closely connected to the needs of the economy

<sup>31</sup> Drivers of technical excellence in the skills economy (2021), WorldSkills UK, p.55.

<sup>32</sup> Switzerland: Institutionalised Innovation (2021), WorldSkills UK, RSA, FETL

Throughout all manufacturing and engineering technology competitions, Team UK were fleet of foot in problem-solving, demonstrating creativity and resilience in reaching solutions quickly and labour market. Switzerland has also successfully used WorldSkills competitions to reinforce the quality and esteem of technical education. This will continue following their impressive 6th place finish at Special Edition 2022 and particular success in manufacturing and engineering competitions where they surpassed the standards of skills from much larger nations.

Our TM's insights also suggested that national standards in mechatronics in the Netherlands are also much higher than in the UK and that other countries, including Switzerland and the Netherlands, have a much stronger focus on practical content in their qualifications.

The UK's bronze medal in industry 4.0 highlights UK strengths across a range of skill areas that feed into this competition, including mechanical engineering where industry 4.0 is an optional unit at level 4 and 5. Institutes of technology could provide an opportunity for a greater focus on mechatronics engineering and automation in curriculum to meet the needs of industry. Greater Birmingham and Solihull IoT for example is currently investing in a new facility to support this objective, incorporating pneumatics and point of care manufacturing into the sequence of training for industry 4.0.

#### Robot systems integration, electronics, and computeraided design (CAD)

Throughout all manufacturing and engineering technology competitions, Team UK were fleet of foot in problem-solving, demonstrating creativity and resilience in reaching solutions quickly. Areas for development across robot systems integration, electronics and CAD, which could prove useful in teaching, learning and assessment across the UK, include the sharpness, speed and quality of young people's technical skills.

Several competitor countries are focused on developing young people's technical skills through investment in project-based learning organised by teams of reflective training practitioners. For example, Portugal, which won gold in CAD, is blending the teaching of core design principles with experimentation in modern cloud-based software and techniques, with training projects embedded at each stage of curriculum. This helps young people acquire technical knowledge and hone their technical skills simultaneously, pooling the expertise of training practitioners to support integrated learning.

France is also mobilising project-based learning to good effect in electronics, where they won a medallion of excellence. Further benefits include the elimination of 'skills fade' throughout a young person's education and training journey, and renewed enthusiasm and experimentation amongst educators through peer-to-peer learning and collaborative test-projects.



WorldSkills UK's TMs are already seeking to implement these findings in partnership with skills providers nationwide. In robot systems integration, our TM has been invited to witness test projects organised by WorldSkills France and is seeking to bring project-based training with a robot cell into the first year of level four and five qualifications to drive up standards. Our electronics TM meanwhile is in conversation with awarding organisations and qualification regulators to explore similar opportunities in this space. For CAD, WorldSkills UK is integrating new cloud-based software into the next national competition programme to remain aligned with the needs of firms, and provide young people with access to both designers and software specialists with industry support.



#### **Aircraft maintenance**

Pressure on global supply chains has placed a greater economic importance on UK transportation and logistics capabilities, and the engineering skills they rely upon. Air freight accounts for 40% of UK imports and exports by value<sup>33</sup> and is crucial to the future of global Britain, acting as the lifeblood of import and export potential for highvalue UK industries such as life sciences. The UK also has the third-largest civil aviation network in the world, with the sector contributing over £22bn to GDP annually<sup>34</sup>.

For the second 'skills olympics' in a row, the UK was awarded the gold medal, outcompeting countries like Korea, Singapore and France. WorldSkills UK's standards at regional and national competitions have been a vital source of success on the international stage, remaining in lockstep with the skills and technical expertise demanded by a growing and global

industry. Longstanding excellence in fabrication, electrical engineering, and safety inspection is being complemented by newer focuses on training with composite materials and knowledge of different types of aircraft. This is broadening and deepening technicians' abilities to troubleshoot and respond in different pressure-tested environments created by trainers.

Indeed, throughout Special Edition, Team UK demonstrated strength in creativity and problem-solving skills, reflecting the emphasis on critical thinking, independent reasoning, and

<sup>33</sup> Logistics UK, Air

<sup>34</sup> UK Aviation Industry, Socio-Economic Report (2016), Sustainable Aviation, p.3.



strong technical knowledge within the 'WorldSkills UK way' and UK qualification landscape. These are all skills that are vital in a real-world commercial setting, where being fleet of foot feeds through to reputation and performance and enables employers to horizon-scan and mitigate risks to profitability and output.

