Make in Salford

Maker Space Impact Report

THE UNIVERSITY OF SALFORD
MORSON GROUP STEM FOUNDATION

Foreword

I would like to extend my heartfelt thanks to our Maker Space community - our students, University staff, industry and community partners who have contributed to this impact report. The feedback gathered highlights the evolving role of academic makerspaces in STEM education and their growing importance in equipping students with the skills required to prosper in their futures.

Academic makerspaces are transforming higher education by bridging the gap between theoretical knowledge and practical application. By demonstrating the Maker Space's impact through clear evidence and data-driven outcomes, we can showcase its value, secure continued support, and enable future growth. At the University of Salford's Maker Space, this approach plays a pivotal role in enriching the STEM curriculum by integrating hands-on design, prototyping, tooling, and innovation into everyday learning.

This immersive, practice-based maker model not only strengthens technical skills but also aligns students' capabilities with industry expectations, equipping them with the confidence and experience to thrive in the workplace. Beyond academic rigour, the Maker Space supports community outreach initiatives that enable accessible and inclusive pathways into STEM.

A special thank you to our Maker Space team for creating such a dynamic and inclusive environment. I would also like to recognise Morson Group as a true STEM Changemaker, whose support continues to connect education, industry, and community to inspire the next generation of STEM talent.

Dr. Maria Stukoff
Maker Space Director, University of Salford

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"Access to the Maker Space is no longer optional - it's essential. We see a clear transformation in students who engage with it. They gain hands-on understanding of technology's potential and limits, turning classroom lessons into real-world skills, ready for industry. By the time they enter, they're fluent in the language of innovation, knowing exactly how and when to use materials and processes to bring ideas to life. These are the students shaping the future, and the ones we're eager to employ.

Andy Hassall, Associate Director, Morson Projects.

Executive Summary

This report offers an external evaluation of the University of Salford's Maker Space - a cutting-edge digital fabrication hub through a diverse stakeholder perspective, including University staff, students and industry partners Morson Group. It also features insights from IntoUniversity, a charity supporting disadvantaged youth aged 7-18 - and highlights the Go Beyond mentoring programme, which empowers female STEM students on campus.

Key findings reveal that the Maker Space has become a highly valued resource, with many benefits to its stakeholder group. The facility's impact is multifaceted, boosting student learning, employability, the University's reputation, and community involvement.

The Maker Space creates a unique environment that fosters student confidence, develops career-ready skills, drives curriculum innovation, and enhances inclusivity in STEM through access and outreach.

A. Empowering student potential: Building confidence and engagement
The Maker Space transcends traditional teaching methods, delivering a transformative hands-on learning experience. The value of practical application is a sentiment echoed in student statements.

- **Hands-on learning:** Direct access to industry-standard equipment facilitates practical learning and skills development.
- Enhanced understanding: The experiential nature of the Maker Space leads to deeper understanding of concepts, exceeding typical academic learning.
- Cultivation of a maker mindset: The space encourages creativity, innovation, and a willingness to experiment, pushing students beyond theoretical limits.

> *"I'm a visual learner, so I want to see how I can apply things, and engineering is all about applying. You can learn all of our engineering on paper, but if you don't know how to apply it, how to turn a set of equations on a piece of paper into a physical thing, then it's useless. And that's where the Maker Space shines because we were able to make something out of an idea. And so, when the lecturer is talking to us and pointing at these diagrams, I understand it much better because I've actually made the item." – Student*

> *"It really opened my eyes to the possibilities. The quality of the ideas that I have now have a completely different dimension because I'm no longer thinking about handmaking things. I'm thinking on a completely different scale in terms of precision, and in terms of possibility."* – Student

B. Developing future ready skills: Cultivating competence and career advancement
The skills and experience gained in the Maker Space significantly enhance student employability:

- Practical skills: Students gain proficiency in using various technologies and materials, developing practical skills highly valued by employers.
- Industry-relevant training: The curriculum integrates practical, industry-relevant training, bridging the gap between academic theory and real-world applications.
- Development of soft skills: The collaborative environment cultivates essential soft skills such as teamwork, communication, and problem-solving.
- Networking opportunities: The collaboration with Morson Group offers invaluable industry connections, enhancing job prospects.

"The type of groups that are using Maker Space, such as the Salford Racing team, have a whole structure. They have their own little departments within them so what we see, as a result of that, is people developing management skills, communication, teamworking skills, time management. They learn how to coordinate, put together a bill of materials, a delivery plan of when all those individual components can come together. So, all these vital skills that we need in industry, they are getting as 'soft' benefits in addition to the very practical skills that they gain from physically getting hands-on using these machines." – Industry

C. Innovating curriculum, teaching, and research practice: Elevating the University's reputation

The Maker Space contributes significantly to the University's overall reputation and capabilities:

- Enhanced teaching practices: The facility enriches teaching methods, making complex concepts more accessible and engaging.
- Support for research projects: The Maker Space serves as a valuable resource for research projects across various disciplines. For example, the creation of 3D-printed PPE during lockdown demonstrates its quick adaptation to urgent needs.
- Attracting high-calibre students: The Maker Space's unique capabilities are a significant factor in attracting high-quality students to the University.

