THE ECONOMIC VALUE OF WORLDSKILLS UK

Report prepared for WorldSkills UK

May 2021

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EXECUTIVE SUMMARY

WorldSkills UK is a partnership between education providers, government and employers which has the overarching aim of accelerating the development of young people's skills to achieve world-class standards.

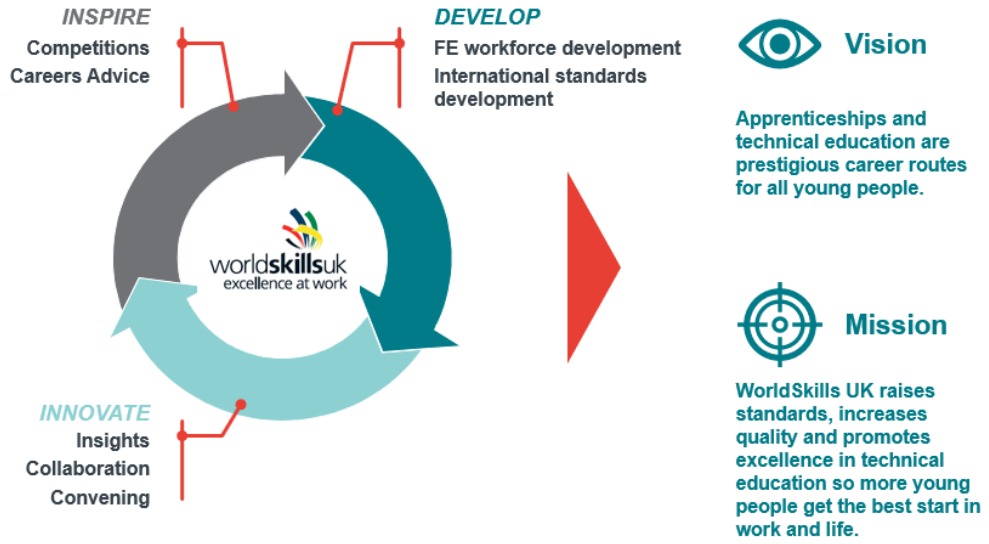
WorldSkills UK activities reinforce each other to support skills development among young people in the UK

WorldSkills UK is a key player in WorldSkills International – an organisation which brings together 85 countries to compete in biennial skills Olympics. One of the key activities of WorldSkills UK is running a national **skills competitions** programme every year from which the UK international skills team is selected and trained. WorldSkills UK brings together the UK's leading employers and delivers tailored experiential **careers events and advice** (including the largest skills and careers event in the UK – WorldSkills UK LIVE).

WorldSkills UK also invests in **research and innovation** in international skills to influence best practice in skills development through a variety of publications (e.g. blogs, reports etc.). It supports the **development of skills** of the further education workforce by sharing international best practice to deliver high quality training and assessment.

These activities can be organised under three main themes, as shown in Figure 1.

Figure 1 WorldSkills UK's activities



Source: Frontier Economics and WorldSkills UK

Value is generated through several channels

Through the national and international competitions programme and associated training, WorldSkills UK ***improves the skills and confidence of young people and stimulates a high performance mindset***. This affects not only those taking part in competitions themselves (competitors and trainers) but also their peers.

WorldSkills UK also ***promotes a better understanding of technical and vocational routes*** through events (such as WorldSkills UK LIVE) and careers advice (in person or through the digital careers advice tools). These activities help to inspire young people to consider a career or further education in a technical field.

Through its research and development activities and convening work, it ***spreads world-class standards to the UK*** and informs training standards.

By sharing international best practice to deliver impactful training and assessment, WorldSkills UK contributes to **developing the further education (FE) workforce**.

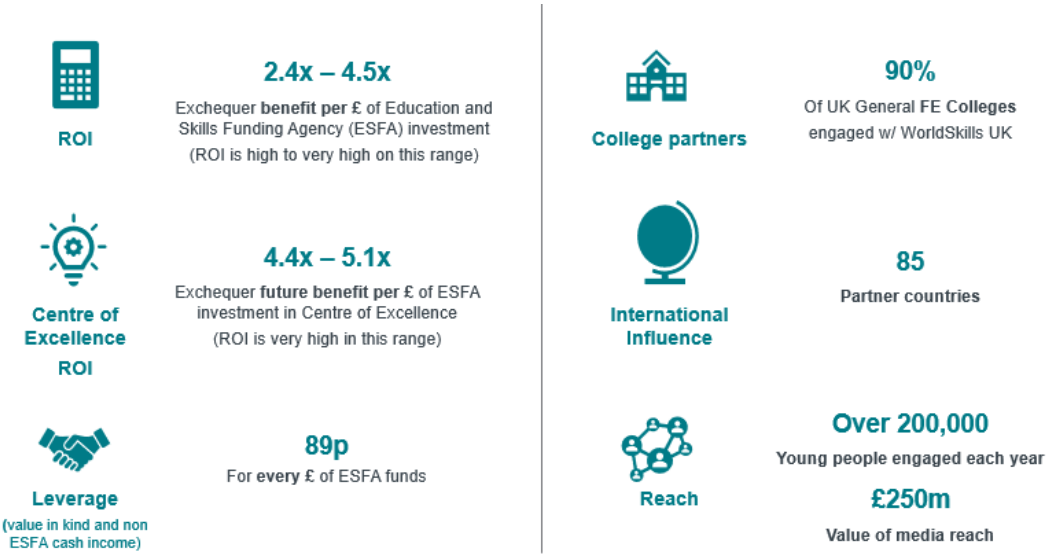
WorldSkills UK activities generate a high return on investment

We conservatively estimate a return on investment (ROI) for the taxpayer (from established WorldSkills UK activities) of at least £2.40 and as much as £4.50 for every pound invested in WorldSkills UK, suggesting high value for money. This is based on analysis of the 2017-2019 period to align with the two-year cycle of international competitions.

An even higher return is likely to be achieved by the investment in the Centre of Excellence, a relatively new initiative which builds on and is made possible by other WorldSkills UK activities such as skills competitions, which was valued separately.

The impact of WorldSkills UK is further evidenced by its ability to leverage private funding – for every £1 of public money it receives, WorldSkills UK attracts a further 89p of funding from the private sector, including significant value-in-kind contributions.

Figure 2 Impact of WorldSkills UK activities



Source: Frontier Economics and WorldSkills UK

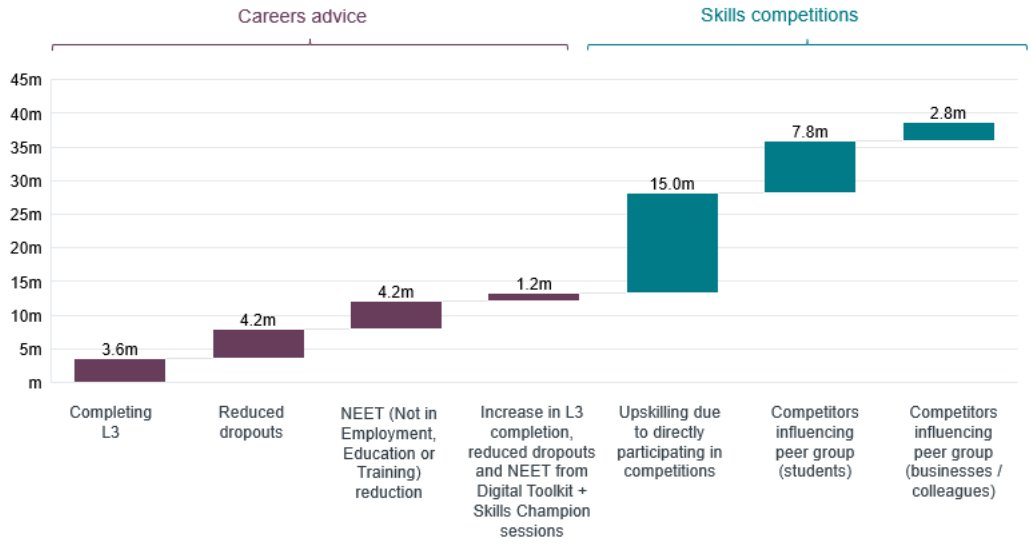
The benefits to the taxpayer in our headline ROI calculations (excluding Centre of Excellence) come from several sources summarised in Figure 3.

The largest is the ***direct upskilling effect*** of training leading up to and during the skills competitions programme (national or international). This effect is reflected in the increased lifetime earnings of participants as a result of their increased skills and better signalling of those skills.

Benefits from participation in the skills competitions programme also spill over to peers as participants share knowledge and inspire their fellow students or colleagues to perform at a higher level. This results in ***improved performance of peers*** (proxied by improved lifetime earnings).

Finally, increased information about career prospects and careers advocacy and advice are likely to lead to ***better educational and job matching*** outcomes for students receiving careers advice (for example, at the LIVE event), once again leading to improved educational outcomes (e.g. reduced likelihood of dropping out and higher likelihood of completing technical education), earnings and employability over their lifetime.

Figure 3 Key drivers of estimated benefits



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

Other benefits could not be quantified but may be significant

In addition to these quantifiable benefits, there are a number of positive impacts from WorldSkills UK's activities which were not captured in our assessment either because they are still in their early stages of development or there is a lack of specific outcome related data to support the assessment. Many of these benefits could be quantified through further research. They include the wider work that WorldSkills UK does which has the potential to influence policy making and practice in the sector – the work of WorldSkills UK has been referenced in the

Skills for Jobs White Paper[1] and Ofsted's Further Education and Skills Inspection Handbook.[2]

As noted above, one of the key benefits we were able to quantify is the impact on competitors of taking part in the competitions programme. Upskilling teachers through the competitions programme and the subsequent benefit of this for the outcomes of students in their classroom via classroom peer effects are also likely to be significant. There is a potentially significant further benefit of teacher upskilling for students in other classrooms (through wider college effects) which has not been quantified at this stage.

Another potential benefit is around reducing skills gaps and wider productivity spill-over effects. It is very likely that WorldSkills UK's activities have an effect on reducing skills gaps and skills mismatch in the UK labour market (a number of WorldSkills UK competitions are in occupations with a considerable skills gap). This will have a value over and above what has been calculated in our work. Further, the spill-over effects we valued only apply within one employer firm, but productivity spill-overs between one employer which employs a competition participant and one that does not may also be present.

Another important benefit which we did not capture in our work (but could be considered in future research) is the international influence of WorldSkills UK. By being a key member of the WorldSkills network, WorldSkills UK is able to raise the profile and prestige of UK skills, possibly enhancing the export potential of education products and encouraging investment into the UK.

Taken together, these additional benefits are likely to generate additional value for the UK over and above what was included in our assessment. All of this points to WorldSkills UK delivering high value for money for the UK taxpayer and, as such, there is a strong case for continued support for the organisation by the Department for Education.

[1] See Chapter 5: Supporting outstanding teaching, paragraph 152 available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957810/Skills_for_jobs_lifelong_learning_for_opportunity_and_growth__print_version_.pdf

[2] See paragraph 252, available at: https://www.gov.uk/government/publications/further-education-and-skills-inspection-handbook-eif

INTRODUCTION

Background

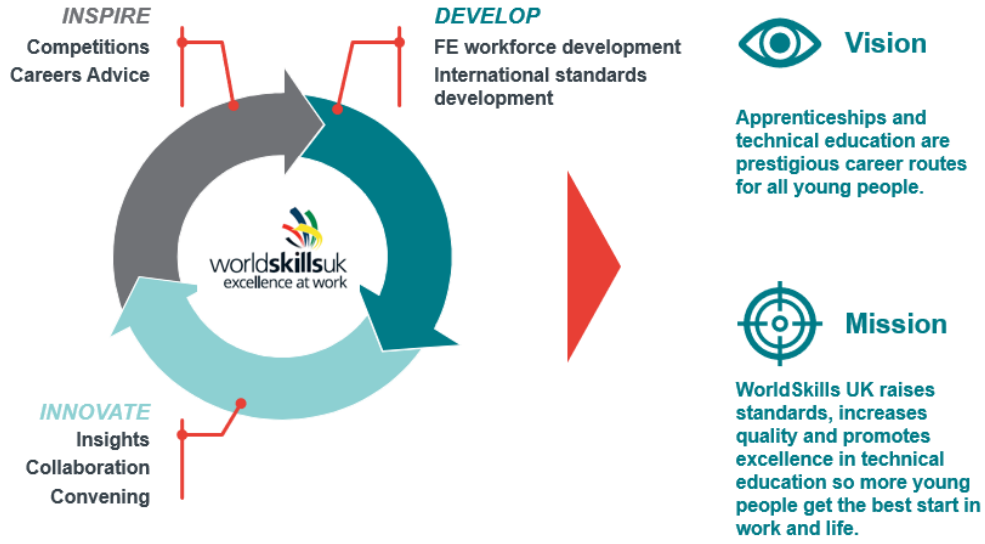
WorldSkills UK is a partnership between education providers, government and employers which has the overarching aim of accelerating the development of young people's skills from national to world-class standards. WorldSkills UK supports the development of skills among young people in the UK through a range of activities.