In recognition of our world-leading position, WorldSkills International and the global community of TMs are exploring opportunities to collaborate and establish a Centre of Excellence for Aircraft Maintenance. This would focus on innovation in pressure testing to equip young people from around the world with the technical and wider employability skills needed to succeed. It would also help emerging economies raise standards in apprenticeships and technical education in this area. Whilst supporting efforts on international collaboration, UK training managers will also focus on cementing our competitive edge in skills development.

#### Key insights across manufacturing and engineering

- knowledge, skills and experience with cloud-based software is now vital to a range of occupations and roles demanded by the manufacturing sector
- the UK is at risk of falling behind world-leading countries in the sharpness, speed and quality of young people's technical skills in manufacturing and engineering
- high-performing countries are cross-fertilising expertise between business, FE, and HE to equip young people with first-rate higher technical skills
- harnessing project-based learning will be integral to the UK's ability to close the gap on competitors and deliver world-class manufacturing and engineering skills in future years
- UK TMs are updating pressure-tested training environments, furthering global collaboration, and harmonising regional, national and international standards to drive continued success in skills for aircraft maintenance.

#### Skills for the life sciences sector

The UK's shortage of laboratory technicians has led HM Government to place the role on the Shortage Occupation List. Chemical Lab Technicians can be employed in a wide range of academic and industrial settings, such as petrochemical and pharmaceutical sectors. High-standards in the UK skills system will be fundamental to building a sustainable talent pipeline relied upon by these industries. International competitions have a vital role to play in showcasing opportunities within chemical laboratory technology to young people and ensuring the skills they develop are world-class. Austria and Finland illustrate how integrating work experience within advanced study pathways can underpin success



#### **Chemical Laboratory Technology**

After pipping the UK to medals in chemical laboratory technology at WorldSkills Special Edition 2022, Austria and Finland illustrate how integrating work experience within advanced study pathways can underpin success. Level three to five apprenticeship models in both countries prize excellence in chemical analysis and knowledge of synthetic materials and place a strong emphasis on young people's independence and broader evaluative skills, with apprentices pressed to critically interrogate their methods and drive improvements.

The UK system has similar assets. WorldSkills UK's TM identified T Level industry placements and strengthened collaboration between further and higher education providers as opportunities for the UK to overcome its close competitors in future years. Good practice is emerging in this area, with Manchester Metropolitan University providing industry placements to students taking new T Levels in Science. In so doing, the university is granting young people both valuable experience and access to cutting-edge technical equipment, whilst supporting the knowledge, skills and behaviours for progression onto their degree apprenticeship programme.

World-leaders China and Singapore have a marginal edge on the UK and others in terms of speed and processing data, with faster hand skills underpinned by significant investment in project-based training. Increased use of project-based pedagogical approaches can help maximise the confidence and speed of the UK's young people and result in increased productivity within an industry environment. However, balancing knowledge with analytical and technical skills should be the bedrock for strong UK performance. This balance is also being mirrored by WorldSkills, with future competitions set to increasingly test a wider range of knowledge and skills demanded by industry.

#### Key insights across the life sciences sector

- balancing knowledge with technical and analytical skills can be the bedrock for strong UK performance in future years
- project-based training can enhance the confidence and hand-skills of young people and result in increased productivity within industry
- integrated work experience opportunities within higher technical study pathways can support success.



## WorldSkills UK insights can inform excellence in skills policy and practice

Across all areas, technical skills were built on a bedrock of strong technical knowledge consistent with the WorldSkills Occupational Standards

#### Global insights: key takeaways

By benchmarking UK skills against international standards, WorldSkills UK has identified insights to help turbo-charge technical education and apprenticeships as a source of economic competitiveness.

#### UK strengths in skills development

It's important firstly to recognise the UK's strengths which provided the foundation for Team UK's top ten finish in the WorldSkills 2022 competition. Across all areas, technical skills were built on a bedrock of strong technical knowledge consistent with the WorldSkills Occupational Standards. The UK's competitive edge often came from our competitors' ability to solve problems when things didn't go to plan, to think creatively and use independent reasoning. Team UK also had to be very strong mentally given the many disappointments they faced and the length of their journey from selection to competition. These are all key elements of WorldSkills UK's training methodology which gives competitors confidence and valuable employability skills, helping them thrive in the workplace. It is also feeds into our Centre of Excellence CPD programme so that many more educators across the UK can draw on these tools to help more young people across the UK develop their technical and mindset skills to world-class standards.



#### Learning from international best practice

Our insights from how other countries performed in the WorldSkills 2022 competition cover different aspects of skills development and should therefore have relevance to policymakers, educators and employers. This summary details some of the key learnings at a system-wide level, in pedagogy and in skill specific techniques.