"We can teach the students the very old stuff like Pillar drilling, machining and so on, but I would like the students to get involved with more advanced techniques like 3D printing, laser cutting and CNC because that is the way the industry is moving. So, the Maker Space is very important for us." – University

D. Promoting inclusive excellence: Enhancing STEM accessibility through unique partnerships

- Widening participation: Extending a positive influence on the wider community through initiatives like the IntoUniversity partnership.
- STEM outreach: The programme provides valuable opportunities for underprivileged youth to explore STEM fields, supporting social mobility and wider participation.
- Breaking down stereotypes: The inclusive environment encourages participation from diverse groups, challenging traditional STEM stereotypes.

"They [pupils] get inspired. Being in a space that is dedicated to engineering. It's the realisation that they can do this, they can be here, they have tried this out, they know how this works…They're motivated to think 'I could go to this university; I could study this subject.' All these realisations and experiences happen because they are in the Maker Space." – IntoUniversity

The Maker Space at the University of Salford has become a highly valued resource, benefiting Morson Group, the University, its staff and students, and the wider community. It significantly enriches the STEM educational experience, preparing students for future academic and career successes.

1. Introduction

This report offers a clear and detailed evaluation of the University of Salford's Maker Space, presented in an accessible version of an extensive analysis. The original, in-depth report conducted by Challenge Multimedia[1] drew upon comprehensive data from semi-structured interviews with students, alumni, university staff, Morson Group managers, and external users, as well as a student questionnaire. This summary reflects the key findings from that analysis, highlighting the significant value of the Maker Space and its transformative role in fostering skills, enhancing education, and promoting inclusivity within STEM fields.

1.1 Introduction to the Maker Space: Mission and vision

> *"Open to all students and staff, the Maker Space provides a valuable resource for the University community and a space nowhere else found on campus. It's a remarkable asset!"*– University

The Maker Space is a 300-square-metre, state-of-the-art digital fabrication facility located in the School of Science, Engineering, and Environment (SEE) building. It is equipped with industry-standard machinery, ranging from rapid prototyping tools to heavy-duty equipment. Key features include 3D printers, CNC routers, milling machines, water jet, welding and laser cutters, and an electronics area with digital and optical microscopes. Additionally, the facility offers a full CAD suite and access to advanced resources, supporting innovation and hands-on learning.

In line with the University's strategic educational framework and civic mission, the Maker Space champions future-fit skills development, ultimately inspiring the next generation of STEM graduates through three core pillars:

1. Student engagement: Building confidence and competence
    - Hands-on learning fosters creativity through exploration and experimentation.
    - Real-world projects enhance critical thinking and problem-solving skills.
    - Collaboration promotes teamwork and effective communication.

2. Curriculum integration and research support: Bridging theory and practice
    - Practical applications deepen understanding of classroom concepts.
    - Industry-relevant training boosts student employability.
    - Research support enables effective science communication.

3. STEM community outreach
    - Accessible sessions engage diverse groups in STEM.
    - Outreach activities ignite curiosity in STEM studies and future careers.
    - The facility builds community among students, educators, and industry to challenge STEM stereotypes.

1.2 Partnership with the Morson Group STEM Foundation

Since the Maker Space launched in 2017, Morson Group has been instrumental in its development. As one of the UK's largest engineering recruitment firms and a recognised STEM Changemaker, Morson is committed to talent development, innovation, and social mobility. Through the Morson Group STEM Foundation, they ensure the facility stays industry-relevant, preparing students with the skills needed for the workforce.

Their support broadens access, particularly for underrepresented groups, aligning with Salford's mission to widen participation in STEM. The prestigious Gerry Mason Scholarship offers financial aid to local students, helping break down barriers to higher education, while engineering summer schools and STEM mentoring schemes further open career pathways.

This partnership is especially impactful at Salford, where 80% of students come from widening participation backgrounds, 60% from the UK's lowest socio-economic areas, and 49% are first-generation university students.

Morson's continued involvement helps shape the next generation of STEM professionals. Their strong ties to Salford underpin a commitment to tackling local educational challenges and shifting perceptions of engineering—particularly among young women.

1.3 Methodology: Diverse stakeholder insights

This impact report evaluates the University of Salford's Maker Space using a mixed-methods approach, combining qualitative and quantitative data collection techniques. The evaluation draws from extensive interviews with both internal and external stakeholders to provide a comprehensive assessment of the Maker Space's role in developing skills, enhancing education, and promoting inclusivity within STEM fields.

1. Student perspective: Interviews and questionnaires with students from various disciplines, including Mechanical Engineering, Aeronautical Engineering, Aerospace Research, Prosthetics and Orthotics, and Fine Art.

2. University staff perspective: Interviews with academic and technical staff from the Mechanical Engineering, Aeronautical Engineering, Aerospace Research, Prosthetics and Orthotics, and Fine Art Schools.

3. External stakeholder perspective: Interviews with representatives from Morson Group, the IntoUniversity initiative and Go Beyond programme.

1.4 Key impressions and highlights

The Maker Space at the University of Salford provides demonstrable added value across multiple dimensions. Its transformative impact on student learning, employability, University profile, and community engagement underscore its significance as a vital resource for the University and the broader community. Continued investment in the Maker Space will ensure its ongoing success and lasting contribution.

