![UK Electronics Skills Foundation]

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Are Electronics graduates meeting the needs of employers?

A report from the UKESF

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> "Putting in place programmes and support that provides opportunities for undergraduates to gain industry experience is crucial to ensuring that graduates enter the workforce with the maturity, confidence and understanding to succeed."

Stewart Edmondson
UKESF

> "Work readiness is the ability of a new graduate to rapidly became a productive member of a design team."

Senior Director
On Semiconductors

Foreword

It is a simple enough and reasonably sounding question to ask "are the graduates entering our industry fit for purpose?" This is what we endeavoured to explore through this study.

The context for our investigation is the wider discussion about work readiness of graduates. Also, is was prompted by reports suggesting that, across engineering generally, the gaps between new graduates and the expectations of industry were wide, and getting wider. Therefore, we wanted look at the specifics for the Electronics sector.

The welcome news, as you can read in the report, is that our findings suggest in our sector the situation isn't as bad as the wider headlines might suggest.

This investigation wouldn't have been possible without the contribution of employers and of a large number of recent graduates, who all gave us their thoughts and shared their experiences. This enabled us to look at the topic from the employer's perspective as well as the graduate's perspective.

I would also like to acknowledge the invaluable support for this study from my colleague Hilary Price at Aston University.

Stewart Edmondson

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Summary of findings

Technical skills

Generally, employers agreed that the technical skills of the recent Electronics graduates they had recruited into their organisation met, or exceeded, their expectations.

Graduates also felt they had the technical knowledge and theoretical understanding they needed as they commenced their graduate employment.

82%
of employers

reported that technical knowledge met, or exceeded, expectations.

86%
of graduates

felt their technical knowledge met, or exceeded, expectations.

Non-technical skills

Employers reported that the non-technical skills demonstrated by their Electronics graduates varied significantly depending on the skill itself.

Our research found graduates were equipped with many of the skills associated with the ability to 'self-start', such as demonstrating curiosity and having the confidence to ask questions, using their knowledge to a up with solutions, and independence to settle into their new work environment. However, they were less well equipped in knowledge of business operations and their understanding of the wider industrial context.

54%
of employers

felt graduates had a good or reasonable understanding of business operations.

66%
of graduates

felt they had a good or reasonable understanding of business.

96%
of employers

felt graduates were curious, asking questions that showed a desire to understand the detail of their work.

92%
of graduates

felt they were curious, asking questions that showed a desire to understand the detail of their work.

Are Electronics graduates meeting the needs of employers?

Introduction

The UK has a long heritage of technological innovation and has a world-class Electronics sector, however it is being limited by too few capable, employable Electronics Engineers and designers entering the industry. The UK Government[1] aims to secure world-leading positions in new semiconductor technologies, but to do this, we need to ensure that not only are there more graduates entering the profession, but also that they are entering the profession with the right skills.

Across all degree subjects, there is debate as to the extent of which students are "work ready" when they graduate, referring not only to their technical knowledge, but their understanding of the internal and external context of work and their non-technical skills.

Graduate employment has been through a turbulent period. The pandemic has led to long term changes in the way education is delivered, as well as changes to workplace culture. Opportunities for placements and internships dropped significantly immediately following the pandemic, as did the number of graduate roles available, however they have to some extent bounced back, with the ISE[2] reporting that in 2022/23, student recruitment increased by 16% and graduate recruitment by 6%, with the expectation it would continue to grow in 2023/24.

The shortage of Electronics Engineers means it is of particular importance that graduates are 'job-ready' to ensure that they are retained and able to thrive in industry. This issue is compounded by being a sector that is largely comprised of SMEs, who have limited capacity to put in place thorough onboarding and training programmes for new recruits to help resolve any skills and knowledge gaps.

The extent of the skills gap in Engineering has reported by the IET[3], who in 2021 found that 46% of employers thought that new entrants to the workforce are lacking in soft skills. The report also found that 25% of employers don't recruit graduates because of the perception that graduates lack the skills they require, and employers lack the resources to implement training. Previous surveys of organisations by the IET have found that a staggering 62% of newly recruited graduates did not meet their reasonable expectations[4].

Therefore, the UKESF in partnership with Aston University, set out to understand whether graduates of Electrical and Electronic Engineering degrees are meeting the needs of employers in the industry. The results of the research can be found within this report.