WorldSkills UK is a key player in WorldSkills International – an organisation which brings together 85 countries to compete in biennial skills Olympics. Key activities of WorldSkills UK are running a national **skills competition** programme every year (from which the UK international skills team is selected and trained), bringing together the UK's leading employers and delivering tailored experiential **careers events and advice** (including the largest skills and careers event in the UK, WorldSkills UK LIVE).

WorldSkills UK also invests in **research and innovation** in international skills to influence best practice in skills development through a variety of publications (e.g. blogs, reports etc.). Increasingly it supports the **development of skills** of the further education (FE) workforce, by sharing international best practice, to deliver high quality training and assessment.

These activities can be organised under three main themes, as shown in Figure 4.

Figure 4 WorldSkills UK's activities



Source: Frontier Economics and WorldSkills UK

The themes are:

- **Innovate** (insights, collaboration and convening, with employers and the economy being the main audience);

- **Develop** (international standards development and FE workforce development with teachers as the main beneficiary); and
- **Inspire** (skills development through competition activity and careers advocacy with young people as the key audience).

WorldSkills UK and its funders wanted to gain a deeper understanding of the benefits and value of its activities both for those with whom the organisation interacts and for the wider UK economy. Frontier Economics was commissioned to conduct an economic review of WorldSkills UK's activities and provide estimates of the value added by the organisation. The analysis focussed on the 2017-2019 period to align with the two-year cycle of international competitions.

Approach and structure of report

WorldSkills UK receives an annual grant from the Education and Skills Funding Agency (ESFA), part of the Department for Education (DfE), to raise quality and excellence in technical education. Like all institutions in receipt of public funding, WorldSkills UK wants to understand and demonstrate the value it generates for its funders and the taxpayer, what factors drive this value and where improvements can be made.

Frontier Economics was commissioned to independently assess the return on investment (ROI) for the taxpayer from WorldSkills UK's activities. Our work built on previous research conducted by DfE economists to calculate ROI based on the best available evidence. In short, the approach involved:

- Setting out the channels through which an impact is expected to materialise based on the nature of WorldSkills UK's activities;
- Gathering data and literature (academic literature and grey literature) to understand the strength of possible effects;
- Combining all the evidence in an Excel model and calculating the size of future benefits arising from WorldSkills UK activities and discounting them to the present day to get net present value (NPV); and
- Comparing the size of benefits with the public funding provided to WorldSkills UK.

The methodology we adopted is described in Section 2. Our findings are discussed in Section 3 and the conclusions are set out in Section 4.

METHODOLOGY

High level approach

We evaluated the costs and benefits of WorldSkills UK's activities over the entire Kazan cycle (the activity cycle leading to the international competition in Kazan); this includes the financial years 2018/19 and 2019/20.

The NPV of future benefits to the Exchequer resulting from WorldSkills UK's activities was calculated by:

- Estimating the economy-wide present and future benefit of WorldSkills UK activities;
- Discounting the future benefits, for example higher employee earnings, to the present day using the government social discount rate (3.5%); and
- Converting discounted economy-wide benefits to Exchequer value, i.e. focusing on what benefits mean in terms of tax take.

We compared the NPV of future benefits to ESFA grant funding to estimate the ROI for ESFA funds and estimated the benefit-to-cost ratio to government. We did not estimate the benefit-to-cost ratio to society because costs to the wider economy include private costs and opportunity costs (on top of public funding) that were either unavailable or difficult to estimate robustly.

We did not account for any reduction in impact due to the coronavirus, as the effects of the pandemic started to heavily impact society and the economy at the very end of the 2019/20 financial year, and it is therefore safe to assume that activities went ahead as usual for most of the financial year.

Figure 5 Summary of approach

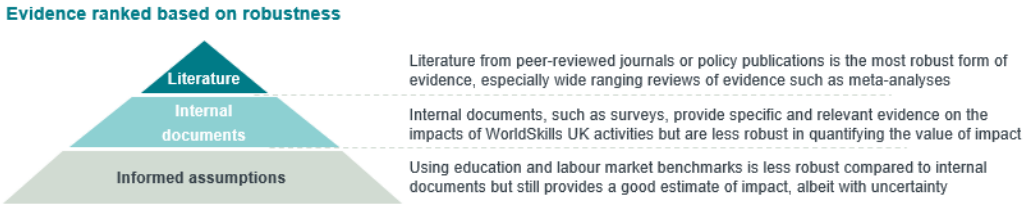
Source: Frontier Economics

To estimate the value of WorldSkills UK activities, we used a variety of different sources. Whenever possible, we used academic literature to inform assumptions as it is the most robust form of evidence, especially wide-ranging reviews or meta-analyses. Our literature review covered careers advice, skills competitions and peer effect productivity spill-overs.

Where academic literature was not available, we relied on evidence from WorldSkills UK's case studies, surveys, interviews etc. to inform our modelling assumptions. Internal documents provided specific and relevant evidence on the impacts of WorldSkills UK's activities but are less robust in quantifying the value of impact.

When no literature or internal documents were available, we made our own assumptions for two different scenarios (low and high). Our assumptions are conservative and consistent with education and labour market benchmarks. Using informed assumptions and education and labour market benchmarks is less robust compared to internal documents but still provides a good estimate of impact, albeit with uncertainty.

Figure 6 Evidence ranked based on robustness



Source: Frontier Economics

Detailed calculations approach

We estimated WorldSkills UK's benefits across the four primary activities that WorldSkills UK conducted over the 2018-20 period:

- **Skills competitions –** WorldSkills UK organises a national and international competitions programme in fields such as engineering, digital, health and construction. **The national competitions programme** involves UK apprentices and students competing to be crowned the best in the UK at certain disciplines. **The international competitions programme** involves the winners of the national competitions programme competing with other countries (both European and global) as part of Team UK.
- **WorldSkills UK LIVE events –** Every year at the NEC in Birmingham, WorldSkills UK hosts the UK's largest skills, careers and apprenticeships event. Attendance ranges from age 10 to 24. The national finals of the competitions programme are hosted at the LIVE event. The event hosts employers as well as career representatives from the National Careers Service and the National Apprenticeship Service.
- **Skills champions (careers advocacy and advice) –** Skills champions are alumni of the competitions programme who act as role models for young people and deliver careers advice sessions in schools. They also participate in youth advisory panels and attend networking sessions and training workshops.

- **Thought leadership –** WorldSkills UK invests in research on international best practice and innovation in technical and vocational education and influences policy to help inspire young people to undertake technical and vocational careers. As part of this thought leadership, WorldSkills UK has recently launched the Centre of Excellence in partnership with NCFE, which will transfer and mainstream world-class expertise to educators and influence standards across technical and vocational education and training.

There are several key benefits arising from these activities.

First, there is a direct upskilling effect on individuals participating in the skills competitions programme (national or international) as a result of the training received as well as their experience of participating in the competitions themselves. This effect is reflected in the increased lifetime earnings of participants due to their improved skills and better signalling of their skills. The lifetime earning benefits for participants in the skills competitions programme come through the classic economic theory of returns to education: a combination of signalling and human capital effects. *Human capital* is commonly defined as the skills, knowledge, capacity and attributes of an individual which determine their productivity. By increasing the human capital of an individual, education can improve productivity and therefore lifetime earnings. Competitions can also improve earnings for competitors through a *signalling effect.* This is where a qualification is taken as a signal of higher existing productivity by a prospective employer and, therefore, generates higher wage returns. This effect occurs because of asymmetric information in labour markets – employers do not know ex ante the human capital of an individual, so must use indicators like qualifications, work history and references to judge the human capital level of the individual. Reaching a given benchmark in WorldSkills UK competitions – be it national finalist, Team UK member or medal winner – may be a signal to employers of strong human capital in a given vocational skill and individuals may be rewarded with higher wages.

Second, there is increased information about career prospects and subsequent better job matching for students receiving career advice (for example, at the LIVE event), once again leading to improved earnings and employability over their lifetime. At the LIVE event, young people are exposed to technical or vocational skills, have interactions with employers and can get careers advice from experts. The key potential benefit of the event is to improve information about what training and career options are available to young people, equipping them with the information they need to make more efficient decisions about their education and career. In the absence of such information (i.e. when there are informational failures), the economy is operating below its potential output, as labour is not efficiently utilised – and individuals are worse off than they would be in a world with perfect information. By giving young people improved information on the options available to them, the potential returns of those options and what suits their skillset, the WorldSkills UK careers events are likely to mitigate this information failure, with economic benefits for the individual and society.

Third, peer effects arise where students participating in skills competitions provide spill-over benefits for their peers (by sharing knowledge and/or inspiring their fellow students/colleagues to perform at a higher level), leading to improved performance for the peers themselves. Peer effects exist when the recognition of one student's performance and accomplishments spill over to other students. Awards that confer public recognition for outstanding performance can impact ex-post behaviour by changing beliefs, norms or interests.[3] However, it is always difficult to prove the existence of peer effects because there are formidable empirical obstacles to estimating them. Recent research by Moreira (2017)[4] shows that the public recognition of students' accomplishments impacts their own and their peers' subsequent academic performance. Reaching a given benchmark in the WorldSkills UK competitions programme may well have a positive effect on peers' motivation and aspirations, thus positively affecting their academic and technical performance and, consequently, their lifetime earnings.

Fourth, educators involved in the skills competitions programme are themselves the source of spill-over benefits which accrue to their students and colleagues, leading to improved performance. Trainers and teachers who attend international competitions are exposed to international best practice. When they return to teaching and/or to their workplace, their students and colleagues benefit from their enhanced motivation, their improved skills and their information sharing etc. The positive effect on their human capital can spill over to the people they work with, in turn, positively affecting their performance and lifetime earnings.

Fifth, the thought leadership activities conducted by WorldSkills UK can lead to positive changes in attitudes in practice and in policy formulation. Thought leadership activities (part of the Innovate strand), are a key element of WorldSkills UK's work and are likely to generate relevant economic benefits. Investment in research coupled with an excellent media reach are evidence of sector engagement that can lead to changes in attitudes, in practice and in policy formulation, thus improving the quality of technical and vocational education policy in the UK.

The key benefits which were valued in our analysis are summarised in Figure 7. It is worth noting that our headline measures of value are based on WorldSkills UK's activities during the 2018-2020 period – chiefly skills competitions and careers advice (including skills champions).

The ROI assessment of future (post-2020) benefits centred around the thought leadership work of the Centre of Excellence which was still being set up during the period of interest and, therefore, benefits are expected to materialise in the future.