The report is presented using several major themes that emerged from the findings, focusing on the benefits and added value of the Maker Space:

- Empowering student potential, building confidence and engagement: Examining how the Maker Space enriches campus culture and enhances student experiences.

- Developing future ready skills, cultivating competence and career advancement: Analysing the skills gained in the Maker Space and their relevance to employability within a vastly developing industry.

- Innovating curriculum, teaching, and research practice: Exploring how the Maker Space influences teaching, and research practices and aligns curricula with industry needs.

- Promoting inclusive excellence, enhancing STEM accessibility through partnerships and outreach: Evaluating initiatives that promote STEM talent through partnerships with local organisations like IntoUniversity and highlighting specific programmes, such as the Go Beyond mentoring programme for female STEM students, and its positive feedback and encouragement.

- Conclusion: Summarising findings on the Maker Space's impact on individuals and the broader University community.

This report structure provides a coherent narrative that clearly articulates the transformative role of the Maker Space in fostering skills, enhancing education, and promoting inclusivity within STEM fields.

2. Maker Space evaluation

2.1 Empowering student potential: Building confidence and engagement

The University of Salford's Maker Space significantly enhances the student and staff experience, boosting education, skills, and personal development. Engagement is facilitated by access to industry-standard equipment; an inclusive culture that promotes community building, wellbeing, and collaboration; and a safe space where making mistakes is welcomed as a valuable part of learning.

2.1.1 Delivering real world impact through hands-on learning

Feedback from across the participants highlighted high satisfaction with the industry-standard technical resources available, surpassing those at other university facilities. Students consistently reported enriched learning, improved skills, and a more engaging university life, directly attributing their success to the Maker Space's resources and opportunities. Key benefits cited include increased engagement through visualising practical applications, reinforcing theoretical learning through hands-on projects, and fostering imaginative design through access to new and innovative technology.

> "*I've always been a hands-on person, and I get the most pleasure from actually 'doing'. It makes you much more diverse in your abilities."* – Student

> *"My confidence levels have grown hugely. I was way behind the other students, having missed so much education, but this year has made a huge difference. I think it's knowing how to use the machines compared to others who may be more intelligent than me but don't have that experience. It makes me stand out."*
> – Student

2.1.2 Creating a space for students to belong and prosper

Both students and academic staff highlighted how the Maker Space provides networking opportunities and exposure to diverse disciplines. Students often drop in to chat, observe, and collaborate, leading to cross-disciplinary projects in engineering, art, and design. This enriches learning and opens up new opportunities beyond their courses.

Another unique feature of the Maker Space noted is that it allows students direct, unmediated access to the technology and to use industry machines unsupervised once they have received training.

> *"In other units, although the students do the design themselves, they aren't allowed to operate the machines, they must pass their design to a technician to manufacture it for them. Here our students have the support and training from technicians, but they do the work themselves, even on advanced machines like CNCs and laser cutters."* – University

Hands-on work with new technologies and materials provides invaluable insights, expanding understanding and fostering creativity, as evidenced by students reporting improved exam results and more impactful final projects.

This approach is particularly beneficial in large lectures, translating complex concepts into tangible experiences. Academic staff emphasised that the Maker Space provides students with opportunities to develop skills that go beyond the scope of individual departments. The facility exposes students to cutting-edge technologies essential for future careers, while encouraging creative engagement with a variety of materials.

> "*You could have a lawyer using it, a history student. It's just based in the engineering school because it makes sense but it's open to all students. So, we would be speaking to everyone from medical students to art students. It really draws people together from all different backgrounds and these are people you wouldn't ordinarily meet on an engineering degree."* – Student

> *"It's more than just a workspace; it's a hub for interdisciplinary interaction, where students from different fields and backgrounds come together to share ideas and skills."* – Industry

> *"It's a good mix of people, age-wise, especially with the student instructors. There's a lot of mature students. There are people who are doing arts PhDs, there's interior designers, architects and, of course, engineers. I wouldn't have met them otherwise. It's also a space that's not built around the student lifestyle, so you get a bit of a wider mix than you do from other societies. It's definitely made my year better.*" – Student

Feedback from across the participants highlighted the crucial role of Maker Space staff in supporting students and projects. The Maker Space staff received glowing praise from students for their interpersonal skills, flexibility, adaptability, enthusiasm, creativity, knowledge, and pedagogical skills.

IntoUniversity interviewees also praised the Maker Space staff for their friendly, genuine approach. The University's Widening Participation Manager highlighted their invaluable expertise and strong student rapport as key to effective outreach. This collaborative, mentoring-led model strengthens IntoUniversity's mission, inspiring young people to pursue higher education and technical careers.