What skills does an Electronics Engineer need?

Despite concerns in the wider engineering field, it was found that, generally, graduates of Electrical and Electronic Engineering degrees were equipped with the theoretical knowledge and technical capabilities expected by employers from a new graduate hire. However, a review of job specifications identified a range of other expected non-technical skills and personal strengths, which included:

- Agility and adaptability

- Analytical and problem-solving skills

- Communication skills

- Creativity and curiosity

- Initiative

- Persuasion and influencing skills

- Self-motivation and continuous self-improvement

- Teamworking and collaboration skills

Also, we found that the skills required from new graduates are evolving. The Royal Academy of Engineering[5] has recently categorised engineering skills as:

- Skills for growth, including technical understanding and understanding of industry developments.

- Skills for navigating the operating environment, including an understanding of the external and internal context.

We found that across the Electronics industry, several terms are used interchangeably with slight nuances when referring work readiness, including non-technical skills, soft skills, human skills, business/management or leadership skills.

"The term 'soft skills' traditionally covers presentational skills, negotiation, communication, and time management, but might not traditionally capture skills like knowing how to cope with failures (to build on them), the ability to learn new technical skills rapidly, and using the skills/knowledge of other team members to both learn and get things done."

Engineering Director
Qualcomm

Who is responsible for ensuring graduates are 'work ready?'

How capable and employable a graduate is will depend on the skills that they have acquired, or have the potential to acquire, through their education and wider experiences. Who is responsible for ensuring that students and graduates are acquiring required skills ready for graduate employment is not straight forward. Responsibility can be attributed to:

1. **University.** In 2020, Times Higher Education[6] reported that an "increasing number of firms worldwide are seeing the purpose of university as ensuring that graduates are "job-ready" when they leave higher education". Some Electrical and Electronics Engineering degrees already aim to support students to develop essential transferable skills, including budgeting, project management and entrepreneurship, however provision varies between universities. It can also be difficult to replicate working experiences within the university environment, for example understanding and coping with organisational change.

2. **Industry.** Many larger organisations have taken responsibility for developing their own employees through rigorous graduate schemes. The IET[3] reported that 45% of engineering employers provide additional training for new entrants into the industry.

3. **The Individual.** Students themselves should seek relevant experience though industry placements. Findings from a study conducted by WRIPA[7] found that "physics students who had undertaken a work placement had a statistically significant higher level of 'work readiness' compared to students that had not done a work placement".

In reality, it is reasonable to posit that all three stakeholder groups have a role to play in ensuring that graduates have the skills required by industry. Alongside this, organisations such as the UKESF, The IET, Power Academy and E3 Academy are actively championing schemes that enable undergraduates to gain meaningful, work-related experiences.

UKESF work readiness research and its findings

The UKESF used its extensive network of industry connections to undertake this research. It conducted in depth interviews with a focus group of industry stakeholders. Subsequently, it surveyed both employers and recent graduates for the purposes of this report.

Qualitative focus group findings

The UKESF hosted a focus group of 10 industry stakeholders working in senior roles.

During the discussion participants were clear that there wasn't a shortfall in expected technical knowledge among graduates. Instead, they focused on graduates understanding of industry / commercial awareness and their attitudes in the workplace.

A summary of the discussion is included at the end of this report. The discussion centred around four main themes:

1. Context of work and commercial awareness

2. Fundamental discipline-related skills to speculate and self-start

3. Curiosity, problem identification and solutions

4. Maturity and confidence, navigating ambiguity and integrating into established teams

Quantitative survey results

Building on the outcome of the focus group discussions, the UKESF undertook two separate surveys.

The first was completed by 46 individuals, mainly hiring managers, from a range of Electronics and Technology companies. The second was completed by 59 recent graduates. Of these graduates, 81% had completed work placements, and 51% had taken part in the UKESF Scholarship Scheme.

A summary of the survey results is included at the end of this report, they key findings were:

Technical Skills

Employers and the graduates themselves both resoundingly felt they had the expected level of technical knowledge. 83% of employers and 86% graduates agreed that technical knowledge was as expected, or exceeded expectations.

Non-Technical Skills

The research shows that graduate capabilities vary across different types of non-technical skills. Both graduates and employers were largely aligned in their reflections about where gaps exist in their knowledge and understanding.