[3] Moreira, D., *How Awards Affect Winners' and Peers' Performance in Brazil*, 2017, Job Market Paper

[4] Moreira, D., *How Awards Affect Winners' and Peers' Performance in Brazil*, 2017, Job Market Paper

Figure 7 Benefits of WorldSkills UK's activities

Main benefit	Description
Direct benefit	**Benefits accrued by those directly affected by WorldSkills UK activities** ▪ Upskilling and lower dropouts due to careers advice ▪ Upskilling due to competition participation ▪ Higher earnings due to better job matching and improved career prospects
Classroom peer effects	**Benefits accrued to those in the same classroom as someone affected by WorldSkills UK activities** ▪ Classmates' upskilling due to positive peer effects ▪ Improved classmates'/colleagues career outcomes and earnings
Teachers/Trainers benefit	**Benefits accrued by those delivering activities as part of WorldSkills UK on their workplace/classroom** ▪ Upskilling of competition trainers and subsequent colleague/business spill-overs
Colleague peer effects	**Benefits accrued to those in the same company as someone affected by WorldSkills UK activities** ▪ Higher wages through higher productivity passed on through colleague upskilling

Source: Frontier Economics

FINDINGS

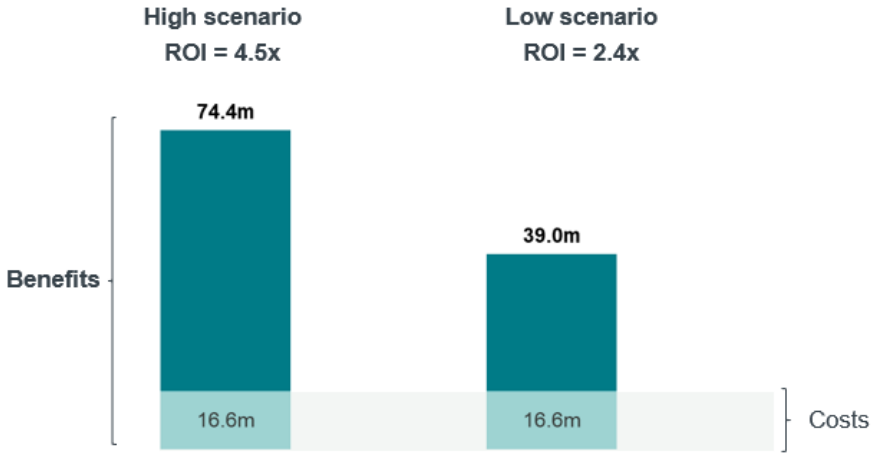
Headline findings

We estimate two scenarios to assess WorldSkills UK's ROI to capture some of the uncertainty that is inherent in the evidence base:

- **"Low" scenario: most likely conservative ROI (e.g. likely at least) –** most likely scenario using the central range assumptions and estimates from the literature/internal documents; and
- **"High" scenario: reasonable maximum ROI (e.g. as high as) –** high scenario of impact, assuming high end range of impacts always based on literature and internal document evidence.

Our assessment shows an ROI of 2.4x, which could be as much as 4.5x. That is to say that for every £1 of government funding that WorldSkills UK receives, it generates value for the taxpayer of between £2.40 and £4.50.

Figure 8 Present ROI calculations to DfE funding (2018-20) – skills competitions & careers advice excluding thought leadership

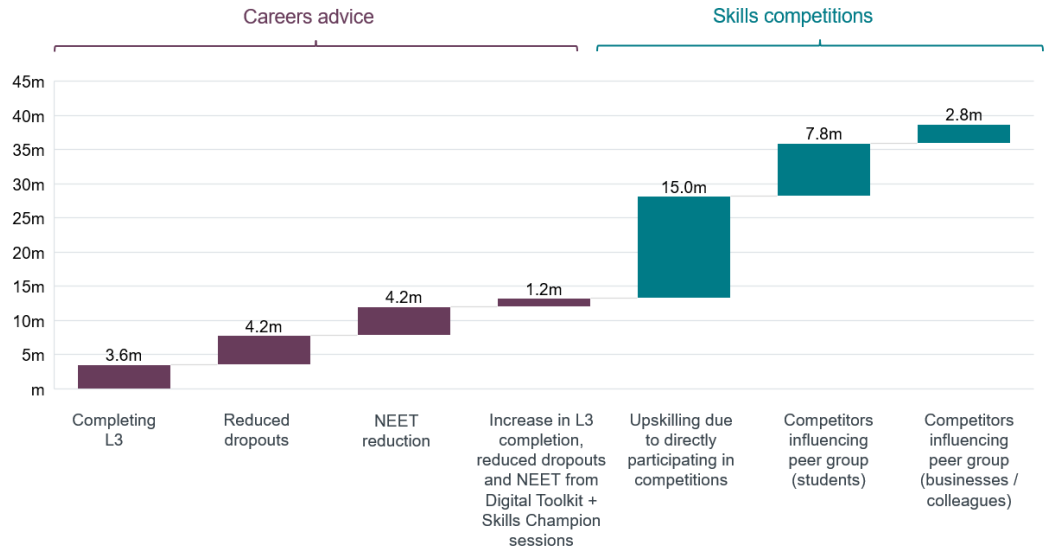


Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

Benefits and costs are assessed over two years to reflect the international competition cycle. Benefits are higher tax take due to wage impacts (i.e. £1 more is worth 32p in tax and National Insurance). Costs only include direct funding from DfE to WorldSkills UK. ROI calculations exclude thought leadership as well as other potential impacts on policy, teacher upskilling, skills gap, productivity spill-overs and international influence (more on this in next sections).

Key quantifiable present benefits arise from WorldSkills UK's activities in delivering careers advice and skills competitions.

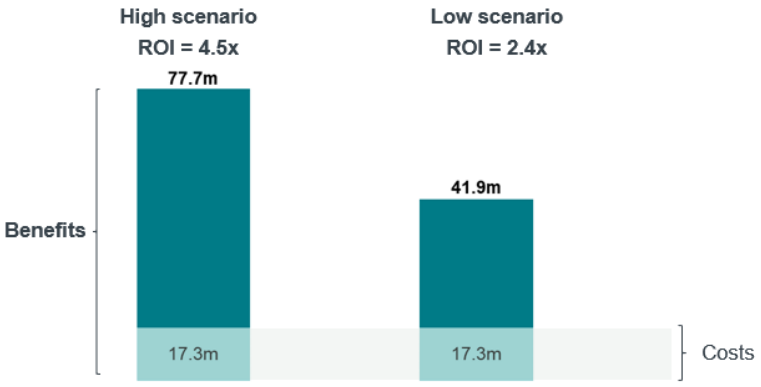
Figure 9 Present benefits (excluding thought leadership) from WorldSkills UK activities: low scenario



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

Including the present value of future benefits from thought leadership, WorldSkills UK's present and future ROI is 2.4x and as much as 4.5x.

Figure 10 Present and discounted Future ROI calculations to DfE funding (2018-20) – skills competitions, careers advice and Centre of Excellence



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

The future ROI of thought leadership to DfE is conservatively calculated to be between 4.4x and 5.1x, using the Centre of Excellence as a case study. The Centre of Excellence represents ~80% of projected future spend on thought leadership. The large ROI to DfE is due to its small contribution to funding the Centre of Excellence activity while receiving a significant share of benefits through increased

tax take. Assuming ROI remains constant, increases to the Centre of Excellence funding will increase WorldSkills UK's ROI substantially.

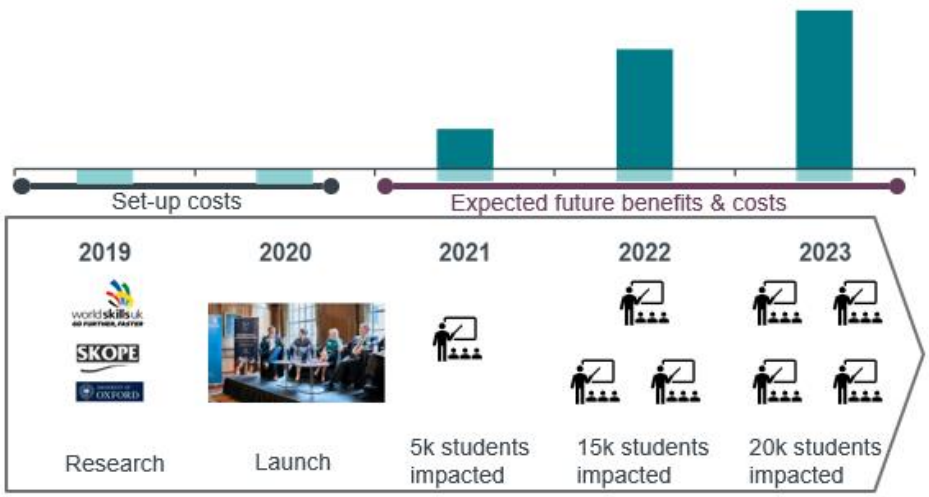
The future ROI of the Centre of Excellence to ESFA is calculated to be at least 4.4x and as much as 5.1x.

The Centre of Excellence is set to account for 78% of projected future thought leadership spend from 2020-2023. ESFA contributes a small amount of funds to the Centre of Excellence while receiving the benefits.

We evaluate the potential future ROI of thought leadership activity using the Centre of Excellence as a case study, discounted to the present. The Centre of Excellence builds on, and would not be possible without, other activities such as skills competitions.

We assume that the Centre of Excellence teacher and trainer impact on students is similar to that of teachers and trainers attending international competitions. We discount the teacher and trainer benefit for students to account for the cost per trainer being 24% lower for the Centre of Excellence compared to international competitions

Figure 11 Cost and benefit timeline of the Centre of Excellence



Source: Internal WorldSkills UK projections, WorldSkills UK plan for Centre of Excellence pilot

Detailed findings

Skills competitions

WorldSkills UK organises a national competitions programme in fields such as engineering, digital, health and construction, and collaborates with WorldSkills International to organise the international competitions programme. The national

competitions programme involves UK apprentices and students competing to be crowned the best in the UK at a certain discipline. The international competitions programme involves the winners of the national competitions competing with other countries (both European and global) as part of Team UK after intensive upskilling and preparation.

Competition Organising Partners (COPs) are contracted to deliver the WorldSkills UK national competition programme. The programme starts with young people registering for competitions in the spring of each year. This is followed by COPs delivering a series of heats during the spring/summer, which can take place anywhere in the UK or remotely. Those who score the highest marks in the heats progress to the national finals in the autumn. The finals provide an opportunity for young people to showcase their strongest talents. Test projects for the finals are designed by the COPs along with industry partners to ensure they reflect the standards that employers are seeking. Competitors in the national finals who are age eligible and achieve the performance benchmark may be invited to join Squad UK and start on a training and development programme towards selection to represent the UK in international competitions.

In the 14 to 18 months following the national finals, members of Squad UK attend training to world-class standards of excellence, undergoing pressure testing through competition and taking part in international exchanges. Before the international competition, the progression and potential of Squad UK members are reviewed and the most promising candidates are selected to be part of Team UK and take part in the international competitions. Every two years, an international competition is held between approximately 70 countries. Every (alternate) two years, a European competition is held (EuroSkills) between approximately 45 countries.[5]

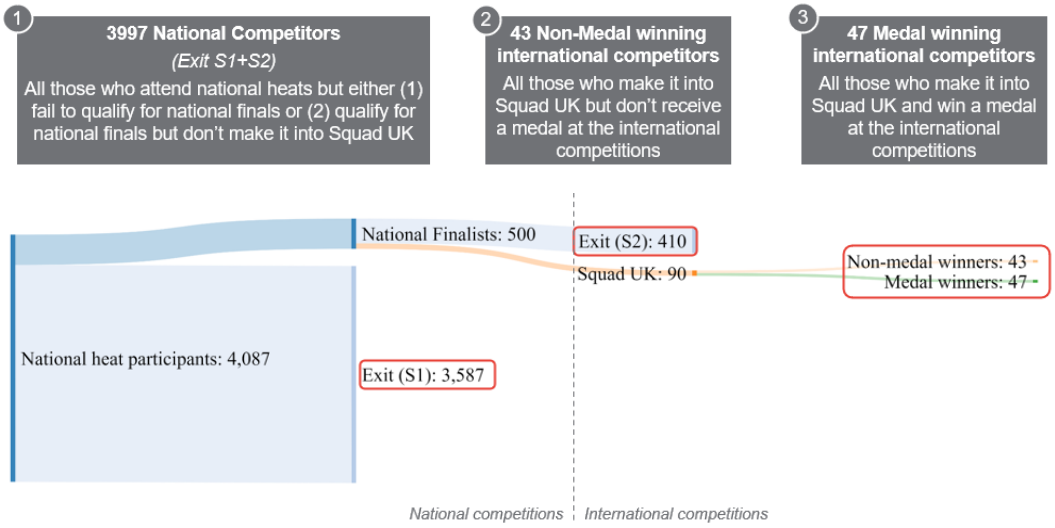
Considering the existence of different stages in the WorldSkills UK's skills competitions, we assumed that the direct benefits arising from upskilling and better signalling in the job market are not the same for each competitor but depend on how far they progress in the competition. For instance, it is reasonable to assume that benefits per student are lower for competitors who participate in the national finals but are not selected as part of Squad UK (from now on **national competitors**), as they do not receive the intense training prior to international competitions. Therefore, we estimated benefits arising through three mutually exclusive and collectively exhaustive competitor groups, based on how far competitors reach in the process:

1. **3397 national competitors** – all those who attend national heats but either fail to qualify for national finals or qualify for national finals but do not make it into Squad UK;
2. **43 non-medal winning international competitors** – all those who make it into Squad UK but do not receive a medal at the international competitions; and

[5] https://www.worldskillsuk.org/skills/how-competitions-work/

3. **47 medal winning international competitors –** all those who make it into Squad UK and win a medal at the European or international competitions.

