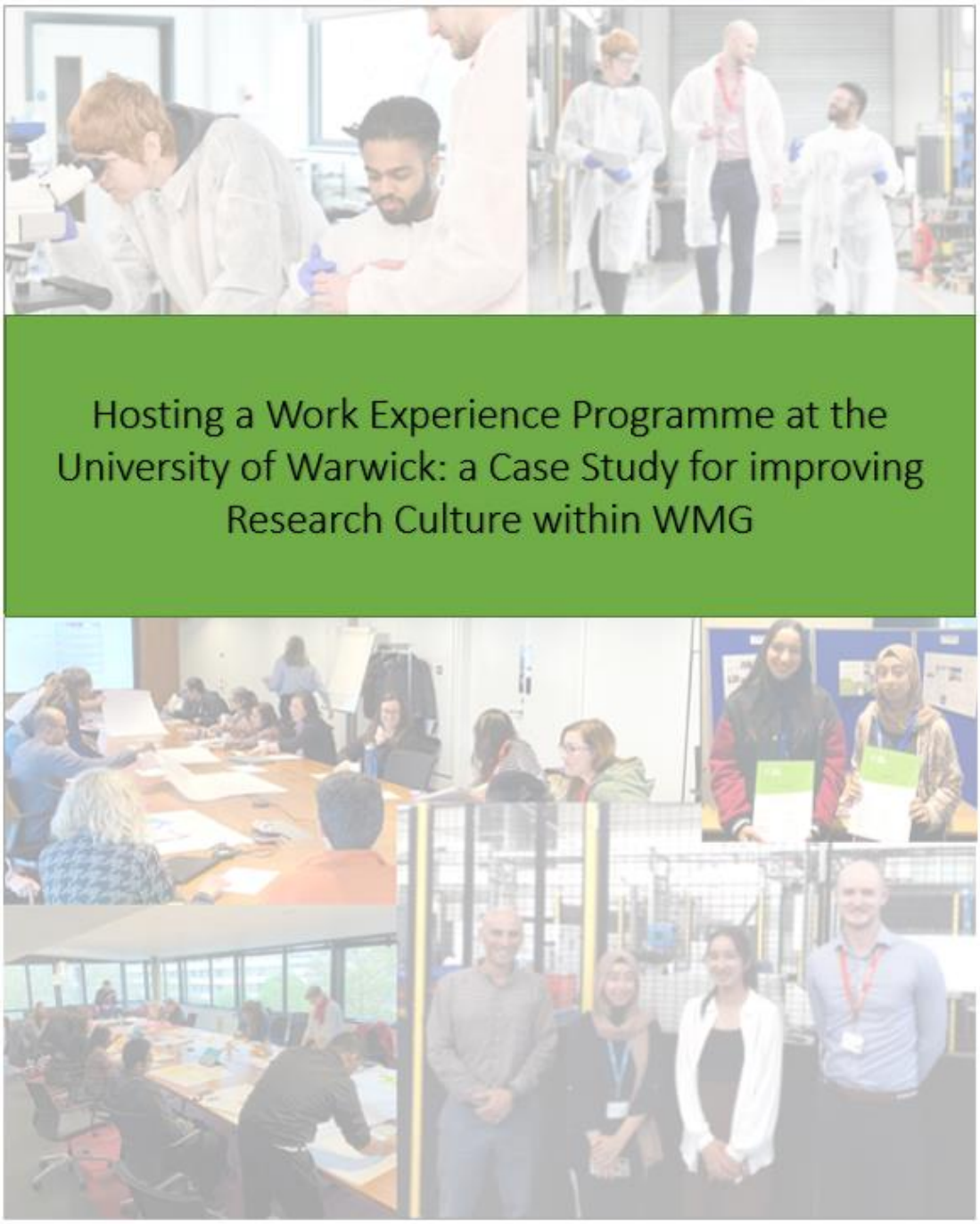

Hosting a Work Experience Programme at the University of Warwick: a Case Study for improving Research Culture within WMG

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Executive Summary

This document shows an in-depth look at the literature around employability schemes and the research culture around them. The authors have discussed their approaches to hosting said schemes and ways in which funding was used to enhance them. They have proposed models for hosting a work experience programme that can be tailored based on three core factors, the ability of the student, the availability of the host and the department's access to resources. Having applied these models to a range of cohorts and provided wider research culture across the department of WMG, the success stories have also been highlighted.

Document Guide

The document has been split into four chapters, please use this guide to decide which section is most useful for you and where to find it.

Chapter 1: Research Culture
This document was funded through an Enhanced Research Culture Fund. Chapter 1 introduces the funding process and project creation, as well as highlighting the culture change that it seeks to address and remedy.

Chapter 2: Approaching Work Experience
The second chapter introduces the department's historical and future approach to hosting employability interventions, specifically a work experience programme. This includes resourcing, making networks and support groups and targeting your scheme at an appropriate audience.

Chapter 3: Work Experience Hosting
Taking the previous learning, this chapter looks at how to apply the information to create your own work experience programme. The authors have created three ready-made models that can be applied to all subjects and departments. The justification for each model has been explored and is adaptable for your own specialised area of interest.

Chapter 4: Conclusions and Cultural Improvements
The final chapter highlights the successful outcomes of the overall ERC fund and the employability scheme that was applied to WMG's Work Experience programmes. It also highlights future work and expansions that are intended for the schemes.

Contents

Landscape and Introduction

This document is a summary of the activities and learning of Dr. Craig Carnegie from his experience hosting young people on Work Experience Programmes at WMG, University of Warwick. It is a guide to good practice, generated as part of an open access deliverable on a Research England Enhancing Research Culture Fund. The experiences and programme have been applied to an engineering environment. However, it can be adopted and implemented on demand by each faculty and department at the University, as the proposed models are independent of subject and field, and there is great potential for cross departmental collaboration. The chapters and their descriptions are as follows:

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Chapter 1: Research Culture

1.1 Chapter Summary

Chapter 1 introduces the creation of a project to support researchers in providing an employability scheme for young people from difficult socio-economic backgrounds. It also highlighting the culture change within a university department that it seeks to address and remedy.

1.2 Project Creation

At the beginning of 2022, the University's Social Inclusion Team appealed for support with their intake on the EY Foundation's Beyond Your Limit scheme. This was a scheme designed to provide work experience for young people from difficult socioeconomic backgrounds. It was an opportunity for WMG, specifically Dr. Craig Carnegie, to contribute to the wider university. WMG has access to a range of applied engineering and an abundance of resources that are available to support it. That year, WMG took on three young people from the EY Foundation and a further two through the Nuffield Research programme.

To continue this work and expand it to a larger audience within WMG, funding was sought. The Enhanced Research Culture Fund was a great opportunity for a smaller sum of money to pay for staff time and consultancy, to create and build a dedicated team within the department to host and deliver a rich work experience programme to a range of students. The ERC fund provides funding to support universities to develop activities in response to the Research and Development (R&D) People and Culture Strategy, for a 'more inclusive, dynamic, productive and sustainable UK R&D sector in which a diversity of people and ideas can thrive', published in July 2021 (Department for Business, Energy & Industrial Strategy, 2021)

The project, titled 'Addressing social mobility issues in STEM through the development of WMG's Research Culture and contribution to the wider University of Warwick community', has allowed WMG to create a core team of five, that have had individual and group training (one-on-one personal development, Disclosure and Baring Service [DBS] checks and safeguarding) as well as providing workshops for the overall improvement of research culture across the department.