> "*You can just walk into the Maker Space anytime - there isn't that distance or hierarchy you have with your lecturers*." – Student

> *"It's also a great place to come and get a bit of a break. My course is really intensive and quite emotionally hard too because you're dealing with people who have had amputations and so on. So sometimes, just coming in and doing something like laser*

cutting is like a wellbeing thing. It's nice to just come in and try things out and maybe help someone else out." – Student

"I love them - if I could adopt them and get it through the ethics committee I'd take them in a heartbeat. Whenever I pop my head in, it's the same two questions every time 'How's it going?', and 'What can I do to help?' I've genuinely yet to hear negative feedback. I often introduce people from non-engineering, and we've had nurses, occupational therapists, every walk of life. A Maker Space isn't about the things, it's about the community. When a new piece of equipment comes in, they are desperate to ensure that they can wring every last bit of goodness out of it and can explain it to others." – University

"I never feel nervous about asking them a question. The tools will change, but all the magic happens through the culture and the team that are in there, and their ability to be warm and welcoming and inclusive of everyone who walks through that door." – University

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Table 1: Feedback on Maker Space staff

Key aspects identified	Details provided by participants
Staff's exceptional availability and approachability	Staff are welcoming and easy to engage with, and respond swiftly to student needs, ensuring minimal wait times for assistance.
Supportive space	The friendly, respectful atmosphere encourages students to seek help without hesitation. Staff demonstrate a commitment to go above and beyond for students.
Proactive guidance ensuring participant safety	Staff provide comprehensive assistance, ensuring students are well-informed about the equipment. Skilled technicians ensure safe equipment use while providing support.
Collaborative learning through engaging training	Staff actively engage students, facilitating shared learning experiences. The collaborative environment enriches the student experience. A strong culture of teamwork is fostered among staff and students. Informative sessions led by personable staff enhance learning.
High quality support with commitment to success	Students receive detailed feedback and exceptional guidance that exceeds typical academic assistance. Staff invest extra time in student projects to ensure positive outcomes.
Innovative teaching fostering hands-on skills	Demonstrations and hands-on training empower students to hone their skills. Practical training creates peer connections and facilitates experiential learning.
Relationship building	Staff forge strong personal connections with students, often providing support beyond scheduled hours.

2.1.3 Encouraging innovation through trial and error

Combined feedback overwhelmingly agreed that the welcoming, inclusive atmosphere in the Maker Space encourages risk-taking and learning from mistakes, viewing mistakes as learning opportunities. This is possible because the Maker Space staff have cultivated a warm, friendly and

collaborative environment that enriches the overall student experience. In this way, students report significant **gains in confidence** and **self-belief**.

> *"As a student engineer, to be successful you need a good framework around you (the teaching environment, mentorship, the way you are taught) but the second thing is that you need the opportunity to fail - fail in the right way. As a structural engineer you design skyscrapers and stadiums for a living, and you can potentially kill thousands with bad design. The beauty of making things is taking an idea and then by making a prototype digitally you can fiddle with it and say that's rubbish because I didn't realise that bolt would foul that connection, and no-one gets hurt. You learn from your mistakes – there's something very powerful in that. You can't argue with the physicality of a model or prototype. We've lost the ability to be tactile as engineers because we rely on the digital models – they're good but sometimes you need that physicality of a model to really see if something works."* – University

> *"The staff are very approachable, very respectful. They always greet you and they're ready to help with anything I need. When you approach them, they are very happy to help. It doesn't feel like you are in a working environment. They teach you and they are very happy if you make mistakes - they won't pick on you, they're really supportive*." – Student

IntoUniversity interviewees also highlighted the supportive environment created by Maker Space staff, where students are encouraged to explore, experiment and mistakes are viewed as learning opportunities, fostering a '**can-do'** attitude.

2.2 Developing future ready skills: Cultivating competence and career advancement

The Maker Space is dedicated to igniting innovative learning by turning theory into practice. Students immerse themselves in additive manufacturing, mastering practical skills with advanced tools while addressing real-world challenges like sustainable materials and technology limits—key knowledge for future employment. This environment also fosters smart skills, including interpersonal communication and personal development, enhancing the overall student experience and skill set.

2.2.1 Advancing practical and technical skills

Feedback from students underlined how students gain practical skills, learn about new technologies and manufacturing processes, and have their academic learning enhanced.

> *"The biggest thing with the Maker Space is we had the opportunity to learn real world situations. In the real world, you need to be able to sell a product, you need to be able to raise money, you need to be able to speak to investors and sponsors. I did that."* – Student

> *"I could go into a technical role now because I know a lot more about machining. I was actually headhunted by Airbus for a machining role before I decided to do this PhD."* – Student

Academic staff consistently identify the Maker Space as a vital asset for developing students' practical and technical skills. Described as bridging the gap between digital design and physical production, the

space empowers students to programme machines and turn ideas into reality. The facility supports hands-on, proof-of-concept projects—a critical component in many disciplines—by providing access to tools and processes central to modern manufacturing. These experiences not only enrich academic work but also contribute to students' progress towards professional accreditation. Lecturers emphasise the importance of introducing students to the Maker Space early in their studies, encouraging its use for both academic and personal exploration.

University staff feedback confirms the Maker Space plays a key role in enhancing student learning and employability. By fostering innovation, adaptability, and creativity, it prepares students for industries shaped by rapid technological change.

Proficiency with advanced tools and technologies is seen as essential, particularly for future architects and other design professionals. Through training in digital fabrication and rapid prototyping, the Maker Space ensures students graduate with the skills needed to thrive in competitive, evolving sectors.