Figure 12 Competitor flowchart from national heats to medal winners



Source: Frontier Economics analysis of WorldSkills UK internal data

We calculate three main benefits from participating or being close to those who participate in competitions:

- **Direct benefits –** the three groups of participants (e.g. medal winners, Squad UK non-medal winners and national competitors) experience a direct increase in their lifetime earnings as a result of upskilling and better signalling due to participation in the competition;
- **Peer benefits –** each group affects its peers through increased upskilling either in the workplace or in the classroom; and
- **Trainer benefit –** the trainers who attend international competitions are exposed to international best practice and benefit the classrooms and workplaces they return to through upskilling and sharing knowledge.

According to a 2019 report from DfE,[6] the median earnings five years after study completion for learners who achieved a Level 4 education in academic year 2011/12 were £22,230. According to another report from DfE and WorldSkills UK,[7] the median earnings five years after study completion for WorldSkills UK competitors who achieved a full Level 3 education in academic year 2011/12 were £26,989. Therefore, it would be tempting to conclude that, by assuming Level 4 education as the counterfactual (i.e. as the education level that the representative competitor would achieve had they not participated in the competition), the annual average wage premium from upskilling and better signalling of competitors is around £4k. However, we do not know whether Level 4 education is the right

6 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/856797/FE_OBSM_Main_Text.pdf

7 DfE – WorldSkills UK Competitors Descriptive Statistics February 2017

assumption on the counterfactual scenario. Furthermore, we do not know where competitors would be positioned on the distribution of earnings of Level 4 learners five years after study. It may be the case that competitors are on average more talented and/or motivated than the average Level 4 learner (hence their decision to take part in skills competition) and, therefore, the counterfactual scenario would fall in the **top quantiles** of the income distribution, thus making the **median** earnings of Level 4 learners an inadequate counterfactual.

In addition to this, it is unlikely that the annual wage premium is the same across the three groups of competitors we identified as the object of our analysis (see above). In fact, there are two issues to bear in mind:

- *Different degree of upskilling* – each group of competitors is exposed to a different amount of training and, consequently, to a different degree of upskilling (national finalists who do not qualify for Squad UK do not receive the intense preparatory training for international competitions and do not experience the positive effect on skills deriving from it). This would support the view that **the wage premium from skills competitions should be higher** for Squad UK members and medal winners than for national finalists.
- *Selection effect* – it is likely that those who qualify for the international competitions (particularly medal winners) are already more talented, skilled and motivated, so their lifetime earnings would probably be higher than average even if they did not take part in the competitions. This would support the argument that **the wage premium from skills competitions should be lower** for Squad UK members and medal winners than for national finalists.

These two effects work in different directions and without adequate data it is not simple to say which effect prevails.

In an ideal world, we would compare competitors with similar learners who did not attend a competition and randomly assign attainment tests to national finalists and international competitors to measure selection effects for international competitors. In the absence of this data, we made informed assumptions taking a very conservative approach, and we estimated the effects of skills competitions under two scenarios to increase robustness.

To take a very conservative approach, and to account for *different upskilling* and a strong *selection effect*, we scaled the annual wage premium down by between 50% and 80% for medal winners and 75% and 87.5% for national finalists (Figure 13).

Figure 13 Estimation of direct benefits

Selection effects estimation

+£4,000

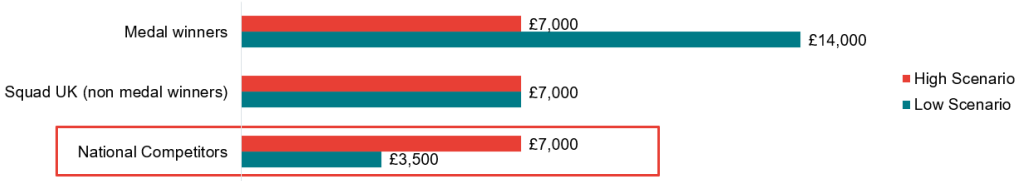
Yearly earnings difference between competitors 5 years after competition compared to level 4 earnings counterfactual

Internal WorldSkills UK analysis of LEO data

Earnings difference explained by participation in competition for…

	Low	High
Scenario explanation	*Declining impact based on progression*	*Flat per-student impact of competing*
Medal winners	50%	25%
Squad UK non-medal winners	25%	25%
National participants	12.5%	25%

Per-student direct benefits (£m) of Skills Competitions



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

To calculate **peer effects,** we had to set the following assumptions based on economic literature:

- 20% peer effect of medal winners on classmates' test scores;[8]
- 10% to 55% peer effect of participants on classmates' test scores (we used the conservative lower bound);[9]
- 3% increase in earnings after college attendance following a one standard deviation increase in FE college value added;[10] and
- 3% business peer effects of peer quality on college wages (repetitive occupations).[11]

Figure 14 shows the estimated per-student/colleague peer effects in the low scenario.

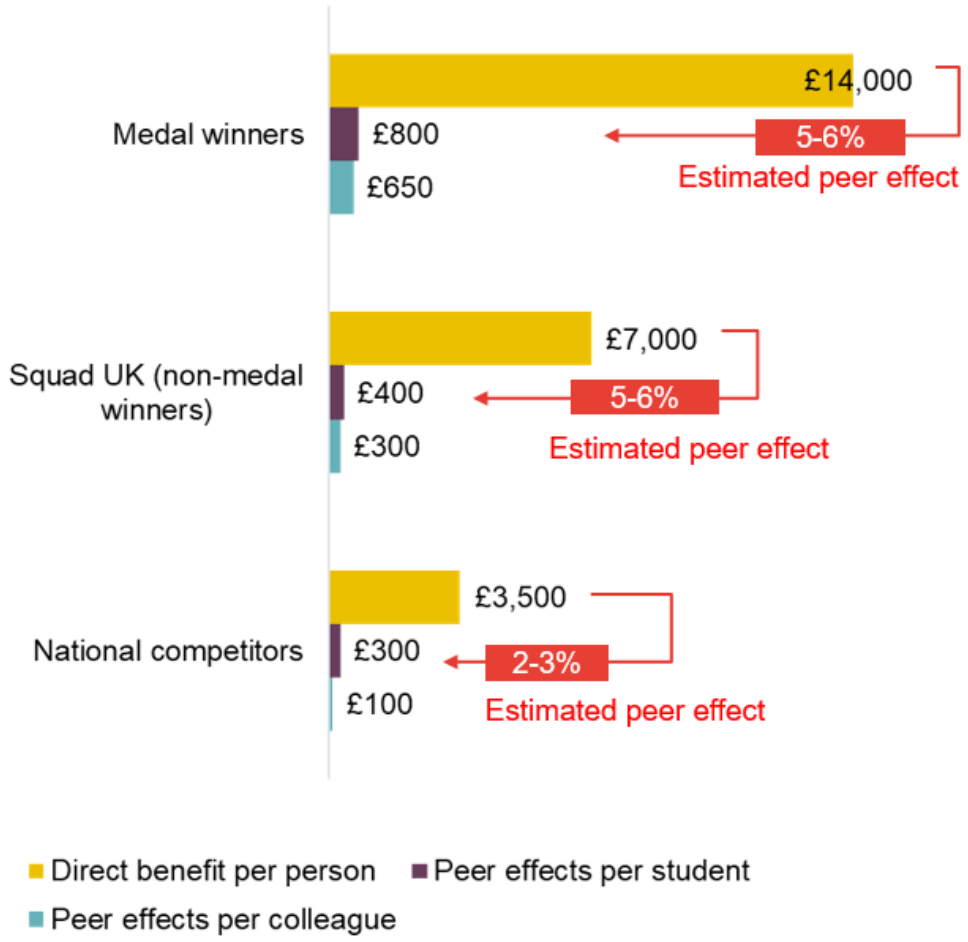
8 Moreira, D., *How Awards Affect Winners' and Peers' Performance in Brazil*, 2017, Job Market Paper

9 Hoxby C., *Peer Effects in the Classroom: Learning from Gender and Race Variation'*, 2000, NBER Working Paper No. 7867

10 Aucejo, E. et al, *Where vs What: College Value-Added and Returns to Field of Study in Further Education,* 2020, Centre for Vocational Education Research, LSE

11 Cornellissen, T. et al, *Peer Effects in the Workplace,* 2009, American Economic Review, Vol. 107, N.2

Figure 14 Per-student/colleague benefits, skills competitions, low scenario



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

As per **trainer benefits,** trainers improve their skills during the competition, increasing their productivity and positively influencing students and colleagues. Survey evidence and interviews suggest that trainers improve a wide set of skills during the competition:

*"From working in Europe and alongside global experts, I have access to **new equipment, new thinking and new ways of training**. This is helping me **shape the training programmes I run** at Southern Regional College where I work" – Training Manager, Wall and Floor Tiling*

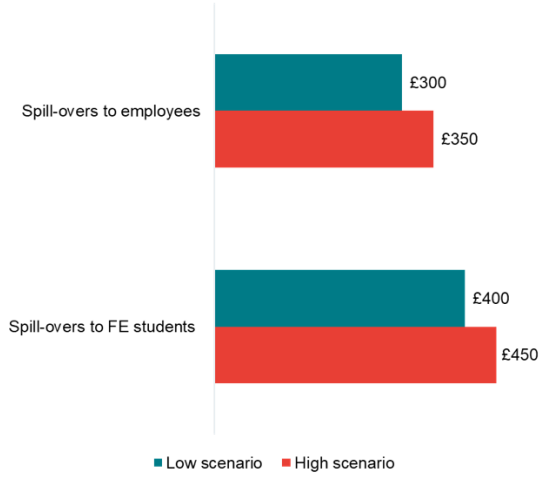
*"For me, being able to work with apprentices and help shape their career is really rewarding but I also benefit from **being part of an international network of experts and this has really enhanced my own career**" – UK Training Manager, CNC Milling*

Based on this evidence, we assume that trainer benefits arise from:

- **Spill-overs to employees –** we conservatively assume that each trainer affects their colleagues in the same way that non-medal winning competitors affect their classmates;
- **Spill-overs to FE students –** we assume the effect of teachers on each student is the same as the estimated non-medal winner peer effects.

We also assume that teachers benefit each class they teach in the future with a yearly decay rate of benefits by 25% – the benefit after five years is 0.42x the estimated benefit.

Figure 15 Per-student/colleague benefits from trainers – skills competitions



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

Overall, the NPV economic benefits generated by the WorldSkills UK's skills competitions programme in the 2018-20 Kazan cycle is estimated to be £25.7m in the low scenario and £55.2m in the high scenario. See Figure 16 and Figure 17 for a detailed breakdown of the benefits and Annexes A and B for an outline of the assumptions underlying these calculations.