1.3 Project Aims

The project had three core aims at the onset. Firstly, to create an internal Work Experience team within WMG (one in a leadership role and three more as core members). Secondly, to expand on our connections (as a team) with the local community to increase Warwick's public engagement. Finally, the creation of the core employability hosting programme at WMG that can be implemented on demand.

In line with the University's 2020-25 Access and Participation Plan, the University aspires to continually 'recognise, inspire, and enrich talented students from socially and economically disadvantaged backgrounds' (University of Warwick, 2019), particularly within the pre-entry stages of the student lifestyle. Highlighting the aims that are relevant to the focus of this project, the University's strategic aims are:

- **remove systematic / structural barriers to access / participation at Warwick, and in higher education (HE)**
- **contribute to reducing gaps in participation in HE o through strong collaborative partnerships**

- **provide regional leadership, ensuring access / participation in HE is championed and collaborative efforts are aligned with regional priorities**
- narrow the gap in participation between the most represented (POLAR4 Q5) and the least represented (POLAR4 Q1) at Warwick from 7.5:1 to 4:1 by 2025 whilst contributing to the national objective for all higher tariff institutions
- **continuously enhance awareness, confidence and resilience of targeted under-represented groups to consider HE as a positive choice**
- improve learner attainment / progression to HE for under-represented groups in the region by 2025
- increase the proportion of Realising Opportunities students progressing to research intensive universities from 42% to 54% by 2025
- improve access to HE, and to Warwick, for care leavers by 2025
- increase access to Warwick for BAME students from the least represented groups from 5.2% to 10% by 2025

Previous work within WMG (through Athena SWAN) has looked at the academic retention based on gender and ethnicity. However, there is a gap in the research around young people from socio-economic backgrounds. Additionally, Coventry is ranked as the 46th most deprived local authority district out of 326 in England, with 13 of Coventry's 18 wards containing Lower Super Output Areas (LSOA) within the 10% most deprived in England (University of Warwick, 2019). There is a need to engage with the local community using exciting opportunities within STEM. The aim of this project was not only to promote STEM within HE, Degree Apprenticeships, and private interest to young people in the local community. It was to also focus on investigating the socio-economic impacts that have led to lower interest and access to STEM, *rather than low attainment*, at what age this occurs, and how the acceleration in disengagement can be undone using interactive and immersive experiences in STEM at WMG, such as work experience opportunities.

1.4 Exploring Research Culture

'Research Culture includes creating an inclusive research environment, removing barriers, recognising different contributions, supporting researchers' wellbeing and career development, involving non-academic stakeholders in research, and keeping our research practice sound and open': Professor Sotaro Kita (Psychology), Academic Director for Research Culture (Research Culture, 2023).

The University of Warwick is one of the UK's leading academic institutes – 92% of our research has been determined 'world leading or internationally excellent', according to a panel of global experts. The results from the Research Excellence Framework (REF 2021) demonstrate the skills and world class quality of Warwick's talented researchers' work across the sciences, arts and social sciences.

Chaired by the Pro-Vice-Chancellor (Research) Professor Caroline Meyer, the Research Culture Committee brings together researchers, technicians, PGR students and Professional Services Staff to have open and collaborative discussion about the University's research culture, spanning themes of 1) inclusive research communities; 2) the wellbeing of researchers and research enablers; 3) equality, diversity & inclusion; 4) research & research support careers; 5) researcher development & training; 6) creative research environment; 7) research integrity; and 8) open research.

It's common to focus on externally visible features of a research environment, the research infrastructure. However, the UK Research Assessment Exercise (RAE) recognised the importance of a lively and supportive context for individual and collaborative research by the quality of research environments of individual University departments (The Science and Technology Committee, 2004). The signs of a department having a strong research culture then refers less to the systems and resources, instead focussing on values, practices, dispositions and habitual behaviours (Casci & Adams, 2020). Thus, developing high quality research does not rest solely on training people in skills

but on cultivating intellectual virtue, including attitudes of open-mindedness, whole-heartedness, responsibility, ability to explore the nature of disagreement and accept criticism without taking offence. (Ridley, 2011).

Nationally however, sourced through an online survey of 4,267 researchers, 55% of researchers attached negative sentiment to describe research culture, with lack of job security, lack of career flexibility, mental health problems, strain on personal relationships, and a sense of isolation and loneliness at work being cited for this significant result (Wellcome, 2020). Figure 1 shows a collection of words that were used to describe research culture in an academic environment. A poor research culture negatively impacts research as well as the society, leading to a loss of quality and innovation due to the loss of talent and high standards of rigour and integrity from the sector (Wellcome, 2020; Universities UK, 2023)

Figure 1: 'Words that researchers would use to describe research culture' (Wellcome, 2020)

Culture varies across industries and organisations, with under-represented groups experiencing the most challenges. With Research Culture initiatives often working in silos within organisations, there are often minimal opportunities to share insights on what can be deemed 'best practice' (Wellcome, 2020; Kernohan, 2022). Hence, a more inclusive approach to research is needed, extending to fostering respectful environments that welcome and value individuals from a range of backgrounds, providing early-career researchers better personal (mental health & wellbeing) and professional support and training to strengthen managing and mentoring skills, identifying and deterring bad behaviours and promoting good practice (Ridley, 2011; Nosek et.al, 2015; Hafeli et.al, 2017; Cheatle et.al, 2019; Association of Research, 2020).

With 800+ staff, WMG is home to students from 64 countries and staff from 49 countries, making WMG one of the most ethnically and culturally diverse departments in the University (Warwick Manufacturing Group, 2021). In 2021, the total research portfolio from WMG to the University was worth £53.3 million through research grants, securing contracts direct from industry and launching fellowships in the fields of Intelligent Vehicles, Digital Technologies, Organisational and Societal Transformation, Materials and Manufacturing and Energy.

This project aimed to develop WMG's Research Culture in four ways, by encouraging diversity and inclusion, guiding career path growth, providing open access resources for work experience programmes, and facilitating the collaboration of colleagues both inside and outside of WMG.

Chapter 2: Approaching Work Experience

2.1 Chapter Summary

This chapter discusses the approach that WMG previously had to hosting a work experience for young people. It shows how they then developed a dedicated team for the process and identified specific groups of society that most benefit from such an employability scheme, to maximise their contribution to the University's Actions and Participation Plan. The following questions will be addressed:

1. What impacts young people's interest in STEM and how do socio-economic factors exemplify this?
2. Who should we target with extra-curricular opportunities in STEM and at what age?

2.2 The impact of socio-economic factors on STEM interest and access

At all levels, the STEM sector has significant levels of under-representation of women, people from lower socio-economic backgrounds, students of state and non-fee-paying schools, disability, those who identify as LGBTQ+ and minority ethnic groups. Research strongly suggests that there is no inherent difference between people of different socio-economic backgrounds that should limit interest, capability, or ambition. The under-representation and/or under-achievement in STEM education across different people is therefore due to systematic institutional failures, as well as socio-economic factors. This research, however, focuses specifically on why certain groups have shown a decline in *interest* and *access* in STEM as opposed to under-achievement within pre-university STEM education.