> *"It improves their employability because they can show they have the practical skills as well as the theoretical knowledge, and that makes them stand out in a crowded market."* – University

This aligns with industry feedback, with Morson Group emphasising that students not only gain technical expertise but also professional skills that match industry needs, enhancing their employability and career readiness. They also highlighted the invaluable role of prototyping: learning from mistakes, refining designs, and gaining an understanding that surpasses digital modelling.

The result? Graduates are equipped not just with theoretical knowledge, but with the practical expertise to bring their innovative ideas to life, ready to tackle the challenges of the modern engineering world.

> *"Recently, a group of final year students were asking us what we look for in an employee, and it was literally a tick list of everything they'd done at Maker Space as part of the Salford Air programme. It's also the extracurricular stuff. When we see on a CV that they've been involved with Maker Space, especially with Salford Racing or Salford Air, those are activities that show initiative. We obviously see a lot of CVs with very good grades, but what we don't often see is evidence of initiative and that's what we value the most."* – Industry

2.2.2 Promoting problem solving and critical thinking

Access to 3D printers, laser cutters, and welding machines transforms how students approach problem-solving and design. One student remarked that hands-on experience revealed the limitations and potential of the equipment, stating, *"Until you actually get hands-on with these machines, you don't know their limitations."* Another student added, *"I've learned how to use the CNC... they let us fix it ourselves. It helps you think outside the box."*

Students report a shift from manual to machine-aided design, enabling them to conceptualise projects on a larger scale. They have also gained a deeper understanding of materials and processes, allowing for informed decisions that save time and resources. Another student reflected, *"I used to think that 3D printing was the only way to do things, but now I've realised you can just cut it out on a laser cutter in MDF in about a minute."*

The cultural shift towards viewing mistakes as learning opportunities emphasises time, cost, and efficiency in prototype creation, resulting in a more professional approach. Students learn not only to operate machines but also to think critically about design, materials, and manufacturing processes. By understanding machine tolerances and developing cost-effective solutions, hands-on experience in a Maker Space builds technical skills and deepens design knowledge, producing well-rounded and capable graduates.

> *"I always knew manufacturing had implications, but prototyping at the Maker Space helped me understand them. You can design the perfect model in CAD, but if you can't make it, it's useless. I've learned to think, 'how am I going to make this?' and consider the process from idea to final product, something I hadn't thought about before."* – Student

Feedback from industry suggests that students learn that design isn't just about aesthetics; it's about manufacturability, understanding the iterative process from initial concept to final product. Failure becomes a stepping stone, fostering crucial problem-solving skills within a supportive environment.

> *"It definitely gets them thinking in a completely different way to students who don't have that experience. It gives them an understanding of the potential and the limitations of the technology."* – Industry

> *"One of the funniest things about some extremely talented technical engineers is that they have no awareness of the commercial or time implications of their design. The industry tends to push people into boxes but that awareness of everything else, that broad spectrum of knowledge makes people better engineers. Because when you design anything there's a huge amount of compromise - everything has to be made, it has to be manufactured, so an understanding of that does make people better engineers."* – Industry

> *"Now these guys in the Formula Student team are in there every day with these machines and they come out with a deeper intrinsic understanding of how things are made. But also, they work as teams. One person will be on brakes, one on chassis and so on, and if one is late then the whole team is late. So, they get that understanding of the importance of teamwork and organisation, managerial skills, delegation, all the things you really need to do this job. They also have an understanding of the financial implications because they have a budget to stick to. If you get through this you will be head and shoulders above any candidate that has not engaged because you can talk to people, you can communicate, you can work in a team." – Industry*

2.2.3 Nurturing transferable skills for lifelong success

The impact study found that students developed key interpersonal and social skills through their time in the Maker Space, particularly in teamwork and communication. Sharing ideas during group projects and teaching peers within the facility helped strengthen these abilities.

Students involved in the Salford Racing Team gained further experience in cross-level collaboration, project management, recruitment, and budgeting—building both confidence and independence. These personal and professional growth outcomes were also recognised by university staff and our industry partners.

"One of the biggest issues you have is if you can't communicate something to your boss, or to your investors, your knowledge is worthless. At university, you are given a project where you need to design something. In reality, in industry you have a whole different set of skills that are required, and these include those soft skills. So, it's not just social benefits in terms of making friends, it's also building confidence and your ability to communicate." – Student

"I've learned how to communicate and work like an engineer, not a student. It's very important to start acting like what you want to be in the future. There's a way of being professional and I've gained that from being here." – Student

"They learn how to coordinate, put together a bill of materials, a delivery plan of when all those individual components can come together. So, all these vital skills that we need in industry, in addition to the very practical skills that they gain from physically getting hands-on using these machines."– Industry

2.3 Innovating curriculum, teaching, and research practice: Elevating the University's reputation

The Maker Space contributes significantly to the University's overall reputation and research capabilities. It has become an invaluable resource for academic staff, assisting in the creation of projects that support research, public engagement, and teaching.

2.3.1 Enriching teaching practice

The student survey underscored the crucial role of Maker Space staff in facilitating personal and professional development. Respondents highlighted the effective hands-on teaching style and the benefits of small class sizes. The Maker Space significantly influenced students' decisions to attend the University of Salford, emphasising its educational importance.