Figure 16 Estimation of benefits from skills competitions programme in the low scenario

Benefit	Low scenario calculation	Evidence
Direct benefits = £14.9m	▪ 47 medal winners with a benefit of £14k each ▪ 43 Squad UK non medal winners with a benefit of £7k each ▪ ~4k national competitors with a benefit of ~£3.5k each	DfE/WorldSkills UK analysis of LEO data to estimate competition impact + conservative assumptions on selection bias of competitors based on internal WorldSkills UK competitor data
Classroom peer effects = £7.8m	▪ 571 medal winners peers @ £785 each ▪ 522 Squad UK non-medallist peers @ £392 each ▪ ~48k national competitor peers with a benefit of ~£294 each	Peer-reviewed economic literature on classroom peer effects + DfE data on classroom size + Internal WorldSkills UK data
Colleague peer effects = £2.7m	▪ 246 medal winners colleagues @ £645 each ▪ 225 Squad UK non-medallist colleagues @ £323 each ▪ ~20.9k national competitor colleagues with a benefit of ~£121 each	Peer-reviewed economic literature on business peer effects + ONS data on average workforce + Internal WorldSkills UK data
Trainer benefit = £0.25m	▪ 290 colleagues in a company a trainer returns to after a competitions @ £323 ▪ 413 students affected by trainer returning to FE colleges at @ £392 each	Internal WorldSkills UK data on trainers and survey evidence on upskilling after international competitions + DfE data on class size and teacher tenure + peer - reviewed economic literature on classroom peer effects

Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

Figure 17 Estimation of benefits of skills competitions programme in the high scenario

Benefit	High scenario calculation	Evidence
Direct benefits = £32.3m	▪ 47 medal winners with a benefit of £8k each ▪ 43 Squad UK non medal winners with a benefit of £8k each ▪ ~4k national competitors with a benefit of £8k each	DfE/WorldSkills UK analysis of LEO data to estimate competition impact + conservative assumptions on selection bias of competitors based on internal WorldSkills UK competitor data
Classroom peer effects = £16.6m	▪ 571 medal winners peers @ £443 each ▪ 522 Squad UK non-medallist peers @ £443 each ▪ ~48k national competitor peers (half of all those in the relevant classrooms) with a benefit of £664 each	Peer-reviewed economic literature on classroom peer effects + DfE data on classroom size + Internal WorldSkills UK data
Colleague peer effects = £5.9m	▪ 246 medal winners colleagues @ £366 each ▪ 225 Squad UK non-medallist colleagues @ £366 each ▪ ~20.9k national competitor colleagues with a benefit of ~£274 each	Peer-reviewed economic literature on business peer effects + ONS data on average workforce + Internal WorldSkills UK data
Trainer benefit = £0.29m	▪ 290 colleagues in a company a trainer returns to after a competitions @ £366 ▪ 413 students affected by trainer returning to FE colleges at @ £443 each	Internal WorldSkills UK data on trainers and survey evidence on upskilling after international competitions + DfE data on class size and teacher tenure + peer - reviewed economic literature on classroom peer effects

Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

While having confidence in the validity of the results of this impact assessment, we acknowledge that more research can be conducted through the analysis of further data to get new interesting insights and improve robustness. For instance, we made informed assumptions on the estimated wage uplift and considered potential selection effects due to higher achievement. The analysis of longitudinal education outcomes (LEO) data (DfE) could enable us to robustly estimate wage uplift from competitions against similar learners who did not attend competitions and randomly assign attainment tests to national finalists and international competitors to measure selection effects for international competitors.

The WorldSkills UK LIVE event

Every year at the NEC in Birmingham, WorldSkills UK hosts the UK's largest skills, careers and apprenticeships event. Attendance is for those aged 10 to 24+ and is predominantly in the 14-18 age range. The event hosts hundreds of employers as well as career representatives from the National Careers Service and the National Apprenticeship Service. The national finals of the skills competitions programme are hosted at the LIVE event.

At the LIVE event, young people are exposed to technical and vocational skills, have interactions with employers and can get careers advice from experts. The key benefit of the event is improving the information about FE and careers available to young people, linked with observing the skills competition finals in action, equipping them to make more efficient decisions about their education and career.

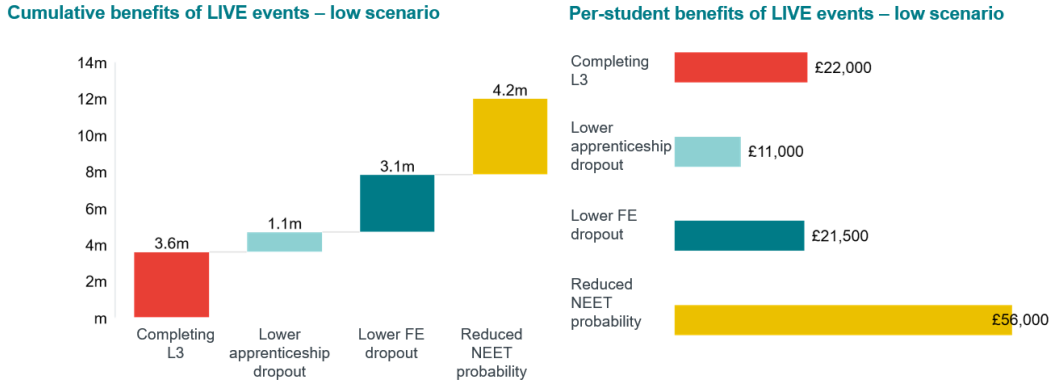
In the context of careers advice, WorldSkills UK also offers a careers advice toolkit: a digital guide for supporting young people with employability skills and careers information, by supporting independent online learning, as well as any careers curriculum.

Receiving careers advice at the LIVE event and/or using the digital toolkit theoretically improves the information about the FE and careers available to young people. Hence, it equips students to make more efficient decisions, improves job matching and leads to a more efficient allocation of resources in the job market. This abstract concept of reduced information failure in the job market practically consists of a variety of tangible long-term outcomes. The three immediate outcomes that we were able to measure with the data available are: (i) a reduced probability of becoming NEET (not in employment, education or training); (ii) an increased likelihood of completing a Level 3 education; and (iii) reduced dropout rates from apprenticeships and from FE.

In theory, careers advice could result in other outcomes, such as reduced skills gaps, which we were not able to estimate with the available data. These are discussed in Section 3.

Figure 18 shows the cumulative and per-student benefits of LIVE events in the low scenario, broken down by outcome category.

Figure 18 Cumulative and per-student benefits of LIVE events in the low scenario



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

The reduction in NEET probability has a relatively large effect but occurs for only 75 attendees (0.75 per 1,000). The benefit of lower FE dropouts and increased likelihood of completing Level 3 is estimated to be the same:

- 165 attendees in years 7-11 (1.6 per 1,000) are affected by increasing propensity of completing Level 3; and
- 143 attendees in years 12-13 (1.4 per 1,000) are affected by a lower FE dropout likelihood.

The reduction in apprenticeship dropouts affects 99 attendees (1 in 1,000).

Overall, the NPV of economic benefits generated by the LIVE event in the 2018-20 Kazan cycle is estimated to be £12.9m in the low scenario and £18.6m in the high scenario. See Figure 19 and Figure 20 for a detailed breakdown of the benefits and the Annexes A and B for an outline of the assumptions underlying the calculations.

Figure 19 Estimation of benefits of the LIVE event in the low scenario

Benefit	Low scenario calculation	Evidence
Completing Level 3 = £3.6m	165 attendees affected with a benefit of £21,760 each	Internal WorldSkills UK survey evidence and assumptions about extent of upskilling
Reduced apprenticeship dropout = £1.1m	99 attendees affected with a benefit of £11,200 each	Internal WorldSkills UK survey evidence and DfE statistics on dropout rates
Reduced FE dropout = £3.1m	143 attendees affected with a benefit of £21,760 each	Internal WorldSkills UK survey evidence and DfE statistics on dropout rates
NEET reduction = £4.2m	75 attendees affected with a benefit of £56,000 each	Internal WorldSkills UK survey evidence, DfE statistics on NEET proportions and studies on careers advice impact on NEET reduction
Digital Toolkit impact = £0.9m	7,750 users affected with a benefit of £119 each	Assumptions about extent of upskilling and internal evidence on users
Impact on skills champions = £0.1m	62 skills champions affected with a benefit of £2,188 each	Assumptions about extent of upskilling and internal survey data on extent of Skills Champions impacts
Impact of skills champions sessions = £0.1m	5,505 session attendees affected with a benefit of £30 each	Assumptions about extent of upskilling and internal survey data on extent of Skills Champions impacts

Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence

Figure 20 Estimation of the benefits of the LIVE event in the high scenario

Benefit	High scenario calculation	Evidence
Completing Level 3 = £7.1m	330 attendees affected with a benefit of £21,760 each	Internal WorldSkills UK survey evidence and assumptions about extent of upskilling
Reduced apprenticeship dropout = £2.8m	99 attendees affected with a benefit of £28,160 each	Internal WorldSkills UK survey evidence and DfE statistics on dropout rates
Reduced FE dropout = £3.1m	143 attendees affected with a benefit of £21,760 each	Internal WorldSkills UK survey evidence and DfE statistics on dropout rates
NEET reduction = £4.2m	75 attendees affected with a benefit of £56,000 each	Internal WorldSkills UK survey evidence, DfE statistics on NEET proportions and studies on careers advice impact on NEET reduction
Digital Toolkit impact = £1.3m	7,750 users affected with a benefit of £171 each	Assumptions about extent of upskilling and internal evidence on users
Impact on skills champions = £0.3m	62 skills champions affected with a benefit of £4,947 each	Assumptions about extent of upskilling and internal survey data on extent of Skills Champions impacts
Impact of skills champions sessions = £0.2m	5,505 session attendees affected with a benefit of £43 each	Assumptions about extent of upskilling and internal survey data on extent of Skills Champions impacts

Source: Frontier Economics

While having confidence in the validity of the results of this impact assessment, we acknowledge that more research can be conducted through the analysis of further data to get new interesting insights. A key recommendation for further research would be to consider adding a follow-up survey of LIVE event attendees to track their career decisions one to two years after the event and use LEO data (DfE) to compare them with similar learners who did not attend the LIVE event. Additionally, we made informed assumptions on the impact of the toolkit based on the overall benefits of the LIVE event (see Annexes). Another recommendation for further

research would be to consider conducting a survey of digital toolkit users to evidence the impact of the toolkit on increased career knowledge and other key outcomes and to consider incorporating questions on the digital toolkit in the annual survey of LIVE event participants.

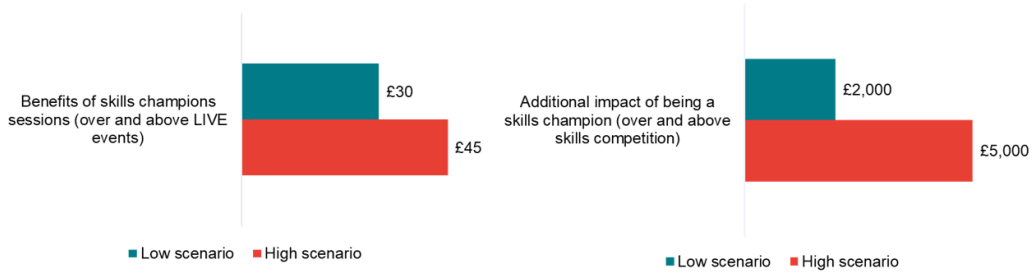
Skills champions

Skills champions are alumni from the skills competitions programme who act as role models for young people, act as career advocates for WorldSkills UK and deliver careers advice sessions in schools and colleges. Skills champions also participate in youth advisory panels and attend networking sessions and training workshops.

The benefits of skills champions' activities are based on higher earnings from students attending sessions and trainers delivering sessions.

When estimating the impact of attending skills champions sessions on students' lifetime earnings, we took a very conservative approach. In fact, to avoid double counting of benefits, we assumed that, for those students who did not attend the LIVE event (23%), attending a skills champions session had the same impact on lifetime earnings as attending a LIVE event. Whereas for students who also attended the LIVE event, attending a skills champion session had no additional impact on lifetime earnings. In other words, in each scenario, attending a skills champions session had a positive benefit only on those students who did not attend the LIVE event (23% of the total). In this way, the per-student benefit of skills champions sessions in each scenario will be equal to 23% of the per-student benefit of LIVE events.

Figure 21 Cumulative per-student benefits of skills champions – low scenario



Source: Frontier Economics

When estimating the impact on skills champions' lifetime earnings resulting from delivering skills champions sessions, we assume that skills champions have a 20% uplift in net earnings on top of their LIVE participation as a result of delivering sessions. This is consistent with previous similar and evidenced studies showing that they acquire soft skills as part of their training. Therefore, in each scenario, the additional benefit of being a skills champion is equal to 20% of the benefit on national competitors' lifetime earnings (Figure 22).

Figure 22 Cumulative benefits of skills champions in low scenario

Source: Frontier Economics

Overall, the NPV of economic benefits generated by skills champions sessions in the 2018-20 Kazan cycle is estimated to be £300,405 in the low scenario and £543,817 in the high scenario.

Thought leadership

WorldSkills UK invests in research on vocational education and influences policy to help inspire young people to undertake vocational careers.