The implications of under-representation in STEM are not limited to young people being denied the opportunity to study and work in this exciting and rewarding sector. UK Higher Education (HE) and Industry cannot reach its full potential unless it can benefit from the talents of the whole population and until individuals from a diverse range of backgrounds can benefit equally from the opportunities it affords.

Socio-economic factors include but are not limited to; gender, ethnicity, occupational class of parents, disability status, access/need for free school meals (FSM), family income, and care-experienced status. These groups are largely under-represented in HE and other educational STEM fields.

A term first conceptualised by Pierre Bourdieu and later developed by Louise Archer, 'science capital' can be defined as the 'sum of all the science-related knowledge, attitudes, experiences and resources that an individual builds up throughout their life' (Archer et.al, 2017). A student's science capital can be grouped into eight dimensions:

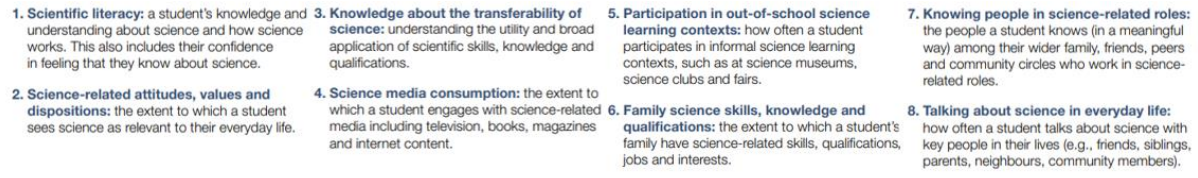

Figure 2 – The eight dimensions of science capital

Studies have shown that the lack of 'science capital' / 'science identity' is a significant factor in the lack of diversity, levels of disengagement and access for young people from a lower socio-economic background in STEM fields. By conducting an in-depth literature review of UK-focused sources (Kessels et. al, 2006; Archer et.al 2017; Dewitt et.al, 2018), the authors have identified two main themes that explain the causes of young people's lowering interest and access within STEM; (1) *Personal*

Perceptions and Identity, including young people's negative perception of STEM, negative parental perceptions of STEM, lack of role models and knowing people in science-related roles and (2) *School experiences, environments and exposures*, including the impact of the UK Education system, lack of IAG (Information, Advice and Guidance) access, the impact of COVID-19, participation in out-of-school learning contexts.

2.3 A Question of Age

A range of sources collectively suggest that young people from lower socio-economic backgrounds tend to permanently lose their connections to, and interest in, STEM by the age of 15, with overall interest declining over the years that young people are in school (despite young children reporting a widespread interest in a variety of scientific phenomena) (Microsoft, 2014; Sims et.al, 2019; Williamson, 2019; Popovich, 2023;). The 'crunch period', 11 to 16 years old, is exacerbated with those from lower socio-economic backgrounds as they often lack the support systems (at home, extra-curriculars or at school) around them to thrive. Targeting this age range with the message that STEM subjects are an area in which they belong and can apply their creativity is extremely important. This tells us the age range to target with extra-curricular opportunities, hands-on technical activities that also offer opportunities to regain lost confidence and passion. A well-structured Work Experience programme in a research/industrial environment addresses this need.

2.4 WMG Historical Position

Historically, WMG has carried out work experience on an ad hoc basis, as employees sought out experiences for their children or family friends. Alternatively, staff were approached by schools that required a larger scale hosting and would then seek out assistance from technicians or the Outreach team. This is a common form of approach found across the university faculty.

As we developed the hosting programme within WMG, for the EY Foundation and Nuffield, the following ways of participating were identified, allowing staff to take part with a minimal amount of time, with one member of staff acting as facilitator:

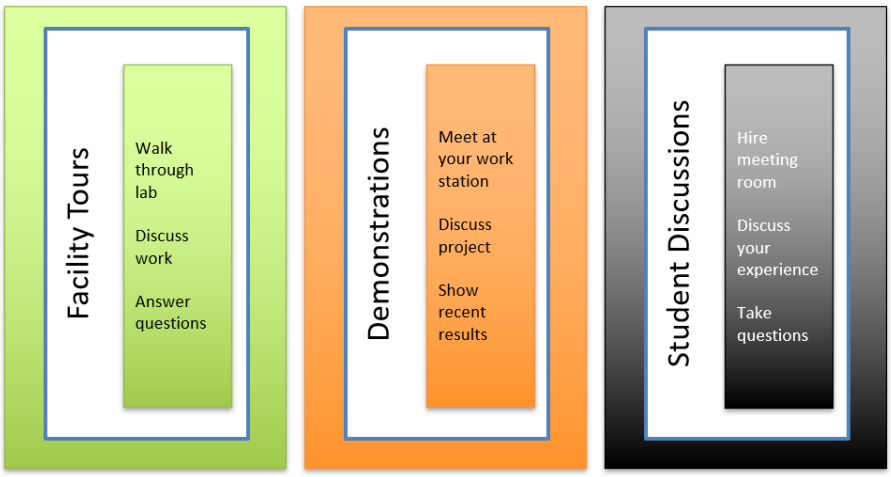

Figure 3 – Methods for individual participation in delivering a work experience

2.5 Funding opportunity

To stimulate a change to the above model, funding was obtained to support its progression. Departments can look for internal and external opportunities, including through the Research &

Impact Services (RIS) and Widening Participation (WP) teams. Externally, UKRI has funding for activities that boost inclusivity and representation with research. As mentioned, the fund chosen for WMG was the Enhancing Research Culture Fund.

2.6 Team creation

Using the fund, a fourth category of hosting contribution could be added, the Core Team. This consisted of four members of staff, plus a team leader. Training and development were provided to them as well as team building. Together, the creation of a hosting model was generated, with a split contributions of time and resource.

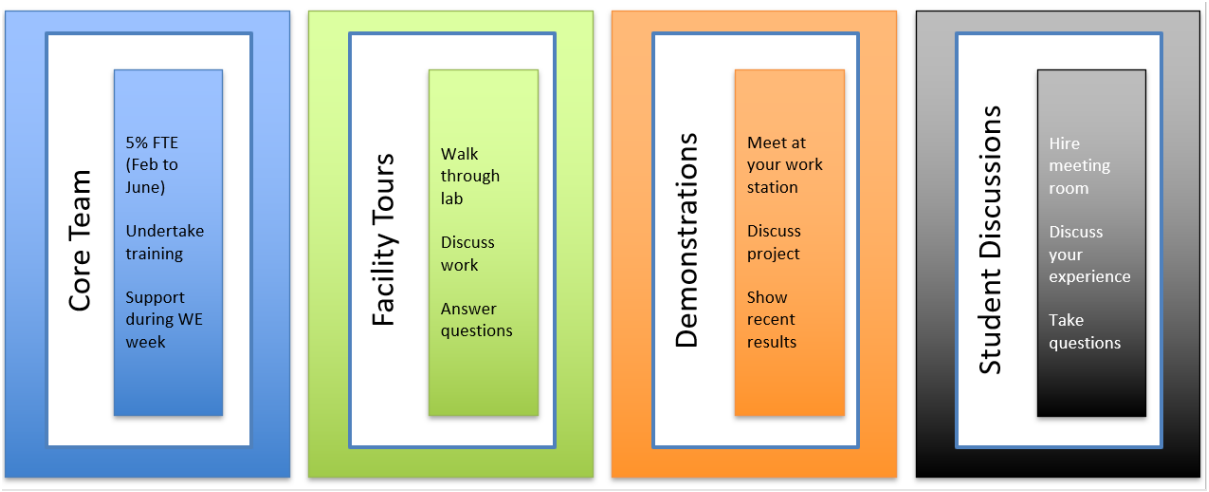

Figure 4 – Additional participation method when creating a dedicated WE team.