While access to the Maker Space is primarily voluntary, university staff commended its high-quality technical resources and expert staff. The Maker Space has positively impacted teaching practices, aligning curricula with industry needs and reportedly leading to significant enhancements. Feedback highlighted several key characteristics:

- Lecturers promote its use in collaborative, design-driven projects.
- Some have integrated it into course modules.
- Others require workshop activities for accreditation.

These aspects were mentioned for the Maker Space's growing value in supporting academic success:

- Acknowledgement of traditional analogue model-making.
- Increasing demand for digital fabrication and rapid prototyping.
- Supporting students' transition from traditional to advanced methods."

"Our collaboration with Maker Space really took flight after Covid and now we have extended our involvement to include integration with one of my modules. I teach aerodynamics and our programmes are accredited by the Royal Aeronautical Society and there are standards we must meet. One of their criteria is that the students must demonstrate an ability, an understanding and knowledge of how to work with 'processes', manufacturing, be able to select equipment, justify their selection and manage a project within this kind of context. So, as part of the aerodynamics module

they have a project where they need to design, manufacture and then hopefully test whatever prototype they have manufactured and provide a report of their findings." – University

"*As part of the Mechanical Engineering and also Aeronautical Engineering degrees, our students go to Trafford College in Year 1 to gain experience of workshop activities – that's a mandatory requirement of the professional body, IMechE. We have much more advanced machining here at Maker Space and I am now in discussion with our managers that we need to bring this element in-house here at Maker Space for their design module and also for their manufacturing experience."* – University

"It's head and shoulders above, in that a lot of other Maker Spaces have massive barriers to access, they're usually stuffed into unloved spaces." – University

"We're dealing with microscopic things that people can't see so we need models that are larger than life. Maker Space created engaging, colourful and bright, impactful models - massive microbes - that help people grasp the concept better. We use them for both our students and the general public. When I'm describing the structure of a virus, being able to hold one in your hand is so much better than a PowerPoint. So, I use them in my teaching extensively. I know that it makes a difference, and it really helps me feel like I'm making my lectures engaging and exciting. It's especially helpful in the huge lectures in the first year. It's great because we can pass them around and it has actually inspired students to be creative themselves. We now have students coming in with knitted versions that they've made themselves." – University

The Maker Space's value extended beyond normal teaching, proving vital during lockdowns by providing essential teaching aids and maintaining high educational standards.

"The first time we engaged with the Maker Space team was to help us with PPE during the lockdown. The Maker Space stepped in and they made us visors. And they were a massive success. They have also made us prosthetics to use in our teaching. We have also asked them to produce equipment for our research labs." – University

2.3.2 Supporting innovative research projects

The Maker Space has facilitated research activities, further contributing to the University's academic profile. Notably, a lecturer in Microbiology has developed models to help both students and the general public grasp complex concepts. Additionally, the facility has enhanced research lab equipment through component testing for personal research projects. From acoustics, wildlife sciences to lab equipment and designing new teaching aids - the Maker Space team is ready to bring an innovative approach to research communication and application.

"Working with the Maker Space allows us to conduct our research projects more successfully. I know of engineering faculties in top rank universities that are struggling with experimental work because they don't have these facilities." – University

"It's certainly high on our marketing profile. It certainly benefits the students. It's benefited research projects that I've worked on with colleagues. I think the staff at Maker Space are doing their own cutting-edge things as well, which have good outreach. It's definitely poised as one of the unique selling points of this institution." – University

2.3.3 Strengthening the University's reputation

The Maker Space has strengthened the University's reputation with employers, enhanced student preparedness, and boosted its overall profile. It has also contributed to the University's research and marketing efforts, attracting sponsorship and supporting its wider mission. By showcasing industry-relevant facilities, the Maker Space is expected to attract high-calibre students and improve league table standings.

Feedback confirms that the Maker Space strongly influences student decisions and experiences. Some applicants were aware of the facility before enrolling, while others discovered it through research, conversations, or academic staff promotion. Many students encounter it after arriving on campus, particularly in the SEE Building, where its presence is a visible and valued asset.

> *"I always wanted to get involved with the practical side of things. When I learned you could use all their 3D printers and other machines then I was really interested in coming here. I also saw the University was investing a lot in the engineering side and, of course, they also had the Salford Racing Team (motorsport is a big interest) so it seemed like a perfect fit."* – Student

> *"In terms of equipment, it's absolutely top notch and a great selling point for the University. It's something that we showcase. Whenever we get visitors, we bring them into Maker Space."* – University

Overall, feedback highlighted ten key benefits of the Maker Space ranging from practical application visualisation which boosts interest and engagement, applying learned theory which simplifies learning, and understanding the technology's potential, which fosters imaginative design.

1. New technologies: Hands-on experience with cutting-edge tools.
2. Social connections: Fosters interaction between diverse students.
3. Manufacturing knowledge: Learn manufacturing processes and iterative design.
4. Enhanced learning: Deepens understanding of theoretical concepts.
5. Transferable skills: Develops teamwork, communication, and problem-solving.
6. Personal projects: Explores creative interests.
7. Increased employability: Enhances attractiveness to employers.
8. University reputation: Improves graduate competitiveness.
9. Research Communications: Supports research, leading to higher-quality publications.
10. Attracts sponsorship: Enhances marketing profile and attracts sponsors.