As part of its thought leadership activity, WorldSkills UK has recently launched the Centre of Excellence, which identifies best practice in teaching and assessing technical skills at the international level and brings this knowledge and experience to technical education and apprenticeships in the UK to improve teaching and learning, thereby enabling young people to achieve higher standards. This is aimed at mainstreaming the world-leading skills that international competitors are exposed to.

The Centre of Excellence programme was developed following research conducted by Centre on Skills, Knowledge and Organisational Performance (SKOPE), part of the University of Oxford and WorldSkills UK.

By August 2023, the WorldSkills UK Centre of Excellence will:

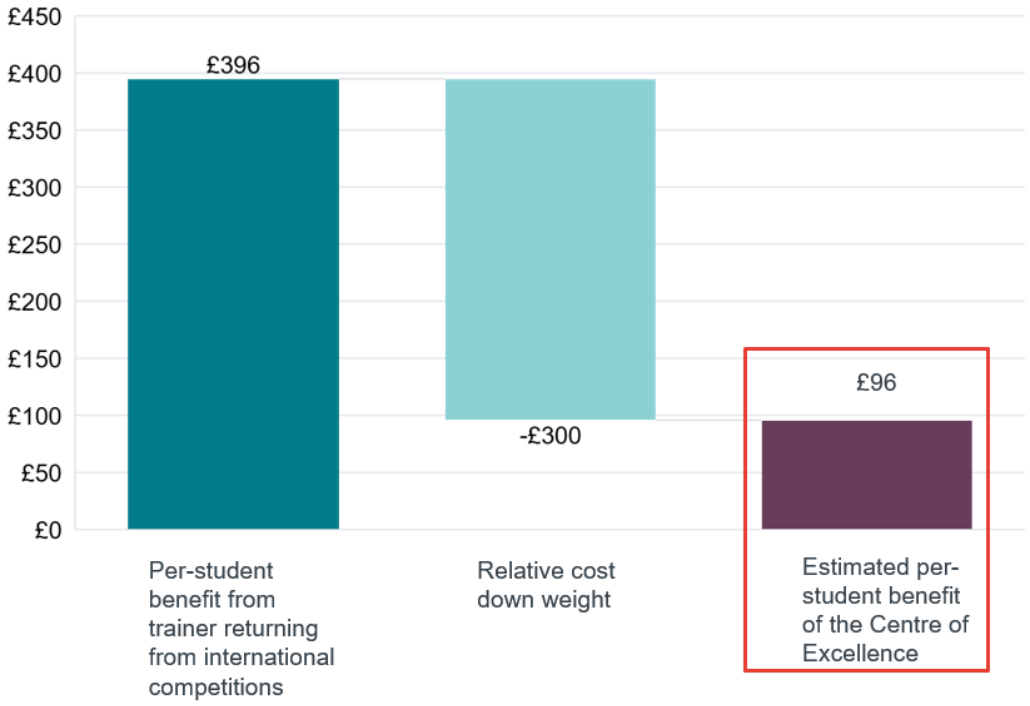
- Promote and advance technical learning so that teaching quality is higher, and staff, student and apprentice performance is raised;

- Support educators to gain high-performing and industry-relevant skills that enhance their career development and progression;
- Provide students and apprentices with increased confidence and career aspirations and give them a springboard for transition into FE and careers;
- Give employers a more highly qualified and performing young workforce, which will support higher business productivity;
- Grow the profile and positive reputation of NCFE and increase both NCFE's and WorldSkills UK's reach and impact across technical education; and
- Boost social mobility to change the lives of learners from all backgrounds.

We discounted the present value of expected future benefits of the Centre of Excellence along with set-up costs to estimate the present value of ROI.

To estimate the benefits of the Centre of Excellence, we assume that the benefit per student is the same benefit each student experiences from trainers returning from international competitions (which we estimate in section 3.2.1 when discussing trainer peer effects), downweighed by its relative cost. In other words, since the benefit per student from trainers returning from the international competition is £396 and the cost per trainer of the Centre of Excellence is 24% of that of trainers in Kazan (according to internal WorldSkills UK data), the estimated per-student benefit of the Centre of Excellence is £96. This estimate is conservative due to the Centre of Excellence's focus on increasing trainer effectiveness. In fact, it would be enough to assume that a Centre of Excellence trainer is three times as effective as an international competition trainer in getting the same per-student benefit from trainers returning from the international competition programme.

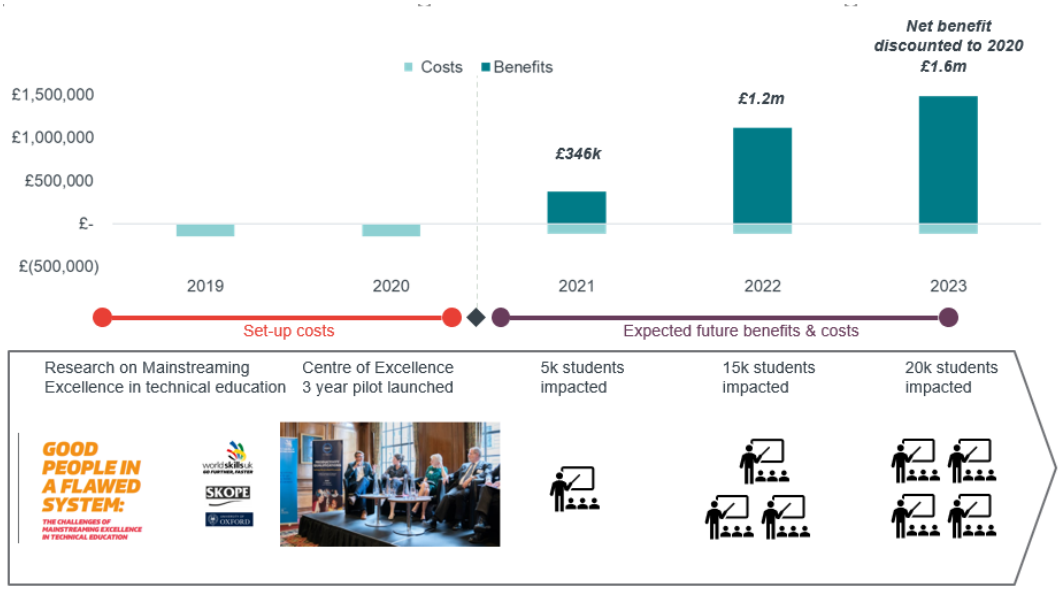
Figure 23 Calculation to estimate per-student benefits of Centre of Excellence in low scenario



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence.

Overall, the NPV of economic benefits generated by the Centre of Excellence between 2021 and 2023 is estimated to be £2.9m in the low scenario and £3.4m in the high scenario.

Figure 24 Estimation of present ROI from Centre of Excellence between set-up and end of 3-year pilot



Source: Frontier Economics analysis of WorldSkills UK internal data and external evidence; Internal WorldSkills UK projections, WorldSkills UK plan for Centre of Excellence

While having confidence in the validity of the results of this impact assessment, we acknowledge that more research could be conducted through the analysis of further data to get new interesting insights and increase the robustness of current ROI calculation. For instance, we used estimates of upskilling in the national competitions to proxy trainer impacts. One way to expand on the current estimates would be to track the development of skills of trainers in the Centre of Excellence and compare them to a suitable comparator (e.g. the average for the subject area). Another avenue that future research may explore is to use experimental or quasi-experimental designs to look at how access to the Centre of Excellence might affect educational outcomes.

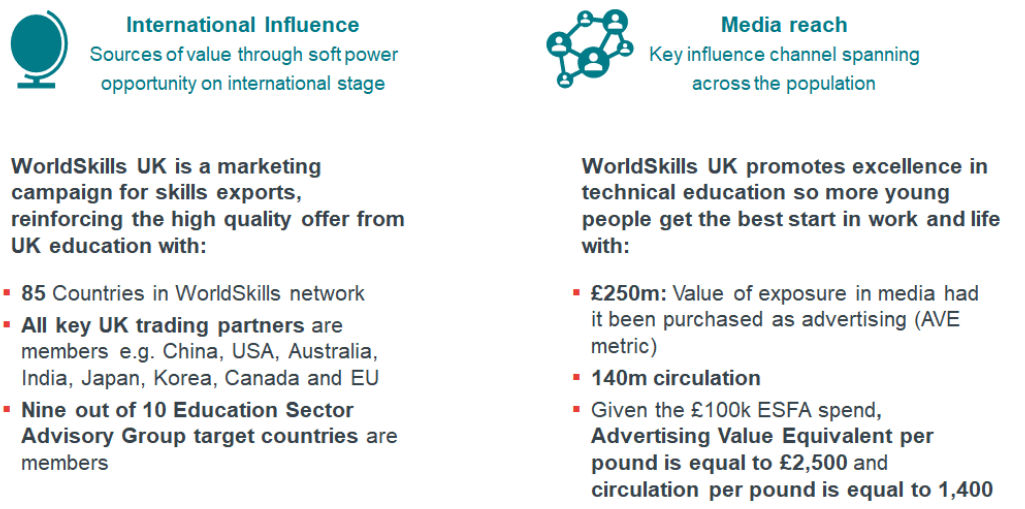
Benefits not captured in ROI calculations

There are many other benefits from WorldSkills UK's activities which are not captured in the ROI and which could be quantified through further research.

Influence on policy and practice

WorldSkills UK publishes and commissions research and outreach, engages with government stakeholders with evidence developed through its activities and reaches significant audiences across various media platforms.

Figure 25 Facts on international influence and media reach



Source: Frontier Economics and WorldSkills UK

WorldSkills UK's investment in insights and research is likely to have positive returns by providing evidence to inform vocational policy and practice. Furthermore, stakeholder engagement can lead to changes in attitudes, in practice and in policy formulation. Our assessment does not include this channel of impact.

Our key recommendations for further research to estimate the economic benefit of WorldSkills UK's policy influence include:

- Tracking engagements that senior leadership has with key policy stakeholders and documenting direct outcomes as part of the engagement (e.g. informed skills strategy etc.);
- Yearly collection of information regarding WorldSkills UK's "brand awareness", with the aim of estimating the changes to brand awareness as a result of changes in reach; and
- WorldSkills UK compiling key gaps in evidence for technical and vocational education research and tracking how its research has supported the filling of said gaps.

Teacher upskilling

We captured the influence of the competitions programme on upskilling teachers and trainers and its subsequent effect on the outcomes of students in their classrooms via classroom peer effects. There is a potentially significant further benefit of teacher upskilling for students in other classrooms which has not been quantified.

Training students for the national competition has a potential upskilling benefit for teachers which could spill over to future students.

*"Central to **teachers embedding competitions** across the curriculum has been **developing their comprehension in this area**. The college runs an induction programme in which lecturers are given an understanding of competition strategies, techniques and training. For lecturers, the challenge of a competition brings **fun and exciting new elements into teaching, learning and assessment**, making the experience more involved for all concerned." A Competitive Edge – The Case for Skills Competitions: Colleges*[12]

The potential upskilling benefit for teachers could, in theory, affect other classrooms and workshops outside of the one relevant for the competition.

Our key recommendation for further research to estimate the economic benefit of teacher upskilling is to collect evidence from teachers with a competition participant in class to determine:

- The extent to which new techniques learned by the competitor were adopted by the students;
- The extent to which training a student increased the standard of teaching, for example through the production of teaching material during the training; and
- The extent to which any teacher upskilling was shared with similar teachers in the same college/employer.

Skills gaps and spill-overs

Skills competitions are expected to have the following additional and potentially very significant impacts:

- Reduction of skills gaps and skills mismatch in the UK job market (a relevant number of WorldSkills UK competitions are in occupations with a considerable skills gap); and
- Productivity spill-overs between one firm which employs a competition participant and one that does not.

Skills gaps cost the UK up to £6.3bn a year. The Open University's Business Barometer estimates the direct cost of skills shortages in the UK at £6.3bn each year. Research from City & Guilds[13] suggests that nine out of ten UK employers struggle to recruit and two-thirds predict that skills shortages will stay the same or get worse in the next three to five years.

WorldSkills UK competitions focus on many hard-to-fill vacancies. In fact, 11 hard-to-fill vacancies are directly relevant and covered by WorldSkills UK. The main reason for hard-to-fill vacancies is a lack of necessary skills/skilled employees to do a certain job.[14] These competitions are likely to help close skills gaps by advertising and upskilling young people in hard-to-fill professions.