The project proposal was created by Craig (PI), Jane (Co-I), Margaret (Co-I) and Darren (Co-I). The Work Placement Team consisted of Craig, Asima, Mona, Ninna and Tarek (Two researchers, two teachers and a member from business development) and the project delivery was supported by Naomi (Research Assistant). Across the work experience weeks, time was contributed by researchers, teachers and technicians to provide a range of tours, demonstrations and discussions.

Figure 5 – WMG's ERC and WE Team

2.7 Resources

The overall time commitment per WE team included a few hours during the work placement (x3), two hours of one-on-one training with an external consultant, a couple of WE preparation sessions. The main commitment of time was provided by the principal organiser of the departments scheme. Resources were sought to help support the PI at 10% for 9 months, the Team at 5% for 6 months and the cost of employing a research assistant full time for 8 weeks.

2.8 Expected Costs

To host a work experience week, three core requirements need to be met:

1. A member of staff (preferably two) is always available and has been cleared with a DBS check.
2. Facilities are available to host the student, including a dedicated desk within an open plan office, and if possible, a computer with internet access.
3. Health and Safety assessments have been completed and are available to the students to read.

This can be provided without a budget and requires the commitment of one or two members of staff for a couple of weeks in the year, something that can be done as a part of their outreach activities as part of a Research or Teaching role.

Beyond this everything is extra. For the ERCF, time was allocated to the principal investigator at 10% for 9 months (£4000), and three team members were given an allocation of 5% for 6 months (£4000). To provide working materials, PPE and lunch, a consumables budget of £1000 is sufficient. Therefore, a total of £10,000 would be more than enough to host a repeat model of the experience.

The following section provides templates and resources that will assist in the initial set up that was required, and therefore time committal can be reduced.

Chapter 3: Work Experience Hosting

3.1 Chapter Summary

Chapter 3 helps to define a good practice for hosting a work experience programme. Three core models have been developed that can be used to provide different experiences based on the young person's ability and the resources available to the department.

3.2 Expectations and Defining Good Practice

Students in year 10 and 11 often have the chance to take part in workplace experiences which may include shadowing opportunities, doing a 1 or 2-week work placement or attending work with a parent or guardian. Although WE programmes are more common during the summer holidays, it's possible to host a WE week at any time of the year.

Young people need career guidance and experience to make informed decisions about their future and to inspire their passions for lost disciplines such as STEM. Yet, as previously investigated, many young people don't receive this consistently or to an adequate level. The Gatsby Benchmarks of Good Career Guidance serves as a framework for schools and colleges committed to providing world-class careers provision and advice to their students, with OFSTED reviewing schools against these benchmarks during inspections (Gatsby, 2013).

The Eight Gatsby Benchmarks of Good Career Guidance are:

1) Stable career programmes	2) Learning from career and labour market information
3) Addressing the needs of each pupil	4) Linking curriculum learning to careers
5) Encounters with employers and employees	6) Experiences of workplaces
7) Encounters with further and HE	8) Personal guidance

Whilst the responsibility ultimately rests on schools and colleges to meet these expectations, work experience hosts at the University of Warwick, can help schools meet benchmarks 5, 6 and 7 – while alternative WE providers at companies are generally limited to 5 and 6.

The pressure students experience to find work experience often comes from schools, and for the most socio-economically disadvantaged young people in the local community, successfully finding work experiences in STEM can be incredibly challenging. This is particularly a challenge for those of lower occupational class and lower income, as they may not have the contacts and networks available to them, compared to more advantaged young people.

The work experience models can be applied to any student, irrespective of socio-economic background. However, the goal is to focus on hosting young people from lower socio-economic backgrounds that may not have the connections to access IAG, to reaffirm their interest in STEM. The programmes therefore encourage students to develop confidence, transferable skills (networking, presentation, research, writing and reading) as well as building a network of contacts through professional routes. It is important to be mindful of safeguarding concerns when working with children under the age of 16, with regards to continues communications. The hosting models are designed for 14 to 20-year-olds, with a duration of one to two weeks, that are hybrid/onsite and typically run between 9.30 am to 4.30 pm. A maximum cohort size of five students is recommended.

Whilst the models proposed here slightly differ in their approach to delivering work experience opportunities to young people, good practice is related to the provider's 1) ability and availability in providing work-related activities; 2) ability to uphold responsibilities as WE coordinator (H&S, risk assessments, considering any additional student needs [Special Educational and Disabilities], safeguarding attendees on work experiences); 3) ability to provide young people monitoring, evaluation and review; 4) ability to develop the Research Culture of their department through the provision of a WE opportunity, all of which are found in all of our proposed models.

As the Work-Experience Lead Coordinator, these steps would need to be taken for planning a work experience opportunity in your department:

1) Identify the members of your departments that can give their time in supporting departmental work experience opportunities, the time of year best for hosting a WE opportunity based on the staff members you have available, and what models you can offer.
2) Develop a suitable schedule of projects and activities and identify any extra training that young people could benefit from, to include an induction and end-of-WE celebration, based on the model you've chosen to provide.
3) Advertising the Work Experience opportunity, with role and key responsibilities and student specification. This is to be followed by recruitment of said students.
4) Welcome students. A good induction will help participants settle into the department and start helping them build relationships.
5) Deliver your work placement activities to the cohort.
6) Summarise the weeks activities with dissemination output.

3.3 Work Experience Activity Types

The format of a working week has been broken down into six core activities, irrespective of the subject being studied, that can be populated based on the company's specialities and resources available to them.

Table 1 – Timetable activities and their descriptions

Activity Title	Description	Colour
Interaction (Fixed)	The interaction has been used to describe all admin / one to one meeting with the designated host. This individual will typically have had a DBS check. Segments include greetings each morning, introduction / inductions.	
Independent	Independent working is allocated time for the student to work alone on a set task or project. They may have been assigned a desk with access to a computer. It is a good idea to set a specific objective for the end of this task or have an overarching objective for the total week that they can continue to work on. Examples may include researching a specific question or topic.	

Practical	Practical work will be an accompanied task, often in a new location where equipment or supplies are kept. This could include laboratory experiments or Computer Aided Design.	
Tour	A tour will be a period walking around a new part of the business. A member of staff that is familiar with this area may be able to provide this tour, giving examples of the work that is done there as well as answering any questions that are provided on the way.	
Lecture	The Lecture is a broad term that encompasses time that the student is sat listening. This could be a guest speaker from within the department, or a PowerPoint presentation delivered by a co-ordinator.	
Close out	Like the fixed interactions in the morning, the close out sessions are for the young person to evaluate their day with the WE co-ordinators. At the end of the placement, where they deliver their final output, the close out will also include a presentation / celebration event.	