2.4 Promoting inclusive excellence: Enhancing STEM accessibility through partnerships and outreach

The Maker Space extends its positive influence on the wider community by engaging in initiatives that widen participation and promote STEM talent through partnerships with local organisations like IntoUniversity, creating pathways to higher education for students from diverse backgrounds and fostering social mobility. The inclusive environment also encourages participation from diverse groups, challenging traditional STEM stereotypes, through programmes like the Go Beyond mentoring programme for female STEM students, as well as supporting adult learners seeking new career opportunities.

> *"Salford can be a bit of an isolated place for mature students…It makes a difference to be able to go to a space where people are approachable, and there is a bit of a community."* – Student

2.4.1 Morson Group partnership: Ensuring success

Morson Group's sponsorship of the Maker Space aligns with their strategic goals, providing substantial benefits to the company, students, and the community. The facility helps Morson fulfil its commitment to giving back to the Salford community, raising interest in STEM, recruiting more engineering students, and establishing the area as a centre of excellence for engineering.

Morson Group's strategic partnership is integral to the Maker Space's success. Their investment ensures:

- Access to state-of-the-art equipment: Aligning student skills with industry needs.
- Integrating industry expertise: Embedding current trends and skills into training.
- Return on Investment: Mutual benefits to attract talent and proficient graduates.

> *"The Maker Space staff are so patient with the young people, and the result of that is incredible. They have this really immersive experience."* – IntoUniversity

2.4.2 Inspiring the next generation through IntoUniversity

The IntoUniversity Salford centre was established in partnership between the University of Salford and the University of Manchester, with strong backing from industry partners, including the Morson Group. The Maker Space plays a vital role in supporting IntoUniversity's outreach, delivering engaging, hands-on STEM sessions.

These include guided tours, tool demonstrations, and practical activities that help build technical skills and confidence. A standout Maker workshop saw Year 8 students design and race remote-controlled cars, led by Maker Space staff and supported by IntoUniversity mentors. Interviews with IntoUniversity staff revealed the Maker Space's significant impact.

Since opening, the Maker Space has welcomed hundreds of students to these interactive sessions - all made possible through the Morson Group STEM Foundation encouraging creativity and inspiring future engineering careers.

> *"One of the programmes we support is 'IntoUniversity' which targets kids from low socio-economic backgrounds. There are huge benefits to Salford, raising expectations, and making them aware that university can be an option for them, even if they're not that interested in engineering."* – Industry

> "*The local community benefits massively. My work takes me around a lot of universities, and I've not seen anything on this scale. It's providing those local skills that no other institute is able to provide. It's definitely building engineering excellence in Salford."*
> – Industry

Interviews with IntoUniversity and University of Salford staff revealed the Maker Space's significant impact.

"The school pupils get an opportunity to be creative. The kids say that they really enjoy the sessions. Every event we have, kids will tell us they've been inspired to maybe think about STEM as a career, or it helped them decide what to do as a career."
– IntoUniversity

Multiple benefits were identified by the sample group, falling into the following broad categories revealing that the Maker Space has profoundly influenced students by introducing them to STEM careers and higher education options.

Career and Educational Inspiration

- Exposure to STEM career paths
- Encourages university as a real option
- Shows real-world uses of subjects
- Builds practical skills through hands-on tasks

Personal Growth and Confidence

- Boosts self-confidence and sense of potential
- Success motivates further learning and ambition
- Meeting professionals links hobbies to careers
- Sparks conversations about career paths
- Encourages teamwork and peer connections

Enjoyment and Engagement

- Fun and engaging learning experiences
- Supportive, non-traditional learning environment
- Promotes creative and imaginative thinking

2.4.3 Challenging STEM stereotypes with the Go Beyond mentoring programme

As part of the Maker Space Impact Study, the *Go Beyond* initiative was evaluated for its key role in supporting women in STEM and boosting student engagement. Participants reported improved interview skills and increased confidence, enabling them to overcome previous challenges and consider a wider range of career opportunities beyond major corporations.

Launched in 2020 by Dr Maria Stukoff, *Go Beyond* supports female STEM students at all academic levels within the University of Salford's School of Science, Engineering and Environment (SEE). The programme pairs students with mentors from Morson Group, Morson Projects, and distinguished alumni, creating a supportive environment for career-focused discussions and guidance.

A highlight of the programme is the annual STEM celebration event held around International Women's Day. This conference-style gathering brings together students and industry leaders to share experiences and champion the advancement of women in STEM fields.

Participants reported a strong sense of community, allowing them to connect and collaborate with fellow women in engineering, ultimately enhancing their wellbeing and confidence as they prepare for careers in STEM fields.

Go Beyond programme structure

Year 1 – Connections

Introduces first-year female STEM students with each other, encouraging peer support and early networking.

Year 2 – Development

Offers tailored coaching in group workshops to build long lasting career-focused skills.