[12] WorldSkills UK internal report

[13] See: https://www.cityandguilds.com/skills-gap

[14] https://graduatemarkettrends.cdn.prismic.io/graduatemarkettrends/f90f52ec-a7ed-45bc-a9b8-1873c0da2c41_skills-shortages-in-the-uk-201920.pdf

Figure 26 Hard-to-fill vacancies covered by a WorldSkills UK competition

Hard-to-fill vacancies covered by a WSUK competition
Programmers and software development professionals
IT users support technicians
Engineering professionals n.e.c
Design and development engineers
Business sales executive
Sales account and business development managers
Marketing associates professionals
Web design and development professionals
Chartered and certified accountants
Nurses and medical practitioners

Source: https://graduatemarkettrends.cdn.prismic.io/graduatemarkettrends/f90f52ec-a7ed-45bc-a9b8-1873c0da2c41_skills-shortages-in-the-uk-201920.pdf

Our key recommendation for further research to estimate the economic benefit of WorldSkills UK's reduction of skill gaps and spill-overs is to track career interest before and after a LIVE event, enhancing the current survey, to estimate whether skills/vocations with a high skills gap were visited by attendees who previously did not consider the vocation to be of immediate interest.

International influence

Participation in international competitions could potentially:

- Raise the profile and prestige of UK skills systems, enhancing the export potential of education products;
- Raise the profile of UK PLC to other countries, increasing cross-border collaboration;
- Raise the profile of the UK as an investment destination due to high standards in skills, driving foreign and direct investment (FDI); and
- Increase knowledge spill-overs due to knowledge transfer of skills best practice from other countries.

Countries that invest heavily in the UK take part in international competitions. The top source markets for FDI projects in the UK (in red in Figure 27) are all part of the WorldSkills UK network.

Figure 27 Top source markets for FDI projects in the UK

Source: Frontier Economics

These markets created a total of 1,102 unique inward investment projects in 2019/20 and 36,000 new jobs as a result of successful FDI into the UK in 2019/20. The promotion of UK vocational education adds value to the UK economy. Advertising vocational education abroad is a benefit of participation in the international competitions. There is a small but significant group of international FE students in the UK – a 2018 report estimated that around 14,000 international students had been sponsored to study FE in the UK.

A study from the Department for Business, Innovation and Skills (BIS) estimated that these students contributed £41.6m in tuition fees to colleges. However, there is likely to be a considerable underestimate of the total economic impact of these students, as a significant part of the overall economic benefit of an international student comes from spending of foreign income on goods and services within the economy (beyond tuition fees, e.g. living costs). As such, there could be significant benefits from advertising UK technical and vocational education abroad through the international competition events and increasing education exports.

Our key recommendations for further research to estimate the economic benefit of WorldSkills UK's international influence include:

- Collecting evidence from employer participants at WorldSkills events to survey whether they engaged with employers from other countries and potential investors; and
- Analysing the UK's medal position by skills and its correlation with associated increases in foreign investment related to those skills.

CONCLUSIONS

The impact and value of WorldSkills UK activities are large.

We conservatively estimate a ROI for the taxpayer (from established activities) of at least £2.40 and as much as £4.50 for every pound invested in WorldSkills UK, suggesting high value for money.

An even higher return is likely to be achieved through the investment in the Centre of Excellence, a relatively new initiative which was valued separately.

The impact of WorldSkills UK is further evidenced by its ability to leverage private funding – for every £1 of public money it receives, WorldSkills UK attracts a further 89p of funding from the private sector, including significant value-in-kind contributions.

Finally, the reach of the organisation is testament to its ability to engage the wider FE sector as well as international partners and learners themselves: over 200,000 young people have been engaged each year by WorldSkills UK through its activities.

The benefits to the taxpayer in our headline ROI calculations (excluding Centre of Excellence) come from three main sources:

- The largest benefit is a direct upskilling effect of individuals participating in the skills competitions programme (national or international) as a result of the training received and the competitions themselves (e.g. competitors are likely to pick up additional skills by observing and learning from other competitors). This effect is reflected in the increased lifetime earnings of participants due to improved skills and better signalling of their skills.
- As well as the direct upskilling effect, we were able to value peer effects whereby students participating in the skills competitions programme provide spill-over benefits for their peers by sharing knowledge and/or inspiring their fellow students/colleagues to perform at a higher level, leading to improved performance (proxied by improved lifetime earnings) for the peers themselves.
- Finally, increased information about career prospects and career guidance is likely to lead to better educational and job matching for students receiving career advice (at the LIVE event), once again leading to improved educational outcomes (e.g. reduced likelihood of dropping out and higher likelihood of completing technical education), earnings and employability over their lifetime.

In addition to these quantifiable benefits, there are a number of positive impacts from WorldSkills UK's activities which were not captured in our assessment either because they are still in their early stages of development or due to unavailability of data to support the assessment. Many of these benefits could be quantified through further research.

These include the wider work that WorldSkills UK does which has the potential to influence policy making and practice in the sector – the work of WorldSkills UK

has been referenced in the Skills for Jobs White Paper[15] and Ofsted's Further Education and Skills Inspection Handbook.[16]

As noted above, one of the key benefits we were able to quantify is the influence on competitors of participating in the competitions programme. Upskilling teachers through competitions activity and the subsequent benefit of this for the outcomes of students in their classroom via classroom peer effects are also likely to be significant. There is a potentially significant further benefit from teacher upskilling for students in other classrooms (through wider college effects) which has not been quantified. This is particularly relevant and important as WorldSkills UK's strategic direction includes a drive to raise the quality of the workforce in FE and technical skills provision.

Another potential benefit is around reducing skills gaps and wider productivity spill-over effects. It is likely that WorldSkills UK's activities have an effect in reducing skills gaps and skills mismatch in the UK labour market (a number of WorldSkills UK's competitions are in occupations with a considerable skills gap) and this will have a value over and above what has been calculated in our work. Further, the spill-over effects we valued only apply within the employer firm – productivity spill-overs between one firm which employs a competition participant and one that does not may also be present. This too is a significant area for further development given WorldSkills UK's increased focus on its role in identifying and providing solutions to skills challenges, especially in sectors key to the UK's economic future such as engineering, digital and green skills.

Another important benefit which we have not captured in our work is the international influence of WorldSkills UK. By being a key member of the WorldSkills network, WorldSkills UK is able to:

- Raise the profile and prestige of UK skills, possibly enhancing the export potential of education products;
- Raise the profile of UK PLC to other countries, increasing cross-border collaboration;
- Raise the profile of the UK as an investment destination due to high standards in skills, potentially helping to attract investment; and
- Increase knowledge spill-overs due to knowledge transfer of skills best practice from other countries.

Taken together, these additional benefits are likely to generate additional value for the UK over and above what was included in our assessment. All of this points to WorldSkills UK delivering high value for money for the UK taxpayer and, as such, there is a strong case for continued support for the organisation by the Department for Education.

[15] See Chapter 5: Supporting outstanding teaching, paragraph 152 available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957810/Skills_for_jobs_lifelong_learning_for_opportunity_and_growth__print_version_.pdf

[16] See paragraph 252, available at: https://www.gov.uk/government/publications/further-education-and-skills-inspection-handbook-eif/further-education-and-skills-handbook

ANNEX A CALCULATION DETAILS

A.1.1 Skills competitions

N.B. Curly brackets in the table below contain the range of values from high to low scenarios for the varying parameters.

Benefit	Number of people affected	Per-person benefit	Value for money
Benefits from increased lifetime earnings of medal winners	47 medal winners International competitors who win a medal on the international stage	{£43,726.65; £24,736.14} (estimated increase in individual lifetime NPV as a result of competing) × 32% (Government NPV benefit ratio to individual gross earnings) = {£14,004; £7,916} (NPV to Government resulting upskilling)	Low scenario = £372k High scenario = £658k
Benefits from increased lifetime earnings of members of Squad UK	43 members of Squad UK (non-medal winners) International competitors who don't win a medal on the international stage	{£24,736.14; £21,881.33} (estimated increase in individual lifetime NPV as a result of competing) × 32% (Government NPV benefit ratio to individual gross earnings) = {£7,916; £7,002} (NPV to Government resulting from upskilling)	Low scenario = £301k High scenario = £340k
Benefits from increased lifetime earnings of national competitors	3,997 national competitors National competitors who don't make it to the international competition but participate in heat qualifiers	{£24,736.14; £10,940.66} (estimated increase in individual lifetime NPV as a result of competing) × 32% (Government NPV benefit ratio to individual gross earnings) = {£7,916; £3,997} (NPV to Government resulting from upskilling)	Low scenario = £14m High scenario = £31m

A.1.2 Skills competitions – medal winner spill-overs

N.B. Curly brackets in the table below contain the range of values from high to low scenarios for the varying parameters.

Benefit	Number of people affected	Per-person benefit	Value for money
Benefits from classroom spill-overs of medal winners	18 (Average class size of FE Colleges) × 47 (number of medal winners) × 67.5% (proportion of medal winners in FE colleges) = 571 affected classmates	{£2,453.13; £1,386.59} (estimated increase in individual lifetime NPV as a result of peer effects of medal winners) – peer effects 6% of direct effect = {£785.00;- £443.71}	Low scenario = £253k High scenario = £448k
Benefits from worker peer effect spill-overs on medal winners	47 (medal winners) × 16.07 (average firm employees) × 32.5% proportion of competitors not in FE colleges) = 246 affected colleagues	{£2,203.83; £1,143.93} (estimated lifetime NPV of wage uplift of medal winners' colleagues) – colleague peer effects 5% of direct effect = {£674.63; £366.06}	Low scenario = £89k High scenario = £159k

A.1.3 Skills competitions – non-medal winning Squad UK spill-overs

N.B. Curly brackets in the table below contain the range of values from high to low scenarios for the varying parameters

Benefit	Number of people affected	Per-person benefit	Value for money
Benefits from classroom spill-overs of Squad UK members (non-medal winners)	18 (Average class size of FE Colleges) × 43 (number non-medal winners Squad UK members) × 67.5% (proportion of medal winners in FE colleges) = 522 affected classmates	{£1,386.59; £1,226.57} (estimated increase in individual lifetime NPV as a result of peer effects of non-medal winning Squad UK members) – peer effects 6% of direct effect) = {£443.71; £392.5} (increase in Government NPV as a result of peer effects of Squad UK members)	Low scenario = £205k High scenario = £231k
Benefits from worker peer effect spill-overs on Squad UK members	43 (non-medal winners Squad UK members) × 16.07 (average firm employees) × 32.5% proportion of competitors not in FE colleges) = 225 affected colleagues	{£1,143.93; £1,011.92} (estimated lifetime NPV of wage uplift of non-medal winning Squad UK colleagues) – colleague peer effects 5% of direct effect = {£366.06; £323.81} (increase in Government NPV from business spill-overs)	Low scenario = £73k High scenario = £82k

A.1.4 Skills competitions – national competitors spill-overs

N.B. Curly brackets in the table below contain the range of values from high to low scenarios for the varying parameters

Benefit	Number of people affected	Per-person benefit	Value for money
Benefits from classroom spill-overs of national competitors	18 (Average class size of FE Colleges) × 3,997 (number of national competitors) × 67.5% (proportion of medal winners in FE colleges) × 50% (proportion of class affected) = 24,282 affected classmates	{£2,079.89; £919.92} (estimated increase in individual lifetime NPV as a result of peer effects of national competitors) – peer effects 3% of direct effect = {£665.56; £294.38}	Low scenario = £7.1m High scenario = £16.1m
Benefits from worker peer effect spill-overs of national competitors	3,997 (number of national competitors) × 16.07 (average firm employees) × 32.5% proportion of competitors not in FE colleges) = 20,880 affected colleagues	{£1,143.93; £505.95} (estimated lifetime NPV of wage uplift of national competitor colleagues) – colleague peer effects 3% of direct effect = {£274.55; £121.43}	Low scenario = £2.5m High scenario = £5.7m

A.1.5 Skills competitions – business spill-overs due to trainer upskilling

N.B. Curly brackets in the table below contain the range of values from high to low scenarios for the varying parameters