The activities have been used to populate the weeks' timetable, based on a percentage distribution associated with Work Hosting Models. Using precious hosting experience, the authors have proposed three fundamental models for providing a working week for young people. The models have been created using three core factors, the **ability** of the student, the **availability** of the host and the access to **resources**.

Work Experience Model					
Guided		Blended		Independent	
Independent	20%	Independent	45%	Independent	60%
Practical	20%	Practical	20%	Practical	10%
Tours	20%	Tours	20%	Tours	15%
Lecture	20%	Lecture	15%	Lecture	5%
Floating	20%	Floating	0%	Floating	10%

Figure 6 – Three WE models and their activity percentages

A floating percentage has been assigned to the Guided and Independent models that allow the host to customise their experience. This can be decided during the placement week itself, based on judgement of the students' abilities and interests. More percentage has been assigned to the Guided model, where they are expected to require a very hands-on experience with the host; if during the week the young people demonstrate their ability to work independently the model can be adapted. The purpose of the blended model has already factored these modifications in, so no floating percentage has been allocated.

Table 2 - Evaluation criteria for hosting model

Category	Guided	Blended	Independent
Academic attainment	Hands-on/practical ability	High achiever; GCSEs in English, Maths and Science	High achiever; C+ grades at GCSE
Exposure to STEM	No requirement for topic interest	Interest and basic knowledge of topics	Sizable interest in topic
Location	All onsite	Mostly onsite	Incorporated hybrid working
Deliverable	Group presentation output	Individual presentation output	Poster and/or Report output
Learning objectives	Focus on transferable skills	Focus on subject knowledge and transferable skills	Focus on achieving final deliverables
Emphasis	Teamwork and effort	Joint team/individual work and effort	Independent work and effort
Host support	Guidance throughout	Guidance required	Guidance as and when needed

3.4 Guided Model

The model has been inspired by a week's hosting experience on the EY Foundation's 'Beyond Your Limits' programme, an employability programme co-designed with and for care-experienced young people aged 16-20, delivered during their school holidays. The programme included team building, CV workshops and a paid work experience placement. The Guided model is designed towards students that are less able, with lower grades who could also have special educational needs such as autism or moderate learning difficulties. This model's primary emphasis is on developing young people's confidence and transferable skills such as networking, presenting, research and communication, through immersive practical, hands-on work and networking within STEM. Using the percentage allocations for activities, an example timetable can be seen in Figure 7.

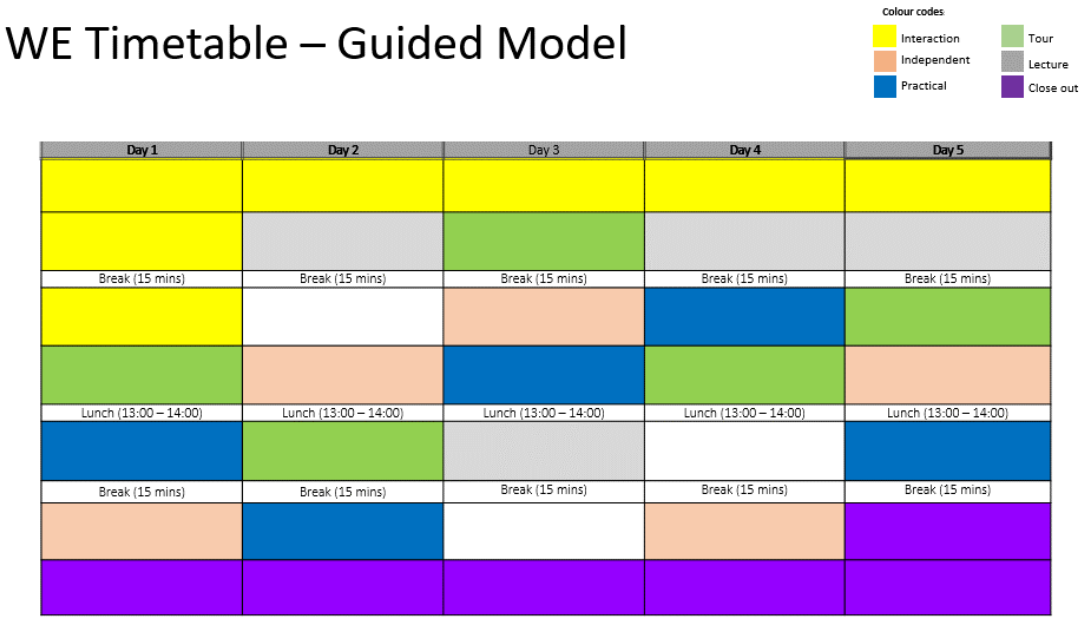

Figure 7 – Example colour-coded weekly timetable (Guided Model) with an activity split of Independent 20%, Practical 20%, Tours 20%, Lectures 20% and the remaining Floating 20%

Due to the ability of the students, an achievable output for the weeks is a group presentation, collecting a summary of the week's activities and learning outcomes. If a cohort of students have been accepted onto the programme, they can work together to deliver this, with the support of the host. Colleagues from the department can be invited to the presentation, to boost the events impact and provide feedback and questions at the end.

3.5 Blended Model

This model has been part-inspired by EY Foundation's 'Smart Futures', an employability and skills programme that is offered to people in Year 12, state schools, eligible for FSM/eligible for a college bursary or Education Maintenance Allowance (where household income is less than £24,421). The Blended Hosting model is designed towards students who are high achievers, not necessarily in STEM and with guidance, are able to work on a technical project alongside others. This model's primary emphasis is on building young people's subject knowledge within the chosen project and their ability to work within a team on a technical project. Using the percentage split on activities, an example timetable has been generated in Figure 8.

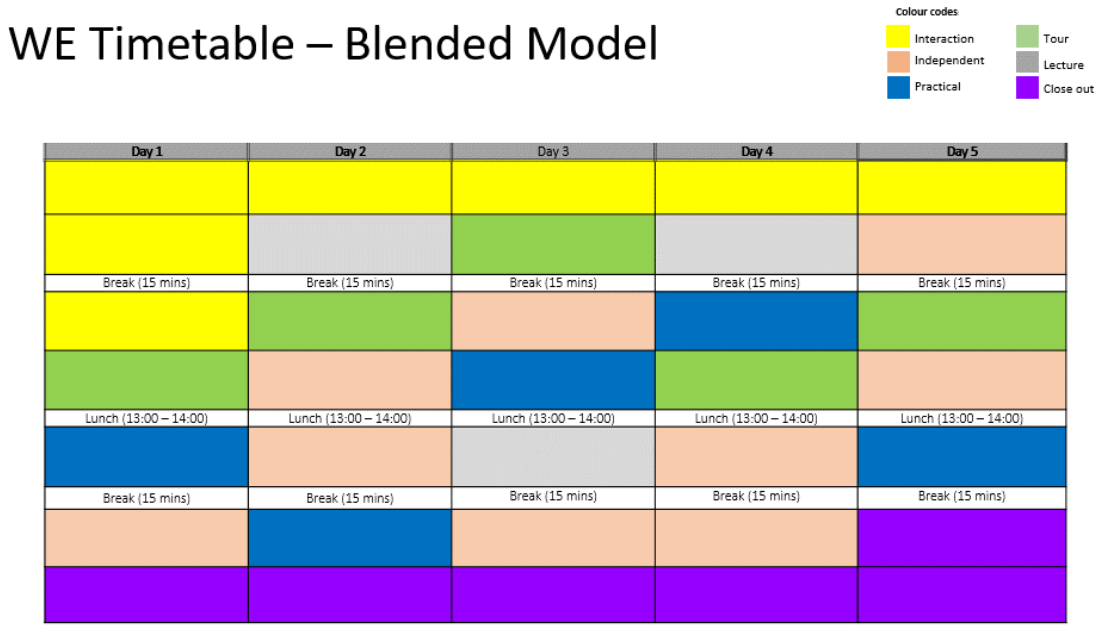

Figure 8 – Example colour-coded weekly timetable (Blended Model) with an activity split of Independent 45%, Practical 20%, Tours 20%, Lectures 15% and an allocation of Floating at 0%.