Just 43% of employers felt that graduates had a good or reasonable knowledge of the business world, and a little over half (53%) felt that graduates had a good or reasonable understanding of business operations. Graduates also recognised this, with only 54% agreeing that they had a good or reasonable knowledge of the business world.

Employers also agreed that few Electronics Engineering graduates were able to take responsibility for the progression of their work tasks from the outset (39%). However, employers largely agreed that they performed well with other behaviours associated with 'self-starting', such as demonstrating curiosity and asking questions (65%), reflecting on their knowledge to come up with solutions (81%), and using independence to settle into the work environment (83%).

Final thoughts

Overall, although some of the results are mixed, the research found that the picture for Electronics graduates is reassuring given the concerns raised in other reports about graduates.

Notably, 81% of the graduates surveyed had completed an industry placement as an undergraduate. This is significant and clearly highlights the importance of completing work placements. These placements ensure that students have the opportunity to acquire and develop their 'work readiness' skills.

There are opportunities for both university and businesses to put in place processes that support the work readiness of graduate Electronics Engineers.

The focus group reflected on opportunities for universities to consider project work that is vocational or replicates a work environment. That said, there are limitations to fully replicating the dynamics of a workplace in a university setting. Businesses can best support work ready graduates by providing meaningful undergraduate work placements.

Qualitative focus group discussion summary

1. Context of work and commercial awareness

The participants discussed:

- "A fundamental knowledge of industry" and whether it is the responsibility of the university or the employer to support graduates to acquire this understanding. Larger organisations often have graduate training in place, as well as systems that manage the transition into the workplace, and give graduates the opportunity to fail and learn. It was recognised that many organisations in the UK don't have the volume of graduates to run such training programmes.

- Universities providing more applied or vocational projects in the final year.

- Graduates understanding of where they fit into an organisation, and how the different departments work together. And on an even more granular level, a graduates practical awareness, for example, their understanding of how long a specific task should take.

- That "industry experience is essential".

2. Discipline-related skills to speculate and self-start

The participants discussed:

- There is no expectation that graduates would deliver on day one, but that they were seeking individuals who could self start, think on their feet, work through problems and have the ability to learn.

- Students who are taught on specific tools often "lack knowledge of the underlying methodology" or "an innate feeling for the engineering side".

- Graduates' confidence to work in the 'abstract', in particular their ability to move between the big picture, the system and the low level details.

3. Curiosity, problem identification and solutions

The participants discussed:

- At university, students are provided with the problem to solve, whilst in work, they have to identify what the problem might be, and often academically strong graduates can struggle.

- The university's role in nurturing curiosity, "university should be a vehicle for curious people to explore". University needs to encourage these behaviours.

- How graduates can be encouraged to ask questions in the workplace, expressing that their "established teams are very supportive of young engineers and keen to share knowledge."

4. Confidence, navigating ambiguity and integrating into established teams

The participants discussed:

- "Many graduates have the skills but lack the confidence to express them".

- The complexities of infiltrating established teams and emphasised that "good interpersonal skills" are required.

- Difficult to replicate integrating into established teams and similar circumstances at university.

- The expectation is different in the workplace from university. At university you are judged on what you achieve as an individual, in the workplace you are judged on the performance of the whole team.

- An open company culture on communication, where everyone has permission to contribute was identified as a positive.

- Graduates' ability to cope with change was discussed, and how graduates that "roll with the changes and manage ambiguity tend to excel".

Online survey questions and responses

Graduates technical knowledge/skills met or exceeded expectations

83%
employers agreed

86%
graduates agreed

Graduates had a good or reasonable understanding of business operations

54%
employers agreed

66%
graduates agreed

Graduates had a good or reasonable knowledge about the business world in which the company operates

43%
employers agreed

54%
graduates agreed

Graduates were very curious, asking questions that showed an eagerness to understand the detail of their work and how it fit into the company context

65%
employers agreed

59%
graduates agreed

Graduates drew freely from their prior knowledge/skills to identify problems and contribute to solutions

50%
employers agreed

51%
graduates agreed

Graduates took responsibility for the progression of their work tasks from the outset

39%
employers agreed

63%
graduates agreed

KEY
- **less than 10%** difference between the employer and the graduate result
- **10-15%** difference between the employer and the graduate result
- **over 15%** difference between the employer and the graduate result