Benefit	Number of people affected	Per-person benefit	Value for money
Benefits from trainers upskilling (spill-overs to employees)	37 (number of trainers) × 44% (proportion of trainers not in FE colleges) × 16.07 (average firm employees) = 262 affected classmates	{£366.06 ; £323.81} (international non-medal winner business peer effect) = {£366.06 ; £323.81} (Government NPV from business spill-overs)	Low scenario = £84k High scenario = £95k
Total benefits from trainers upskilling (FE student spill-overs)	37 (number of trainers) × 56% (proportion of trainers in FE colleges) × 18 (average class size of FE colleges) = 373 affected students	{£1,200 ; £1,000} (Gov. NPV of estimated increase in yearly income through increased training) + £11 NPV of discounted yearly benefit of increased teaching quality on subsequent classes, assuming 25% YoY decay of benefits till retirement. = {£1,225; £1,084} (Government NPV of per-student effect from better training)	Low scenario = £404k High scenario = £457k

A.1.6 Careers advice – LIVE event

N.B. Curly brackets in the table below contain the range of values from high to low scenarios for the varying parameters

Benefit	Number of people affected	Per-person benefit	Net present value
Completing Level 3	100,655 total attendees × 25% (proportion of students shifting career plan as a result of careers advice) × 66% (proportion of attendees year 7-11) × {2%; 1%} (increase in switching to Level 3 due to a shift in material planning) = {330; 165} students affected	£68,000 (NPV for a student completing a Level 3 qualification) × 32% (Government NPV benefit ratio to individual gross earnings) = £21,760 lifetime value to Government of a student completing Level 3	Low scenario = £3.5m High scenario = £7.1
Reduced dropouts from apprenticeships	100,655 total attendees × 7% (proportion of students planning on working on apprenticeships post 18) × 28% (proportion of attendees year 12, 13) × 4.8% (reduction in dropout rate) = 94 students affected	{£88,000; £35,000} (lifetime increase in private NPV benefit ratio to individual gross earnings) × 32% (Government NPV benefit ratio to individual gross earnings) = {£28,160; £11,200} (lifetime value to Government from a student not dropping out)	Low scenario = £1.2m High scenario = £2.6m
Reduced dropouts from FE	100,655 total attendees × 25% (proportion of students shifting career plan as a result of careers advice) × 29% (proportion of attendees year 12, 13) × 1.94% (reduction in dropout rate) = 143 students affected	£21,760 (lifetime value to Government from a student not dropping out of FE)	Low scenario = £3.1m High scenario = £3.1m

NEET reduction	100,655 total attendees × 25% (proportion of students shifting career plan as a result of careers advice) × 9.9% NEET rate × 3% NEET reduction rate after careers advice = 75 affected students	£56,000 (Lifetime value to Government from a student not becoming NEET)	Low scenario = £4.2 High scenario = £4.2
Digital toolkit impact	62,000 digital toolkit users x 25% who did not attend a LIVE event = 15,500 (digital toolkit users who didn't attend LIVE)	{£179.07; £122.9} (Per-person benefit of attending LIVE event) × 50% (assume benefit of toolkit is half of attending LIVE event) = {£89.54; £61.45}	Low scenario = £0.9m High scenario = £1.3m
Impact on skills champions	62 skills champions Skills champions are ex-national finalists/international competitors who deliver career advice sessions in colleges	{£24,736; £10,941} (per-student impact of national competition) × 20% (assumed uplift due to delivering skills champions sessions) = {£4,947.23; £2,188.1} (additional impact of being a skills champion – over and above skills competition)	Low scenario = £136k High scenario = £306k
Skills champions sessions impact	5,505 (Number of students in sessions)	{£192.9; £132.4} (per-student benefit of attending LIVE) × 23% (proportion of involved students not attending LIVE events) = {£44.88; £30.80} (benefits of skills champions sessions – over and above LIVE events)	Low scenario = £170k High scenario = £247k

ANNEX B CALCULATION COMPONENTS

	Components	Evidence	Value/Range
Skills competitions – raw earning differential from competing	Median earning for WSUK competitors in academic year 2011/12 five years after study	DfE - WorldSkills UK Competitors Descriptive Statistics - February 2017 Internal WSUK analysis based on DfE LEO data for WSUK competitors	£26,988.87
	Median earnings five years after study for learners that achieved Level 4 in academic year 2011/12	DfE – Further education: outcome-based success measures (24 October 2019)[17]	£22,230
	This results in ~£4 yearly raw uplift in earnings 5 years after study between those that compete in national finals vs a counterfactual achieving a Level 4 qualification		
Skills competitions – adjusting earnings differential for selection bias by group	Earnings difference between competitors and controls caused by competition for medal winners	This £4k earning difference might not be entirely caused by upskilling and better signalling from participation in the competition. It might be explained by systematic differences between competitors and the average population of Level 4 students. For example, those willing to take part in these	Low = 25% High = 50%
	Earnings difference between competitors and controls caused by competition for Squad members		Low = 25% High = 25%

[17] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/856797/FE_OBSM_Main_Text.pdf

	Earnings difference between competitors and control caused by competition for national competitors	competitions may be more talented or more motivated than the average Level 4 student. Therefore, part of this earning difference might be explained by different unobservable characteristics, or in other words, by *selection bias.* In order to remove the selection bias, we conservatively assumed that only a limited portion of the estimated earnings difference is explained by participation in the competitions. We assume medal winners receive a larger earnings boost than others due to the signalling effect a medal has on their career prospects in the labour market. We assume at least 50% of the difference in median wages is due to selection bias – a conservative estimate. In the lowest scenario, we assume that national competitors only receive 12.5% of the documented differences in earnings between competitors and non-competitors	Low = 12.5% High = 25%
Classroom peer effects between 3% and 6% of direct effect by group	Peer effect of participants on classmates' test scores (National)	Hoxby C., *Peer Effects in the Classroom: learning from gender and race Variation*, 2000, NBER Working Paper No. 7867. Peer effect estimated between 10% and 55%. We have used the conservative lower bound. Estimate used for national competitors.	10%
	Peer effect of participants on classmates' test scores (International)	Moreira, D., *How Awards Affect Winners' and Peers' Performance in Brazil*, 2017, Job Market Paper Impact of winning a medal in International Math Olympiad on peer performance. Impact used for international competitors.	20%

	Increase in earnings following an increase in test scores	Classmate peer effects are based on test score uplifts (estimated 10-20% increase in scores). We estimate the responsiveness in wages following an increase in test scores through peer effects. We assume effect is proportional to an increase in a one standard deviation (s.d.) increase in FE college value added on wages. We conservatively assume that a 100% test score increase is equivalent to a one s.d. increase in FE college value add. To estimate classmate peer effects we multiply peer effect (10-20%) by estimate (3%). Aucejo, E. et al, Where vs What: *College Value-Added and Returns to Field of Study in Further Education*, 2020, Centre for Vocational Education Research, LSE[18] Estimate is conservative as literature has found elasticity of test scores on wages to be up to 30%, albeit without ascertaining causality.[19]	3%
Skills competitions – colleague peer effects between 3% and 5% of direct effect by group	Business peer effects on colleague wages	Estimated colleague peer effect (assumed effect on wages following a unit increase in colleague productivity) assuming below median skill level of tasks. Accounts for larger estimated impact on younger peers. Cornellissen T., et al, *Peer Effects in the Workplace*, 2009, American Economic Review, Vol. 107, N.2	3-5%
	Average firm employees (excl. businesses w/no employees)	National statistics – Business population estimates for the UK and regions: 2019 statistical release (HTML)[20]	16

[18] http://cver.lse.ac.uk/textonly/cver/pubs/cverdp030.pdf

[19] https://www.sciencedirect.com/science/article/pii/S1517758014000265

[20] https://www.gov.uk/government/publications/business-population-estimates-2019/business-population-estimates-for-the-uk-and-regions-2019-statistical-release-html

Careers advice	Probability that careers advice triggers a material shift in careers certainty/planning	70% of students declared that after attending LIVE event they were likely to consider a technical career in the future; according to Education and Employers (https://www.educationandemployers.org/wp-content/uploads/2020/01/Disconnected-Career-aspirations-and-jobs-in-the-UK-1.pdf) only 45% of students in the UK have a technical career as a top preference	25%
	Lifetime value to Government of one student prevented from being NEET	Public Health England and UCL Institute of Health Equity – Reducing the number of young people not in employment, education or training (NEET)[21]	£56,000
	Percentage of young people NEET in the UK	Source: [22]	9.9%
	Proportion of students planning on working on apprenticeship post-18	Source: [23]	7%
	NPV for a student of completing a Level 3 qualification	Source: [24]	£68,000
	Average NPV of starting L3 working/apprenticeship post 18	Source: [25]	£88,000
	Average NPV of starting L2 working/apprenticeship post 18	Conservative NPV estimate using low scenario and only 25% productivity spill-over when sizing impact[26]	£35,000

[21] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/356062/Review3_NEETs_health_inequalities.pdf

[22] http://www.skope.ox.ac.uk/wp-content/uploads/2019/07/Holmes-Murphy-and-Mayhew-2019.-What-accounts-for-changes-in-the-chances-of-being-NEET-in-the-UK_-.pdf

[23] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/860135/Destinations_main_text_2020_REV.pdf

[24] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/435166/bis_15_323_Measuring_the_Net_Present_Value_of_Further_Education_in_England.pdf

[25] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/435166/bis_15_323_Measuring_the_Net_Present_Value_of_Further_Education_in_England.pdf

[26] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/435166/bis_15_323_Measuring_the_Net_Present_Value_of_Further_Education_in_England.pdf

Proportion of students who switch to Level 3 qualification following a material shift in career planning	Assumption based on analysis of LIVE event by research highlighting: ▪ 72% of LIVE attendees felt inspired by LIVE ▪ 76% reported better knowledge of technical education and apprenticeships ▪ 98% of young people intend to take at least one action to learn more about the world of work after attending LIVE	Low = 1% High = 2%
Reduction in one-year dropout rates in apprenticeships post 18 following careers advice	30% apprenticeship dropout rate (source 1) multiplied by 16% of dropouts due to a change in career (shifting to FE) as a result of LIVE event (source 2). Assumption is that LIVE reduces possibility of career changes mid-apprenticeship, preventing career-change related dropouts.[27][28]	4.8%
Reduction in one-year dropout rates in FE post 18 following careers advice	20% baseline FE dropout rate multiplied by a 16% rate of dropouts due to a change in career (we assume the same share as apprenticeships). We conservatively calculate this effect only for 60% of the relevant LIVE attendees to avoid double counting (some will move from FE to apprenticeships or vice versa due to a change in career, most likely dropping out from an apprenticeship to undertake a different career via an FE college qualification)[29]	1.94%
NEET reduction rate for students shifting career plan after LIVE event	Assumption based on the NEET reduction rate of a similar careers advice programme[30]	3%

[27] https://www.policyconnect.org.uk/sc/sites/site_sc/files/report/469/fieldreportdownload/aspotlightonapprenticeshipssocialmobilityweb.pdf

[28] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/912618/DfE_Learners_and_apprentices-Reasons_for_non-completion.pdf

[29] https://www.officeforstudents.org.uk/data-and-analysis/continuation-and-transfer-rates/

[30] https://learningandwork.org.uk/wp-content/uploads/2020/04/Evidence-Review-What-works-to-support-15-to-24-year-olds-at-risk-of-becoming-NEET.pdf

Careers advice – digital toolkit	Assumed uplift due to toolkit usage	25% (overlap between LIVE events & toolkit) × 50% (proportion of effect of LIVE event) Overlap estimated using WSUK internal data on demographic splits of LIVE event attendees and toolkit users. We assume toolkit session is half as effective as LIVE event to be conservative.	12.5%
Skills champions sessions	Proportion skills champions session attendees not attending LIVE	Internal documents on make-up of LIVE event participants vs skills champions events. We conservatively assume no additional effect of skills champions session on those attending LIVE. Therefore, impact equal to LIVE attendance occurs only on 23% of skills champions attendees	23%
	Uplift in impact on skills champions additional to national participation	Conservative assumption based on survey evidence on skills champions: ▪ 84% of respondents suggest being a skills champion increases ability to problem solve & work under pressure ▪ Skills champions improve their communication skills by running events and speaking publicly in conferences	20%

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