Whilst the output can be similar to the Guided model's (group presentation), as this model gives for a lot more independent time and is suited to student's that are more academically able, achievable outputs also include an individual presentation or a short report.

3.6 Guided and Blended Workbooks

Figure 9 is an example workbook that can be provided to the students either prior to or on arrival. The Guided and Blended workbooks give an overview of the events and learning that will take place during the work experience, a detailed timetable of the week's events and interactive worksheets for learning tasks. The booklet can also provide a personal touch to the department that they are working in, for example it contains an introduction to WMG and its founder; Professor Lord Bhattacharyya.

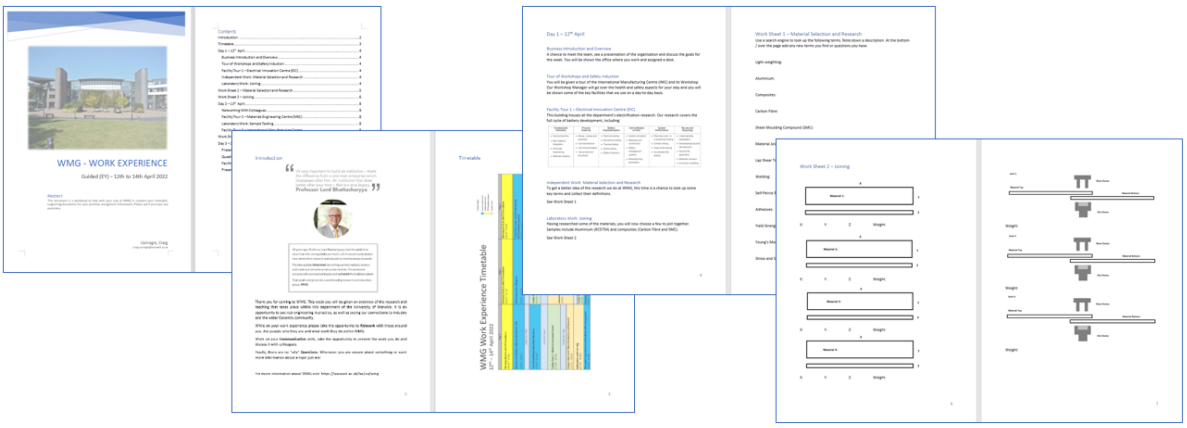

Figure 9: Example workbook for the Guided Model

3.7 Independent Model

This model has been part-inspired by Nuffield Research Placement, which offers engaging and hands-on research projects related to an area of STEM for Year 12 students in full-time, state-funded education with at least 5 GCSEs at 6/B and from a lower socio-economic background. The Independent model is tailored towards students who are high achievers, with interest in the assigned topic and show the ability to work independently on a technical project. This model's primary emphasis is on building young people's technical knowledge in a particular subject area, and ability to work predominately on their own to produce a report or poster. An example timetable, designed using the activity split for independent working can be seen in Figure 10.

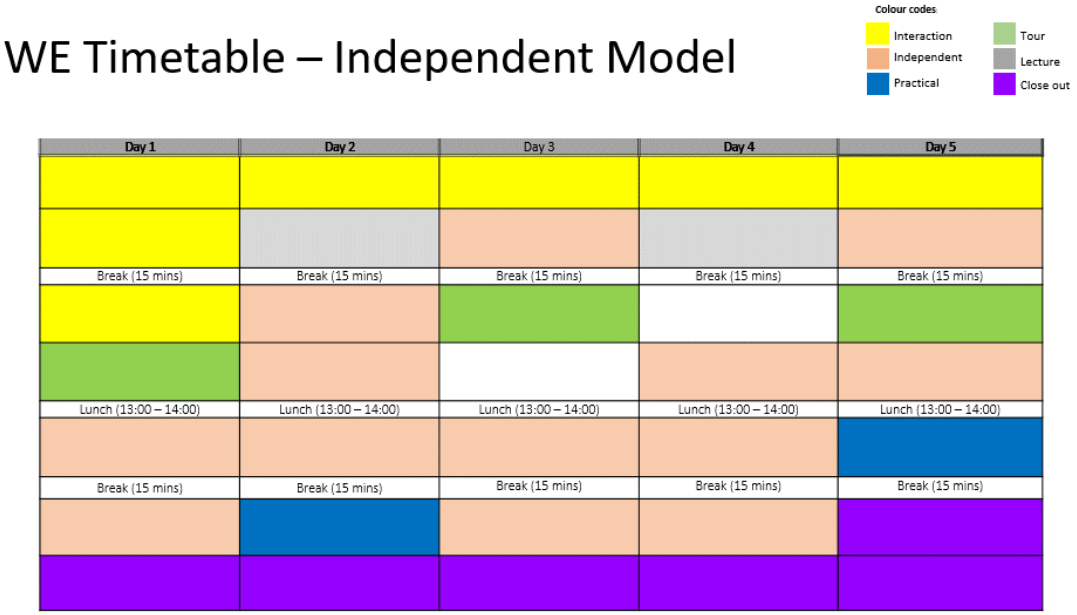

Figure 10 – Example colour-coded weekly timetable (Independent Model) with a percentage split of activities of Independent 60%, Practical 10%, Tours 15%, Lectures 5% and a Floating 10%

This model does not emphasise a requirement for a workbook, mainly as this model is designed to be a very independent research experience for the students. With an assigned research project supported by the WE Host, students are tasked to come up with their own schedule. Example projects and tasks have included: 'Designing a Bespoke Novel Rail Joining System', 'How can ChatGPT be used

to develop professional skills in STEM students?', and 'Incorporating mixed material design into automotive manufacture and discovering how to disassemble for improved circularity'.