Online survey questions and responses *continued*

Graduates were either very or reasonably reflective, to use their prior knowledge and skills to speculate solutions

81%
employers agreed

93%
graduates agreed

Graduates were either self-reliant and able to manage the transition to their new work environment, or showed independence but needed time to feel comfortable

83%
employers agreed

93%
graduates agreed

Graduates quickly established themselves in their team and became a productive member

52%
employers agreed

53%
graduates agreed

KEY ■ **less than 10%** difference between the employer and the graduate result
■ **10-15%** difference between the employer and the graduate result
■ **over 15%** difference between the employer and the graduate result

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References

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This report has been produced by the UKESF
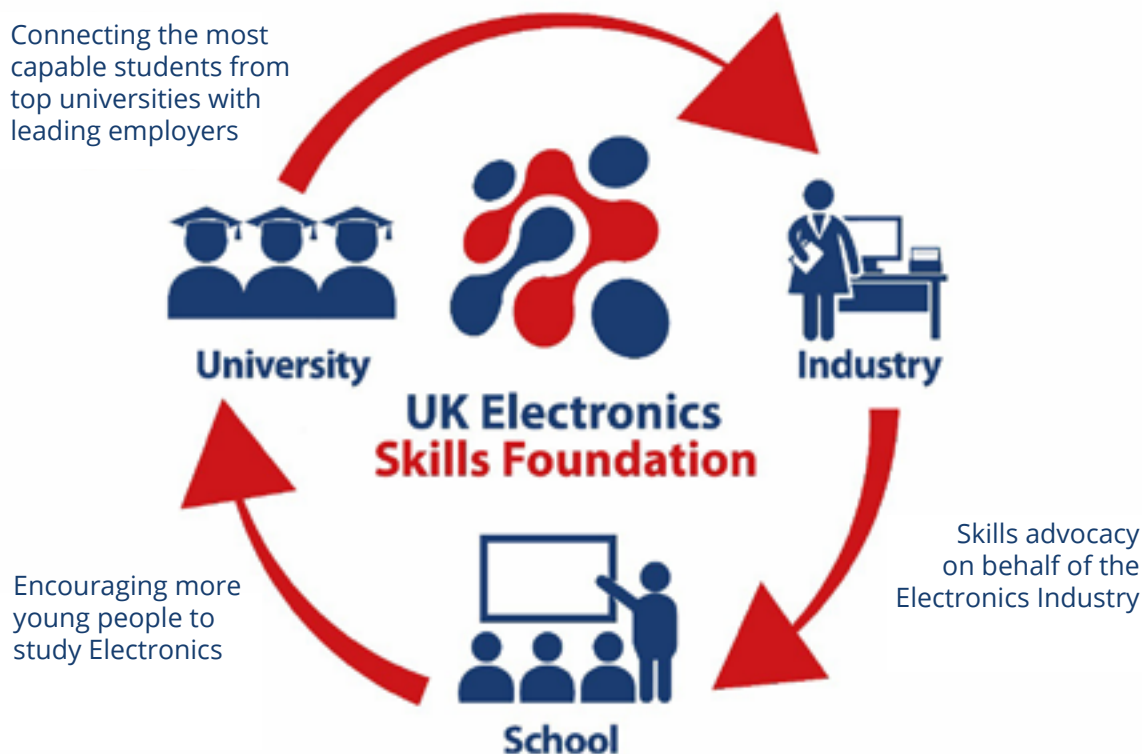
The purpose of the UKESF is to tackle the Electronics' sector skills shortage in a coherent way. With our partners, we provide opportunities for young people to develop their interest in Electronics, Technology and Engineering, through to university study and/or apprenticeship. At university, we ensure that undergraduates are encouraged to pursue careers in the Electronics sector and they are supported in their professional development so when they graduate they are equipped with work ready skills and experience.
Visit our website to find out more.

About the author:

Stewart Edmondson has been the CEO of the UK Electronics Skills Foundation since 2015. He has a degree in Electronics and a wide range of engineering and training management experience in both the public and private sectors. He has been a Chartered Engineer for over 20 years and is a Fellow of the IET. As a volunteer, he has chaired their Professional Development Advisory Committee. He has been a Royal Academy of Engineering Visiting Professor of Employability, Professionalism and Ethics at Aston University.

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