#### System-wide

- access to specialist equipment at key stages of training increases the quality of skills being developed
- mirroring fast moving technological change in educator training and qualification design can help support UK competitiveness
- high-performing countries are cross-fertilising expertise between business, FE, and HE to equip young people with first-rate higher technical skills

#### Pedagogical

- harnessing project-based learning will be integral to the UK's ability to close the gap on competitors and deliver worldclass skills in future years
- pressure-tested training environments are driving continued success across all skills
- leading countries have a greater focus on practical skills in their curriculum.

#### **Technical**

- the UK is at risk of falling behind world-leading countries in the sharpness, speed and quality of young people's technical skills in manufacturing and engineering
- broadening young people's knowledge and skills base, and increasing progression to higher technical study can enable the UK to meet the direction of business demand in web technologies and 3D digital game art
- 4D planning and the role of BIM coordinator are growing in importance in digital construction as building specifications become increasingly technical
- knowledge, skills and experience with cloud-based software is now vital to a range of occupations and roles demanded by the manufacturing sector
- balancing knowledge with technical and analytical skills can be the bedrock for strong UK performance in chemical laboratory technology in future years.

The Centre of Excellence .... represents a radical new way of bringing global best practice into local economies and supporting young people

# Opportunities to engage in WorldSkills UK programmes

WorldSkills UK already has a number of programmes which use international best practice gleaned from decades of WorldSkills events. These programmes offer fantastic opportunities for educators from anywhere in the UK to benefit from our insights and help raise standards in technical education and apprenticeships.

#### Centre of Excellence – workforce development programme

The Centre of Excellence draws on WorldSkills UK's unique insights from international benchmarking, and NCFE's expertise in curriculum design to mainstream excellence in skills development. The initiative, launched in 2020, now boasts 48 member institutions across FE colleges, universities and independent training providers. By providing NCFE endorsed continuous professional development (CPD) founded on learnings from international competitions, the programme aims to supercharge the quality of technical education through world-class training for educators. This represents a radical new way of bringing global best practice into local economies and supporting young people.



## Learning Lab – world-class online skills development tools and resources

WorldSkills UK's Learning Lab is a new online learning centre powered by international best practice and providing free tools and resources for educators and learners alike. Our on-demand teacher training can help skills providers use world-class training practices to complement curricula and qualifications being delivered. Teaching tools and resources enable educators to translate their sharpened skills into classrooms and workshops and innovate the way they train, teach and assess, whilst 'digital

credentials' verify their achievements and commitment to world-class standards. Meanwhile mindset masterclasses, designed for students and apprentices at levels two to four, can stretch young people to strive for excellence in technical and transferable skills that support employment leaving learners more inspired and motivated to fulfil their potential. Content and tools are continually renewed in line with insights gained through international benchmarking, mirroring changes in international occupational standards in educator training and qualification delivery. This includes a new series of technical masterclasses in areas such as cyber security building on our experience at WorldSkills Special Edition 2022.

WorldSkills UK has seven international partnership agreements; with leading institutions in Japan and Korea on Digital and STEM skills, in France on green skills, and with WorldSkills Finland on pedagogical developments

## Informing the development of technical qualifications and apprenticeships standards across the UK

WorldSkills UK's team of TMs are involved in many processes to boost the quality of qualifications and apprenticeships being delivered across the UK. After WorldSkills Kazan 2019 – we focused on expanding TMs' influence within our extensive network to champion world-class standards in skills development through T Levels, higher technical qualifications, apprenticeships and other vocational qualifications. This shaped <u>over 40 different routes</u> available to young people, including the authoring of new qualifications and standards in areas such as digital construction and cyber security.

## International partnerships – promoting international best practice exchanges

WorldSkills UK has seven international partnership agreements; with leading institutions in Japan and Korea on Digital and STEM skills, in France on green skills, and with WorldSkills Finland on pedagogical developments. Each is underpinned by a memorandum of understanding, with agreed sets of activity covering: research and investigation into future skills; insights on teacher training and assessment; and joint training and cultural exchanges for young people and TMs alike.

The new East Midlands IoT is just one of the UK institutions involved in our partnerships, accessing global expertise on how to drive critical engineering, manufacturing and digital skills needed in the region. This forms part of the IoT's efforts to embrace advanced skills required for AI and a datadriven economy and strengthen collaboration with global powerhouse employers like Toyota and Fujitsu, who sponsor WorldSkills competitions.





## WorldSkills UK's new actions to stay on top of international skills developments

Following the dissemination of our global insights we are undertaking new commitments to share these insights through our programmes and gather new insights on international best practice over the coming years:

#### 1 Expanding the Centre of Excellence

Over the next three years, our Centre of Excellence programme will open to all skills providers and focus on delivering higher level technical training in priority sectors – including for educators delivering new T Levels and HTQs. This can help the UK close the gap on international competitors who focus heavily on up-skilling educators and boost the quality of much-needed higher technical skills in priority sectors.