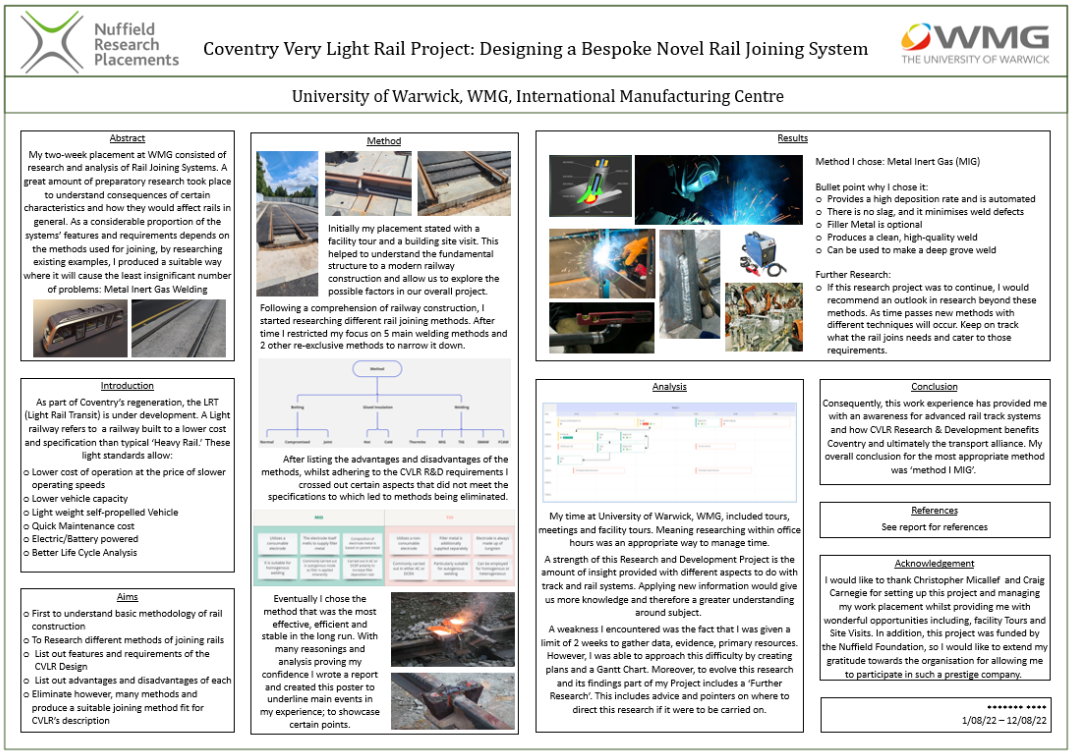

Figure 11: Example output (academic poster) from one of the students that was hosting on the Independent Model

3.8 Themes

It is useful for both the young people and the hosts to assign the work experience week an overarching *theme*. For the Guided and Blended models, this theme will be the objective, to be showcased in the end-of-week presentation. Some examples include 'How do you build a car?' or 'What is the Milky Way?'. Framed as a question, it provides the students the aim of answering the question. Using this theme, the week (specifically the *Independent Activities*) can be tailored for that question and broken up into manageable 1-hour objectives / tasks:

> 'How do you build a car?' becomes several blocks of; 'Car Designs', 'What is a material', 'How do we manufacture components', 'Joining Techniques', 'Marketing'. Which can all in turn, become one or two slides within their final presentations.

Amongst these individual activities, project relevant tours, practicals and lectures can be entwined, breaking up the office work.

For the Independent model, a more specific theme or research question can be assigned. As the level of input and output will be greater. An example is shows in Figure 11; 'CVLR: Designing a Bespoke Novel Rail Joining System.

It helps to assign a theme that is relevant to the hosts own research / expertise; not only to assist with any difficulties, but also to demonstrate their efforts can have a lasting impact on the department.

Chapter 4: Conclusions and Culture Improvements

4.1 Chapter Summary

The final chapter of this document highlights the conclusions of the project and discusses where the successes were achieved. It also explores where the project can be taken next through further work.

4.2 Successfully Work Experience Programmes

The work experiences that were hosted between 2022 and 2023 were a huge success within WMG. The feedback from all stakeholders has been very positive. The work created a sense of community with young people from the local area by offering them placements and by working with local schools to identify candidates, instilling a role-model cycle of candidates that can become inspirations to future cohorts of our WE scheme. Figure 12 shows a few testimonials from those involved in the work experience weeks.

Figure 12 – Testimonials from those involved in the work experience week.

4.3 WE Team Building and Personal Development

Because of the wide variety of researchers working in the team, from Materials and Manufacturing to Business Development, it was essential for us to have a broad view of professional development that could be learned and applied within the Work Experience team and in their own work. It was also important to provide transferrable skills and knowledge.

The team was recruited and trained within WMG to equip them with personal and group training ready to implement a WE programme designed for young people from lower socio-economic backgrounds. Training included bespoke one-on-one training, specifically on working with young people within a university environment, NSPCC training, DBS and Safeguarding training based on the team / individual needs. This combination of group and team training helped to bring all individuals to an equal level, improved research leadership skills across all career stages, and highlighted people's

strengths. It was important to embed the procedures and training to last beyond the duration of the funded pilot scheme. The Research Assistant also improved her research and networking skills whilst attending workshops organised within the project and supporting the project's delivery. The project's PI developed his own leadership skills as an ED&I representative within WMG as well as gaining experience in recruitment and facilitation skills, in expanding the department's hosting capabilities.

4.4 Research Culture for the Wider WMG Community

Passionate and committed to creating engaging learning and development for both the private and public sector, Sandy Sparks worked closely with the University on projects over the last 20 years covering Research Culture, mediation and facilitation. During the 2022/23 academic year, 3 workshops led by Sandy were held at WMG. The workshops; 'Mapping your achievements to University of Warwick's promotions criteria', 'Influencing, Politics & Being Strategic', and 'Valuing Diversity & Increasing Inclusivity: What can I do?' supported WMG staff to enhance their capabilities, effectiveness as researchers and professional services staff and employability. 33 individuals from WMG attended the workshops, with many attending all three across the year.

Figure 13 – Testimonials from the Workshop

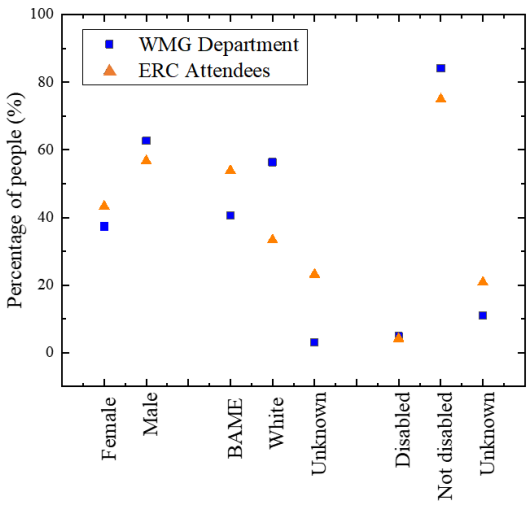

Figure 14 – Demographic representation across the WMG department compared to the average % of ERC workshop attendees

Figure 14 shows a comparison of two sets of data, the overall demographic of staff that are employed at WMG, and the demographic of staff that signed up for the activities delivered through this year's ERC Fund. The data suggests that the delivered workshops managed to reach a fair representation of people when compared to the expected percentiles across the department. Areas where staff were underrepresented, although only slightly, include Males, White ethnicity, and Not-disabled.

Looking at the specific categories for the staff that signed up for the ERC Fund activities, we see three graphs in Figure 15. The variety of representation in the workshops suggests what is demanded more by different types of people at WMG. Workshop 1 reached more women compared to men and more BAME staff compared to White, despite there being less in the department respectively, and had over-representation from disabled staff. Research Culture in the UK is described as 'competitive' 'elitist' and 'hierarchical', this perhaps indicates that whilst ambitious, these are the groups that require more support and information in the promotions process.