Final Year – Mentoring

Pairs students with industry mentors, including Morson Group volunteers and our Alumni, for at least four one-hour sessions. Some mentor/mentee sessions continue post-graduation.

> *"It [Go Beyond] gave me a lot of insight into what working life would be like. Also, just being empowered by the women who are working in engineering, just being able to have a connection, and being able to talk to someone who has similar experience. It was a very male dominated area, and it gets tough sometimes. Just being able to talk to someone about that was really helpful."* – Student

One student's experience illustrates the programme's impact. She had four to five mentoring sessions, each lasting about an hour, over six months. Go Beyond not only helped her academically but also supported her in overcoming personal challenges, proving to be a vital resource during her final year.

> "*My mentor would spend time with me going through my dissertation. I remember, during a couple of these sessions that we had, we discussed impostor syndrome and about believing in ourselves and the value of smart skills. I think lots of these personal skills had really been ignored in my degree. And I never felt confident about what I know. I think Maria and Rachel and the others, sharing about these techniques, how to feel confident, how to believe in your skills, how to just take a 'growth mindset' rather than a 'criticism mindset,' was really helpful."* – Student

> *"It encouraged me to not be frightened, to feel more comfortable, to ask questions, and not be scared of being criticised. Go Beyond had a really massive impact on my wellbeing, in terms of feeling supported, engaged, connected, believing in myself and boosting my confidence."* – Student

A student studying a Master of Science in Aerospace Engineering, described Go Beyond as *"an incredible opportunity to enhance my confidence, with my mentor providing assistance in interview skills."* Following graduation, they successfully secured a full-time position as a Mechanical Design Engineer at Morson Projects while another female student on the mentoring programme commented: *"I was able to gain a different perspective on my challenges and the one-on-one sessions provided me with valuable advice from a more experienced person as well as the opportunity to expand my professional network."*

> *"To give these graduates the best chances of success in this industry, it is important that time, advice, and guidance is provided from the offset. It is a great responsibility being asked to help these aspiring engineers; this is our chance to share experiences and discuss how they see their career progressing*." – Industry

Go Beyond was successful due to its comprehensive approach to fostering personal and professional growth. By empowering female students with inspiring role models, a supportive community, and strong industry connections, it cultivated a sense of belonging and aspiration, transforming it into a valuable initiative for aspiring women in STEM.

The interviewees identified a range of Go Beyond benefits, and these collectively contributed to the personal and professional growth of the participants:

Table 2: Feedback on the benefits of the Go Beyond programme	
Key Aspects	Details
Exposure to role models	Participants interacted with successful female role models, offering inspiration and motivation.
Community building	The programme fostered a supportive network among women in engineering.
Connecting encouragement	Encouraged connections among female students to build a community.
Industry connections	Linked students with industry partners to explore career opportunities.
Career Insight	Provided valuable insights into working life and future career preparation.
Career path awareness	Informed participants about various career paths and relevant companies.
Mentorship	Offered relatable guidance through mentors with similar experiences.
Understanding personal skills	Helped participants recognize essential personal skills for their careers.
Interview skills coaching	Included coaching on crucial interview skills for job readiness.
Profile development	Offered guidance on creating professional profiles on platforms like LinkedIn.
Confidence boost	Significantly increased participants' confidence.

3. Impact report conclusion

The Maker Space has emerged as a highly successful initiative in advancing STEM learning. By empowering students to apply theoretical knowledge through practical projects, it enhances their learning experience and understanding of key concepts within their modules. Access to tools, technologies, and workshops not only equips students with essential skills but also cultivates a strong sense of community, facilitating collaboration and idea-sharing among peers while building smart skills and general competencies.

As a unique facility for skills development, the Maker Space plays a crucial role in inspiring student engagement and extends its influence beyond the University. Through its establishment and the Morson Group's STEM Foundation, students have been successfully attracted to Salford and engaged with the local community and charities, aligning with the University's outreach commitments and civic university aspirations.

The Maker Space is widely recognised for contributing to strong educational outcomes, creating employment opportunities, and enabling the exploration and communication of complex research and innovation across the campus. The evidence presented in this report showcases the significant achievements attained through various activities and collaborations, demonstrating that the mission

of the Maker Space is being realised and benefiting the institution, its students, and the broader community.

> "*By creating that open community, we're trying to encourage innovation, and what might be innovative for an engineer might actually be every day for a fashion student or a health student. Sometimes innovation can be transferring ideas from one sector into a different sector. This cross fertilisation, this opportunity to create serendipity, is really valuable.""*
> – University

> *"They're brilliant. They're such lovely, kind, knowledgeable humans, who are so excited to talk to people about the projects that they want to do with Maker Space. Every time I go in there I'm greeted smiling, enthusiastic faces.... , happy to help you. Everyone's really interested in what you want to do and what you want to achieve. It's kind of an infectiously enthusiastic atmosphere... It's a safe space to progress ideas and do something completely outside of normal conventional comfort zones."*
> – University

Special thanks to Challenge Multimedia for compiling the original report[1].

Footnotes

1. Astle, Nick. (2024). MAKE IN SALFORD - MAKER SPACE IMPACT REPORT.pdf. figshare. Dataset. https://doi.org/10.6084/m9.figshare.28936730.v1