# 2 Influencing more qualifications and apprenticeship standards

Our skills experts are already drawing on their experience of international competitions and knowledge of global trends to support curriculum development and world-class teaching standards nationwide. For example, in robot systems



Integration our TM is helping to bring project-based training with a robot cell into the first year of level four and five qualifications, as well as bring teaching and curriculum development in line with international occupational standards. Our TM in electronics is exploring similar opportunities to reflect training approaches and assessment practices witnessed at WorldSkills Special Edition 2022, building on his experience developing multiple qualifications from level one to five.

# **3** Gathering new international insights through study visits

Over the next two years WorldSkills UK will be using best practice exchanges to bring together colleagues from across the global WorldSkills community to explore innovative solutions to universal challenges. In the run up to WorldSkills Lyon 2024 we have 29 skills in our international competition portfolio and intend to host best practice exchanges for the majority by the end of 2023, involving UK TMs and WorldSkills experts from overseas. This includes via international study visits with WorldSkills France and WorldSkills Netherlands to witness how other countries are incorporating project-based training to drive standards and improve the competitiveness of their skills base.

# 4 Deepening collaboration with other countries in skills key to growth

WorldSkills UK will be building on its international partnerships to link UK institutions with global pioneers of new skills development techniques- enriching the education and training experience of young people, and symbiotically strengthening the skills systems of each partner nation.



#### 5 Benchmarking UK skills against continental competitors at EuroSkills Gdansk 2023

WorldSkills UK will be benchmarking UK skills against economic competitors and international occupational standards at EuroSkills Gdańsk 2023. This is the eighth edition of the biennial EuroSkills Competition, and the first with UK participation for five years owing to the impact of the pandemic. EuroSkills Gdańsk 2023 will welcome 600 young people from 32 countries in 43 different skills. This event will provide the opportunity for policy-makers, educators and employers to join a delegation to see world-class skills in actions and take part in bilateral meetings with other nations.

#### 6 Developing new skills for priority sectors

In addition to bringing world-class standards into existing education and training pathways, WorldSkills UK is also engaged with helping young people acquire internationally competitive skills in emergent fast-growing global industries. This year we are launching new national competitions programmes in both renewable energy and additive manufacturing. By feeding through to international competitions at WorldSkills Lyon 2024, these can help guide the development of qualifications and occupational standards in the UK and ensure these reflect international best practice from the offset.

### Annex

2021 Progress Report to Parliament, Climate Change Committee

2022 EU Attractiveness Survey, EY

2022 UK Attractiveness Survey, EY

Accountability Agreements for 2023 to 2024: Guidance (2022), Department for Education

Disconnected: Exploring the digital skills gap (2021), Learning & Work Institute/WorldSkills UK

Drivers of technical excellence in the skills economy (2021), WorldSkills UK

Exploring the skills economy (2022), WorldSkills UK

Future Skills: Action Plan (2021), Scottish Government

Global Market Insights Report (2022), Aon

Good people in a flawed system: The challenges of mainstreaming excellence in technical education (2020), WorldSkills UK/SKOPE/University of Oxford (S. Relly)

Logistics UK, Air

Making a comeback: How a manufacturing renaissance can level up the country (2021), Onward

Point of view on Digital Construction: The business case for incorporating digital technologies into the construction industry (2019), Deloitte

Promoting technical skills to win foreign investment (2022), OCO Global/ WorldSkills UK

Skills for a 10x economy: Skills Strategy for Northern Ireland (2021), Department for Economy NIa

Skills for jobs: Lifelong learning for opportunity and growth (2021), Department for Education

Skills for net zero economy (2022), Learning & Work Institute/WorldSkills UK

State of the Tech Workforce UK (2022), CompTIA

Switzerland: Institutionalised Innovation (2021), WorldSkills UK, RSA, FETL

The Skills Construction Needs: Five year outlook (2022), Construction Skills Network

UK Aviation Industry, Socio-Economic Report (2016), Sustainable Aviation

UK Independent Game Developers Association (TIGA)

Vocational pedagogy; what it is and why it matters (2016), Skills Development Scotland/Edge Foundation,

Wanted: Skills for inward investors (2022), Skills Taskforce for Global Britain (J. Buscombe)



**WorldSkills UK** is an independent charity and a partnership between employers, education and governments. Together, we are using international best practice to raise standards in apprenticeships and technical education so more young people and employers succeed.

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