There was significant under-representation of Female and White staff in Workshop 2, which looked at how to be influential and political within a working environment; Males and BAME staff in comparison were highly represented. A promising demographic split was found in the last workshop, number 3, which discussed how to value diversity and increase inclusivity. This workshop had the highest amount of ethnic diversity compared to the previous workshops, excluding 'unknowns', with a 50:50 split between BAME and White Staff, who represent 41% and 56% of the department respectively.

There was close to four times the number of attendees at Workshop 1 compared to Workshop 3, which focussed on more independent career progression and supporting altruistic and communal goals respectively. We can argue that improving research culture relies not only on personal and career development of those who work in a research environment, but also about collaborating to equip the most under-represented with the skills, knowledge, and encouragement to be able to successfully navigate a Research Culture.

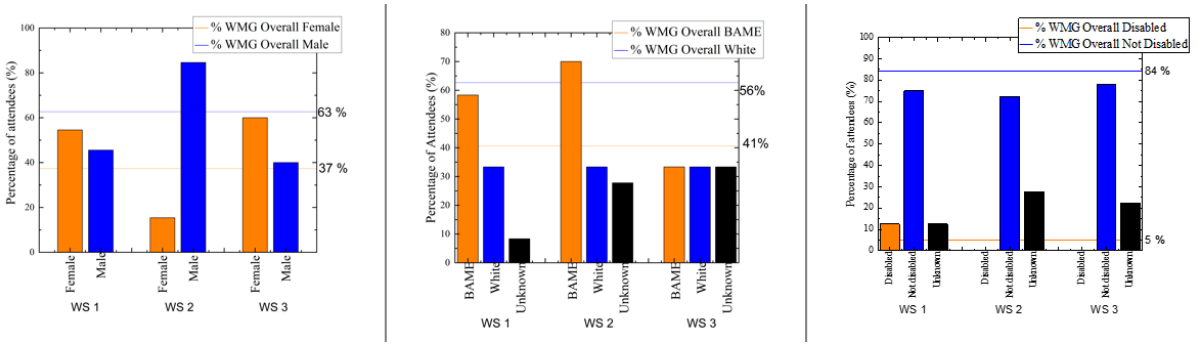

Figure 15 – Comparison between different groups that signed up for the ERC activities

4.5 Building Internal and External Connections

Collaborations between WMG Outreach team, WMG Academy, the Technical teams, the Degree Apprenticeship team, and others with a range of engineering expertise (Batteries, Joining, Metals, Composites, Additive Manufacturing and Metrology) strengthened the Research Culture of the department. There was a lot of support from external team members, with assisting on facility tours across the department (EIC, MEC, IMC and AMMC) and being available for forward-facing networking with students.

Having previously worked with and supported National Charitable Trusts EY Foundation and Nuffield Research since 2021 with two high profile employability schemes targeted at young people, the development and continuation of work in widening participation using Work Experience strengthened the collaborative relationships between WMG and the organisations. The project also strengthened our relationship with STEM Learning, a national learning centre committed to STEM education and the Faculty of SEM's Work Experience Working Group, a newly created team based in the university across departments with interest in developing and delivering work experiences within SEM and creating a community that can support others in this work.

4.6 Conclusions

This document stands as a guide for all departments across the University of Warwick and further, wanting to host work experiences for young people. The authors have used their experience to suggest three Work Experience Models; Guided, Blended, and Independent, that can be used to create a week, or two, experience for any young person between the ages of 14 and 20. The models are tailored based on a young person's ability, availability of the host and the department's access to resources.

The project 'Addressing social mobility issues in STEM through the development of WMG's Research Culture and contribution to the wider University of Warwick Community', was a year-long ERC-funded project which successfully improved the Research Culture of WMG and contributed to the wider University of Warwick and local communities.

Chapter 1 outlined the aims of the project, signposting to the University's Access and Participation plan and UK Government's R&D People and Culture Strategy and explored the UK's Research Culture. Starting with conducting in-depth research into the impact of lower socio-economic standing on young people's interest and access within STEM in **Chapter 2**, a 'crunch period' was identified, with young people gradually tending to lose STEM interest from age 15 due to negative perceptions of STEM as well as lack of access to information, advice and guidance, exciting out-of-school opportunities, and hands-on applications within school.

Chapter 3 explains how creating a leadership position for WE allowed the PI to recruit a team within WMG, and then equip them with personal and group training ready to implement bespoke Work Experience programmes, based on three distinct models (Guided, Blended, and Independent), designed for young people from difficult or lower socio-economic backgrounds. **Chapter 4** outlined how the Research Culture of the University was improved. During this project, many WMG staff, external charitable trusts, contractors and organisations and young people from the local community have engaged with WMG through the development of WMG-led WE Strategy.

Going forward, the PI aims to further this by collaborating with representatives from the Mathematics Institute and Physics departments, in a 2023-24 bid for ERC funding. The objectives of a future project include collaborating with these departments to create and deliver a cross-faculty WE programme, reaching more staff members across the three departments (WMG, Mathematics Institute, and Physics) through team building and personal development opportunities and increasing the opportunities available for local students to participate in a rich and rewarding STEM-based WE programme, designed to inspire them to remain within STEM for their future career.

The outcome of this guide is to produce a university-wide standardised and streamlined system to organise WE placements.

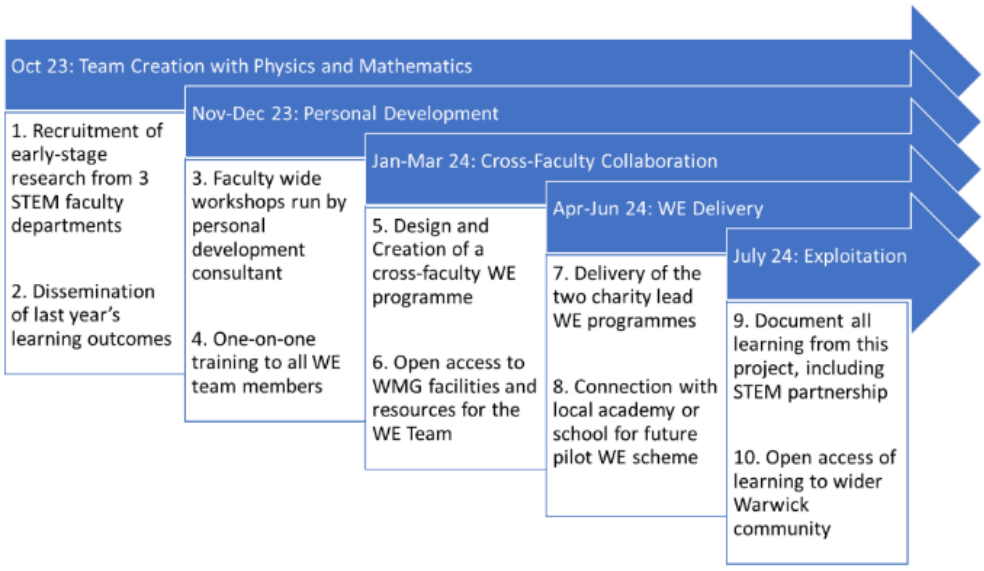

Figure 16 – Next steps for the WE programme at WMG

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